Draft for OMB Review

Regulatory Impact Analysis

USEPA's 2008 Final Rule Amendments
To The Industrial Recycling Exclusions
Of The RCRA Definition Of Solid Waste

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Prefatory Notes

- ### RIA Pedigree

This Regulatory Impact Assessment (RIA) is a revised and updated version built upon two prior consecutive RIAs from 2003 and 2007, in support of the USEPA Office of Solid Waste's (OSW) development of the final rule amendments to the RCRA Definition of Solid Waste (DSW). The 27 June 2003 RIA (document ID nr. EPA-HQ-RCRA-2002-0031-0002, 274 pages) is available from the Federal regulatory docket at http://www.regulations.gov in support of OSW's 28 October 2003 DSW proposed rule available at: http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/abr-rule.pdf. The 22 January 2007 RIA (EPA-HQ-RCRA-2002-0031-0357, 284 pages) is available at: http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/ria.pdf in support of OSW's 26 March 2007 DSW supplemental re-proposal available at: http://www.epa.gov/EPA-WASTE/2007/March/Day-26/f5159.htm. Both the 2003 RIA and the 2007 RIA were subject to public review, and this RIA includes revisions made by Mark Eads (OSW Economist) to remedy deficiencies and address enhancements suggested by public commentors. This RIA includes updated unit cost data and impact spreadsheet calculations prepared by DPRA Incorporated as sub-contractor to Industrial Economics Inc. under FY2008 Work Assignment Number 1-21 of USEPA Contract Number EP-W-07-011. Mark Eads was the FY2008 Work Assignment Manager.

- ### Peer Review of this RIA

Although RIAs do not normally require peer review according to USEPA's peer review guidance1, prior drafts of this 2008 RIA have been subject to four independent external reviews outside of OSW, at least one of which (i.e., Economics Subgroup item 2 below) may be considered peer review. Peer review is conducted by qualified individuals (or organizations) independent of those who performed the work, and who are collectively equivalent in technical expertise (i.e., peers) to those who performed the original work. Peer review is an in-depth assessment of the assumptions, calculations, extrapolations, alternate interpretations, methodology, acceptance criteria, and conclusions pertaining to the specific major scientific and/or technical work product and of the documentation that supports them.

1. <u>Industry review:</u> Both the prior 2003 and 2007 RIAs for the DSW rulemaking were subject to public review and comment

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1 Concerning peer review of RIAs, USEPA's 2006 peer review guidance states "*Generally, if a RIA applies accepted, previously peer-reviewed methods in a straightforward manner, it would not undergo an additional peer review. RIAs prepared to support "major" or "economically significant" regulations typically do not utilize innovative or untried economic methods. It is unnecessary to conduct peer reviews of straightforward applications or transfers of accepted, previously peer-reviewed economic methods or analyses. The procedures used to transfer or adapt an economic work product are generally established by separate economic guidance documents which have be peer reviewed. Therefore, RIAs that are developed using these procedures do not normally undergo an additional peer review, even those prepared in support of "major" and "economically significant" rules.*" Source: Section 2.2.6 (page 35) of USEPA Science Policy Council, "Peer Review Handbook", 3rd Edition, document ID nr. EPA/100/B-06/002, May 2006, http://www.epa.gov/peerreview/pdfs/Peer%20Review%20HandbookMay06.pdf.

according to the Administrative Procedure Act Federal agency rulemaking requirements. However, USEPA's peer review guidance does not classify public review as peer review.2

2. USEPA Economics Subgroup review: The 27 May 2004 USEPA memorandum from Steve Johnson (now USEPA Administrator) titled "Improving EPA's Action Development Process", established beginning in 2004 a new "Economics Subgroup" process for each USEPA economically significant rule (http://www.epa.gov/ocir/hearings/testimony/108_2003_2004/2004_1117_slj.pdf). Mark Eads, OSW Economist, convened on 17 March 2005 an internal USEPA "Economics Subgroup" to oversee and review the design and execution of the 2007 RIA and this RIA. The Subgroup consisted of nine USEPA employees from OSW, OPEI (http://www.epa.gov/opei), and ORD (http://www.epa.gov/ord), four of whom are Economists. Special thanks to Robin Jenkins (OPEI Economist) of this Subgroup for exceptional review efforts on prior drafts of this RIA.
3. USEPA-OPEI review: In March 2008, OSW provided the draft DSW final rule package including a March 2008 draft of this RIA to USEPA's Office of Policy, Economics & Innovation for review and comment prior to sending to OMB.
4. OMB review: OPEI provided the DSW final rule package including a March 2008 draft of this RIA, to OMB-OIRA for 90-day review (April, May, and June 2008) according to Executive Order 12866 (Section 6(b)(2)(B)). OSW addressed OMB's comments by making appropriate edits and revisions as reflected in this finalized RIA.

- **Discount Rate Applied in this RIA**

The average annual economic impact estimates in this RIA are mathematically formulated in the first instance without discounted present value computations. Consequently, for the most part, the average annual impact estimates in this RIA are not sensitive to either the 3% or 7% discount rate prescribed for Federal regulatory analyses in OMB's September 2003 Circular A-4 "Regulatory Analysis" (http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf). OSW's 22 January 2007 version of this RIA (284 pages at: http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/ria.pdf) applied 7% and 15% discount rates for computing the present value and average annualized value of capital and O&M investment costs for onsite materials recovery/ recycling units (plant & equipment), but estimation of future new investment in onsite recovery/ recycling as a result of the DSW final rule, is not included in the scope of this RIA because industry public commentors on the 2007 RIA indicated such investment is not likely for reasons cited in this RIA.

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2 Concerning public review, USEPA's 2006 peer review guidance states "*Peer review and public comment are not the same. Public comment solicited from the general public through the Federal Register or by other means is often required by the Administrative Procedure Act, other relevant statutes or both. Public comment may also be solicited for policy purposes. The Agency takes public comment on some strictly scientific products and almost all regulatory decisions. Public commenters usually include a broad array of people with an interest in the technical analysis or the regulatory decision; some are scientific experts (who may provide some peer input), some are experts in other areas, and some are interested non-experts. The critical distinction is that public comment does not necessarily draw the kind of independent, expert information and in-depth analyses expected from the peer review process. Public comment is open to all issues, whereas the peer review process is limited to consideration of specified technical issues. While it may be an important component of EPA's decision making process, public comment does not substitute for peer review.*" Source: ibid, section 1.2.8 (page 14).

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Chapter 1
Summary & Major Findings

Note: The word industrial "*recycling*" is used in this RIA as a generalized term which is not necessarily synonymous to "*recovery*" or "*reclamation*". "*Recycling*" typically involves a series of industrial activities, including storage and other handling steps that culminate in the production of a valuable end product of some kind. Thus if industrial secondary materials need to be *reclaimed* in order to produce a valuable intermediate or end product, the industrial *reclamation* activity can be thought of as one step in the overall industrial *recycling* process.

This RIA does not include "*burning waste for energy recovery*" or "*blending waste for use as fuel*" within the scope of the usage of the word *recycling*, because those industrial activities are not eligible for exclusion from RCRA regulation under the 2008 DSW amendments final rule. However, some state government have classified "*energy recovery*" and "*fuel blending*" as forms of recycling. Although not included in the "*recycling*" impact estimates, this RIA does include both energy recovery and fuel blending in the scope of potential impacts of the DSW final rule, on baseline hazardous waste "*disposal*" methods.

1A. Purpose of the 2008 DSW Final Rule

The purpose of OSW's 2008 final rule amendments to the RCRA "Definition of Solid Waste" (DSW), is to revise and clarify the RCRA definition of solid waste (40 CFR 261.2) as it pertains to certain types of hazardous secondary materials that will no longer be considered "solid wastes" subject to hazardous waste regulation under RCRA Subtitle C. OSW initiated this revision to the DSW for the reasons described in Chapter 2 "Statement of Regulatory Need" of this RIA. The DSW revisions final rule builds on:

- 2003 OSW's 28 October 2003 proposal (Federal Register, Vol.68, No.208, pp. 61558-61599): http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/abr-rule.pdf
- 2007 OSW's 26 March 2007 DSW supplemental re-proposal (Federal Register, Vol.72, No. 57, pp.14172-14218): http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/fr3-26-07.pdf

1B. Scope of the 2008 DSW Final Rule

As summarized in Exhibit 1A below, there are four basic elements of the 2008 DSW amendments final rule: it adds three recycling exclusions to the 16 existing DSW recycling exclusions at 40 CFR 261 for three categories of industrial recycling involving hazardous secondary materials (i.e., spent materials, listed sludges, and listed byproducts), plus the rule codifies "*legitimate recycling*".

Exhibit 1A **Four Main Components of OSW's 2008 DSW Amendments Final Rule**			
Item	Final Rule Component	Amendments to 40 CFR 260 RCRA DSW Exclusions	Brief Description
1	**Exclusion 1**: Generator controlled recycling for: 1A. Land-based units* 1B. Non-land based units**	261.4(a)(23) land-based units exclusion 261.2(a)(2)(ii) non-land based units exclusion 260.42 Notification 260.10 Definitions	Generated and legitimately recycled within the US or its territories under the control of the generator: 1. Onsite in land*- or non-land** units at the generating facility, or 2. Offsite within the same company, or 3. Pursuant to a written agreement between an offsite tolling contractor and the generator.
2	**Exclusion 2**: Transfer-based recycling	261.4(a)(24) Exclusion 261.4(a)(25) Exports 260.42 Notification	1. Generated and subsequently transferred offsite to a different company, or 2. Exported to a foreign country for recycling.
3	**Exclusion 3**: Case-by-case variance for "non-waste determination"	260.30 materials eligible for variances 260.33 variance procedures 260.34 variance standards & criteria	1. Materials reclaimed in a continuous industrial process, or 2. Materials indistinguishable in all relevant aspects from a product or intermediate,.
4	Codification of RCRA "***Legitimate Recycling***" criteria	261.2(g)	• The DSW final rule specifies two of the four industrial recycling "legitimacy" criteria described in the 2003 and 2007 DSW proposals as "requirements" which "must" be met: 1. Hazardous secondary material being recycled provides a useful contribution to the recycling process or to the product of the recycling process (261.2(g)(2)(i)), and 2. Product of the recycling process is valuable (261.2(g)(2)(ii)) • The DSW final rule specifies the other two "legitimacy" factors "need to be considered" and "should" be met in making legitimate recycling determinations: 3. Hazardous secondary material to be recycled is managed as a valuable commodity (261.1(g)(3(i)), and 4. Products of the recycling process do not contain significant concentrations of hazardous constituents (a) not found in analogous products or (b) at elevated levels found in analogous products, or (c) exhibit D001 ignitability, D002 corrosivity, D003 reactivity, or D004 toxicity leaching hazardous characteristics that analogous products do not exhibit (261.1(g)(3)(ii)).
Explanatory Notes: * Land-based units = landfill, surface impoundment, pile, injection well, land treatment, salt dome formation, salt bed formation, mine, cave, lagoon, pond, reservoir, unlined sump, pit, shaft, trench, trough, sink hole. ** Non-land based units = tank, tank system, container, containment building, industrial furnace, incinerator, boiler, kiln, oven, pad, thermal treatment device (e.g., sludge dryer, distillation column), sump (e.g., lined pit, lined shaft, lined reservoir, lined trough, lined trench), totally-enclosed equipment directly connected to an industrial production process (e.g., pipes), loading dock, vessel.			

1C. Summary of Expected Net Cost Savings to Industry for the DSW Final Rule

Exhibit 1B below presents this RIA's estimated average annual net cost savings to industry--- taking into account the new costs to exclusion-eligible industrial facilities to comply with the implementation conditions for the exclusions --- for the aggregate national impact of the three DSW exclusions in the 2008 DSW final rule.

> Note: The scope of economic impacts estimated in this RIA includes the three DSW final rule exclusions but not the legitimate recycling criteria for the reason explained in Chapter 3 (Section 3C) of this RIA.

Exhibit 1B
Expected Annual De-Regulatory Net Cost Savings to Industry for the 2008 DSW Final Rule

A	B	C	D	E (B+C+D)
Impact Metric	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Transfer-Based Recycling	Exclusion 3: Case-by-Case Variance	Combined Impact (Exclusions 1+2+3)
1. Count of RCRA-regulated industries affected (2005)	70	211	Not estimated	**281**
2. Count of RCRA-regulated facilities affected (2005)	308	5,182	74*	**5,564**
3. Million tons per year of RCRA hazardous wastes affected (2005)	0.506	0.910		**1.537**
4. Cost savings to facilities subject to the rule:	($millions/year)	($millions/year)	($millions/year)	($millions/year)
4a. Net industry savings from de-regulating baseline recycling =	$6.8	$70.6	$1.3	$78.6 (82%)
4b. Net industry savings from disposal switchover to recycling =	Not estimated	$16.7	Not estimated	$16.7 (18%)
Subtotal direct impacts (4a+4b) =	$6.8 (7%)	$87.3 (92%)	$1.3 (1%)	**$95.3 (100%)**

Explanatory Notes:

- Source: The de-regulatory industry cost savings net impact estimates summarized in this Exhibit are from **Chapter 9** of this RIA.
- * 74 variances correspond to the average annual number of affected facilities for an arithmetic series of 7 variances per year over a future 20-year period.

1D. Summary of Other Findings of this RIA

- **De-Regulatory Cost Savings to Industrial Generators of Affected Secondary Materials**

- 5,564 affected total industrial facilities, which represents 31% of the 17,741 LQG+TSDF RCRA 2005 universe facilities
- $95.3 million per year future annual net cost savings to industry:
  - 82% of impact: $78.6 million/year savings from de-regulating baseline recycling
  - 18% of impact: $16.7 million/year savings from expected induced switchover of baseline disposal to recycling
- Cost savings for de-regulation of 1.537 million tons per-year of hazardous secondary materials currently managed as RCRA hazardous wastes, which represents 3.5% of the 43.9 million tons/year 2005 RCRA hazardous waste management universe:
  - 98% of impact: 1.514 million tons/year from de-regulating baseline recycling
  - 2% of impact: 0.023 million tons/year from expected induced switchover of baseline disposal to recycling
- These impact estimates reflect the highly skewed[3] national distribution of hazardous waste annual tonnage; if the largest waste generators can take advantage of a DSW exclusion, then most of the industry cost savings will likely be realized.
- Top-5 affected economic sub-sectors (2-digit NAICS) = 86.9%:
  1. 48.3% NAICS 33 manufacturing
  2. 27.7% NAICS 32 manufacturing
  3. 4.2% NAICS 92 public administration
  4. 3.7% NAICS 61 educational services
  5. 3.0% NAICS 54 professional, scientific & technical services
- Top-5 affected industry groups (4-digit NAICS) = 24.3%:
  1. 7.0% NAICS 3344 semiconductor & electronics mfg
  2. 5.1% NAICS 3251 basic chemical mfg
  3. 4.3% NAICS 3328 coating, engraving, & heat treating mfg
  4. 4.1% NAICS 3254 pharmaceutical & medicine mfg
  5. 3.8% NAICS 3364 aerospace product & parts mfg

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3 Skewness = Skewness is a measure of data symmetry, or more precisely, the lack of symmetry. A distribution, or data set, is symmetric if it looks the same to the left and right of the center point of the data range. Source: National Institute of Standards and Technology, "Section 1.3.5.11. Measures of Skewness and Kurtosis" in the Engineering Statistics Handbook at: http://www.itl.nist.gov/div898/handbook/eda/section3/eda35b.htm

According to the "*National Analysis*" summary statistics presented in each biennial data year issue (i.e., 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005) of OSW's RCRA Hazardous Waste Biennial Report (http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm), the universes of RCRA-regulated hazardous waste (a) generators, (b) managers, (c) shippers, and (d) receivers are skewed according to three complementary numerical indicators of skewness based on annual tonnage hazardous waste generated in each data year (illustrative percentages below based on 2005 data year universe of 38.347 million tons generated by 16,191 LQG generator facilities in around 600 NAICS 4-digit generator industries in 56 US states/tribes/territories):

- Facility skewness: Top-1 facility generated 11%; top-5 facilities generated 30% .
- Industry skewness: Top-1 industry (NAICS 3251: Basic Chemical Mfg) generated 55% ; top-5 industries generated 81% .
- State location skewness: Top-1 state (TX) generated 40% ; top-5 states (TX, LA, OH, MS, IL) generated 67% .

- **Increased Industrial Recycling**

- Resource Recovery: Both of OSW's 2003 and 2007 DSW proposals asserted this action will encourage resource recovery:

  "*This regulatory initiative is thus consistent with the Agency's longstanding policy of encouraging the recovery and reuse of valuable resources as an alternative to land disposal.*" (Source: p.61560 of 28 Oct 2003 DSW FR notice, and p.14175 of 26 March 2007 DSW FR notice).

  - $4.7 million/year market value of potentially recoverable materials (e.g., metals, solvents, other chemicals) contained in 2.085 million tons/year baseline disposed RCRA hazardous wastes evaluated in this RIA for potential switchover from disposal to future recycling.
  - Induced new industrial recycling switchover from baseline disposal could involve 23,000 tons per year, representing:
    - 2% of the annual tonnage impact of the rule
    - 18% of the annual net cost savings to industry from the rule
    - 1.1% increase above the 2005 baseline 2.045 million tons per-year hazardous waste recycling (i.e., 1.1% increase above the 1.420 million tons metals recovery + 0.297 million tons solvent recovery + 0.328 million tons other materials recovery reported in the 2005 Biennial Report)
  - 2,440 industrial facilities may switchover from baseline disposal to future recycling.

- Resource Conservation: Both of OSW's 2003 and 2007 DSW proposals asserted this action will encourage resource conservation:

  "*It is also consistent with one of the primary goals of the Congress in enacting the RCRA statute (as evidenced by its name), and with the Agency's vision of how the RCRA program could evolve over the longer term to promote sustainability and more efficient use of resources.*" (Source: p.61560 of 28 Oct 2003 Federal Register DSW initial proposal, and p.14175 of 26 March 2007 Federal Register DSW supplemental proposal).

  - 902 tons per year of 14 virgin materials (i.e., 6 virgin metals, 7 virgin solvents, 1 other virgin material) may be conserved in the future as a result of disposal switchover to recycling under the DSW rule:
    - 123 tons/year metals (chromium, copper, lead, molybdenum disulfide, nickel, zinc)
    - 345 tons/year solvents (acetone, alkyl benzenes, C9-C10 alkyl benzenes, methanol, methyl ethyl ketone, toluene, xylene)
    - 102 tons/year other materials (carbon)
  - $4.7 million/year market value of 14 virgin materials conserved (i.e., production of 14 virgin materials displaced by baseline disposal switchover to recycling induced by the DSW final rule).

- ## Distributional Effects

Exhibit 1C below presents potential distributional effects on 23 industries, consisting of 8 industries directly affected by the rule by being engaged in or supporting recycling and subject to the terms of the rule, and 15 industries possibly indirectly affected by the rule but not engaged in or supporting recycling nor subject to the terms and conditions of the rule.

Exhibit 1C
Potential Direct & Indirect Distributional Effects on 23 Industries

A	B	C	D	E	F
Item	NAICS industry code	Industry Identity	Count of facilities affected	Average annual distributional effect on industry sales revenues	Distributional effect as % average annual facility revenues
A. Direct Distributional Effects on Industrial Facilities Engaged in or Supporting Recycling and Subject to the Terms of the Rule					
		A. Hazardous waste recovery/recycling:			
1	331492	H010 metals recovery (secondary smelting nonferrous metals)	96	-$21,892,500	-1.995%
2	562211	H020 solvent recovery	57	-$2,353,300	-0.422%
3	562211	H039 other materials recovery (carbon in this RIA)	36	-$6,508,400	-1.845%
		B. Intermediate (middlemen) waste/materials distribution			
4	562998	Waste & recycling brokerage facilities	Up to 164	$0*	0%*
5	562998	Waste & materials transfer facilities (storage & consolidation)	Up to 1,473	$0*	0%*
6	562998	Waste & materials sorting facilities	Up to 1,233	$0*	0%*
7	42393	Industrial recyclable materials wholesale distribution facilities	Up to 16	$0*	0%(
8	562112	C. Hazardous waste transportation services (trucking)	Up to 358	-$46,511,300	-2.192%
B. Indirect Distributional Effects on Industrial Facilities Not Engaged in Recycling Nor Subject to the Terms of the Rule					
		D1. Hazardous waste beneficial disposal (H050 & H061 energy recovery):			
9	21223	Copper, lead, nickel & zinc mining	1	-$27,400	-0.036%
10	3241	Petroleum & coal products mfg	2	-$31,900	-0.018%
11	325	Chemical mfg	3	-$47,900	-0.051%
12	327	Nonmetallic mineral product mfg (i.e., cement mfg)	20	-$355,900	-0.303%
13	493	Warehousing & storage	1	-$12,200	-1.325%
14	561	Administrative support services	1	-$9,100	-1.506%
15	562	Waste management & remediation	15	-$273,700	-0.629%
		D2. Hazardous waste non-beneficial disposal:			
16	562211	H132 landfill or surface impoundment disposal	44	-$8,460,200	-3.324%
17	562211	H134 deepwell injection disposal	0	$0	0%
18	562211	H040, H071 to H131, H135 other non-beneficial disposal methods	88	-$648,700	-0.096%
19	562212	E. Non-hazardous waste disposal (displaced by switchover to recycling)	Up to 2,012	+$943,500	+0.014%
		F. Virgin materials production (displaced by disposal switchover to recycling):			
20	331492	Virgin metals production (primary smelting nonferrous metals)	Up to 172	-$3,680,400	-0.156%
21	325199	Virgin solvent production (all other basic organic chemical mfg)	Up to 685	-$578,900	-0.001%
22	325188	Virgin other materials production (carbon black mfg)	Up to 25	-$438,500	-0.0004%

23	2121	G. Coal mining (to replace lost H050 & H061 energy recovery rows 4 to 10)	Up to 1,190	+$191,800	+0.0012%

Explanatory Notes:
- Source: This exhibit summarizes the distributional effect estimates presented in **Chapter 10** (Exhibits 10B & 10C) of this RIA.
- * This RIA assumes no net inter-industry distributional effects on intermediate middlemen because they handle both hazardous and non-hazardous wastes/materials.

- **Small Business Impacts (1980 Regulatory Flexibility Act[4])**

  - Because the DSW final rule exclusions are voluntary, as well as deregulatory, there is no expected direct adverse impact to small entities subject to the DSW rule (industrial waste generators and TSDFs are subject to the rule's requirements).
  - Compared to LQGs, SQGs most likely have a smaller number of hazardous constituents in their waste and thus may have a technical advantage for their hazardous wastes to be recycled. Ninety percent (90%) of facilities in a 1996 OSW national survey of TSDFs reported that between 10 and 60 hazardous chemical constituents are present in RCRA hazardous wastes they manage (i.e., in hazardous wastes TSDFs receive from LQGs and SQGs or generate themselves). Over one-third of all TSDFs surveyed reported between 10 and 20 hazardous chemical constituents. The highest number of constituents reported for a single waste stream was 287. Each of the 15 most prevalent constituents occurred in 20% of large waste streams: five heavy metals (lead, chromium, cadmium, barium, arsenic) and 10 organic chemicals (toluene, xylenes, benzene, acetone, methyl ethyl ketone, methylene chloride, ethyl benzene, methanol, methyl isobutyl ketone, ethyl acetate). Waste streams reported in the survey carry a total of 724 different chemical constituents. This survey suggests that most LQGs must address a relatively higher number of hazardous constituents in developing their waste management approaches such as recycling, compared to SQGs (source: see Chapter 3 of the OSW "National Hazardous Waste Constituent Survey Summary Report", Oct 1998: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/pdf/summary.pdf; complete survey data are available as item (4) at: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm.).

1E. Sensitivity Analysis

Not revealed in the impact estimates (i.e., annual industry net cost savings) of this RIA are uncertainties in numerical values for computation factors. These uncertainties are not transparent because this RIA assigns single point values to numerical factors applied in the impact computations, rather than numerical uncertainty ranges (e.g., lower-bound, most-likely, and upper-bound). As defined and derived in **Chapter 12** of this RIA, there are nine impact estimation uncertainty factors which deserve highlighting how they may influence the magnitude of future annual impacts of the DSW final rule. Exhibit 1D below presents how each of the uncertainty

4 Since its enactment in 1980, the RFA has required every Federal agency to prepare "regulatory flexibility analyses" for any public notice-and-comment regulation (i.e., proposed rule) it issues, unless the agency certifies that the proposed rule "will not, if promulgated, have a significant economic impact on a substantial number of small entities" (i.e., SISNOSE) subject to the terms and conditions of the rule. The 1996 SBREFA amendment to the RFA strengthened the RFA's analytical and procedural requirements. For additional information about RFA/SBREFA see: http://www.epa.gov/sbrefa

factors could affect the actual economic impacts of the DSW final rule in any given future year. Negative percentages for each uncertainty factor indicate the relative magnitude of possible decrease in future annual impacts (i.e., possible impact over-estimation in this RIA), and positive percentages for each factor indicate the relative magnitude of possible increase in future annual impacts (i.e., possible impact under-estimation in this RIA). These nine factors are not necessarily additive (i.e., compounding) in any given year, and some factors are over-lapping (e.g., factors #3, #4, and #6 are sub-components in part or in whole of factor #2).

Exhibit 1D
Sensitivity of Annual Impact Estimate to Nine Uncertainty Factors

	A	B	C	D	E
Item	Type of Impact Uncertainty Factor	Numerical Uncertainty Range in Factor*		Impact Estimate Range** ($millions/year)	
0	RIA annual impact estimate for Exclusions 1 + 2 + 3 (w/out uncertainty applied) =			**$95.3**	
	Uncertainty ranges =	Low-end	High-end	Low-end	High-end
1	State government adoption uncertainty	-23%	0%	$73.6	$95.3
2	Future fluctuation in annual tonnage of affected materials (3 major components):	-57%	+45%	$41.0	$138.2
3	a. Within-year tonnage discrepancy between generation & management of affected materials	-34%	+39%	$62.9	$132.5
4	b. Future annual economic growth of US industrial output	0%	+5.6%	$95.3	$100.6
5	c. Data quality assurance (already de-regulated wastes may be in Biennial Report database)	-0.7%	0%	$94.6	$95.3
6	Indirect inclusion of SQGs in baseline (rather than direct inclusion)	+1.6%	+2.4%	$96.8	$97.6
7	Physical/chemical quality of secondary materials for viable recovery/recycling	-21%	0%	$75.3	$95.3
8	Expected accuracy of impact estimates	-20%	+30%	$76.2	$123.9
9	Change in future market price of commodities recovered from DSW-excluded materials	-50%	+50%	$94.2	$98.1
	Overall minimum and maximum range indicated across all uncertainty factors =			**$41.0**	**$138.2**

Explanatory Notes:
- * Definitions and calculations for each sensitivity factor provided in Chapter 12 of this RIA.
- ** Columns D & E:**:**
  - Rows 1 to 8: Low and high impact ranges calculated by multiplying the annual impact estimate (row 0), by the percentages in columns B & C.
  - Row 9: Low- and high-end impact ranges calculated by changing the prices applied within the impact estimation spreadsheets for this RIA.

Chapter 2
Statement of Regulatory Need & Executive Order 13422 Problem Statement

This chapter traces the historical origin of the need for this regulatory form, in the form of a 1992 task force and a series of 1987-2000 court decisions on the subject, followed by more recent environmental policy, industrial comments, and independent studies which also established the need and provided both a theoretical and empirical context for the final rule amendment to the RCRA Definition of Solid Waste.

2A. 1992 Task Force Recommendation to Improve RCRA Recycling Regulations

OSW's ambition to re-examine the 40 CFR 261 RCRA "Definition of Solid Waste" (DSW) dates back to October 1992 when it formed the "Definition of Solid Waste Task Force", which published recommendations for developing new DSW regulations in November 1994. The DSW Task Force was formed in response to a recommendation in the July 1992 update to the RCRA Implementation Study (RIS)[5], which concluded that:

> *RCRA Subtitle C regulations are difficult to understand and apply, and that the rules do not regulate [industrial hazardous waste] recycling consistently.*

The RIS update recommended developing policy options that would improve how RCRA recycling regulations address environmental risks while reducing barriers to industrial recycling. The 2008 DSW final rule reduces barriers to recycling by adding three new regulatory exclusions for industrial recycling to the 16 existing DSW industrial recycling exclusions listed in Exhibit 2A below.

Exhibit 2A
16 Current Industrial Recycling Exclusions from the 40 CFR 261 RCRA Definition of Solid Waste (as of 2007)

Item	Year	40 CFR	Abbreviated Description of Exclusion (see http://www.gpoaccess.gov/cfr for complete descriptions & conditions)
1	1985	261.2(e)(i)	Materials used or reused as ingredients in an industrial process to make a product without being reclaimed
2	1985	261.2(e)(ii)	Materials used or reused as effective substitutes for commercial products
3	1985	261.2(e)(iii)	Materials returned as a feedstock to the industrial process from which generated without being reclaimed or land disposed
4	1985	261.4(a)(6)	Pulping liquors that are reclaimed in a pulping liquor recovery furnace and then reused in the pulping process

5 RIS = EPA Publication Number: 530-R-92-021. This document is not currently available in electronic format. RCRA Online Number: 50309. Title: "RCRA Implementation Study Update: The Definition of Solid Waste", 15 July 1992; Description: Reexamines the EPA definition of solid waste in an attempt to clarify EPA's RCRA mandate. Explores resource recovery, recycling regulations, and implementation issues, and presents a plan for change. Summarizes meetings held to solicit industry, interest group, and other government branch input on the definition of solid waste and hazardous waste recycling regulations (source: http://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/1ab72d5921fa644c85256a7e00762b62!OpenDocument).

Exhibit 2A 16 Current Industrial Recycling Exclusions from the 40 CFR 261 RCRA Definition of Solid Waste (as of 2007)			
Item	Year	40 CFR	Abbreviated Description of Exclusion (see http://www.gpoaccess.gov/cfr for complete descriptions & conditions)
5	1985	261.4(a)(7)	Spent sulfuric acid used to produce virgin sulfuric acid
6	1986	261.4(a)(8)	Materials reclaimed and returned to the original process(es) in which generated for reuse in production if entire process is closed by tanks, pipes or other enclosed conveyance, if reclamation doesn't involve combustion.
7	1990	261.4(a)(9)	Spent wood preserving solutions that have been reclaimed and reused for their original intended purpose
8	1991	261.4(a)(10)	K060, K087, K141, K142, K143, K144, K145, K147, K148 wastes recycled to coke ovens or tar recovery
9	1991	261.4(a)(11)	Recovered non-wastewater splash condenser dross residue of K061 treatment in metals recovery units
10	1994	261.4(a)(12)	Petroleum refinery oil-bearing sludges, byproducts or spent materials inserted into the refining process
11	1997	261.4(a)(13)	Scrap metal being recycled
12	1997	261.4(a)(14)	Circuit boards being recycled if stored prior to recovery and free of mercury, nickel-cadmium & lithium
13	1998	261.4(a)(17)	Spent materials generated by the primary mineral processing industry for recovery of minerals, acids, etc.
14	1998	261.4(a)(18)	Petrochemical oil recovered from organic chemical manufacturing if oil is inserted into petro-refining process
15	1998	261.4(a)(19)	Spent caustic solutions from petroleum refining used as feedstock to produce cresylic or naphthenic acid
16	2002	261.4(a)(20)	Hazardous secondary materials used to make zinc micronutrient fertilizers

2B. 1987-2000 Court Decisions Direct USEPA to Restructure the RCRA DSW Regulations

In addition to the purpose of removing regulatory barriers to industrial recycling, OSW also initiated this final rule partially in response to a 1987 to 2000 series of seven decisions by the US Court of Appeals for the DC Circuit[6], which, taken together, have provided OSW with additional direction regarding RCRA regulatory exclusion of industrial recycling. This final rule represents an important addition to and restructuring of the 40 CFR 261 RCRA DSW regulations that:

- Distinguish "wastes" from non-waste (i.e., not "discarded") materials for RCRA regulatory purposes,
- Ensure environmental protections over industrial hazardous secondary materials recycling practices, and
- Codify the concept of "legitimate recycling" which has been a key component of RCRA's hazardous waste regulatory program, but which has been implemented by USEPA regional offices and RCRA-authorized state governments without

6 Pages 61562 to 61563 of the Federal Register announcement for OSW's 28 Oct 2003 proposed revisions to the RCRA "Definition of Solid Waste" provide a synopsis of the following seven 1987-2000 series of DC Circuit Court decisions: http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/abr-rule.pdf

- 1987: American Mining Congress v. USEPA ("AMC I")
- 1990: American Petroleum Institute v. USEPA ("API I")
- 1990: American Mining Congress v. USEPA ("AMC II")
- 1993: US v. ILCO
- 1994: Owen Electric Steel Co. v. USEPA
- 2000: American Petroleum Institute v. USEPA ("API II")
- 2000: Association of Battery Recyclers v. USEPA ("ABR")

criteria.

The DSW final rule is de-regulatory in nature because it excludes certain recyclable materials that have heretofore been subject to RCRA hazardous waste regulations, from Subtitle C regulation as hazardous waste. The factors for defining "legitimate" recycling codify existing principles. The DSW final rule is not intended to bring new wastes into the RCRA regulatory system.

2C. USEPA Policy to Encourage Resource Recovery

By removing hazardous waste regulatory controls over certain industrial recycling practices, and by providing more explicit criteria for determining the "legitimacy" of industrial recycling practices in general, USEPA expects that this final rule will encourage the safe, beneficial recycling of additional hazardous secondary materials. This regulatory initiative is thus consistent with the USEPA-OSWER's longstanding policy of encouraging the recovery, recycling, and reuse of valuable resources as an alternative to discard and disposal as waste, while at the same time maintaining protection of human health and the environment. It also is consistent with the primary "resource conservation" goal of the Congress in enacting the RCRA statute (as evidenced by the RCRA statute's name: Resource Conservation & Recovery Act), and with OSW's vision of how the RCRA program could evolve over the long-term to promote economic sustainability and more efficient use of resources.[7]

2D. Industry Commentors on 2003 & 2007 DSW Proposals Identify RCRA Barriers to Recycling

OSW received in public comments on the October 2003 and March 2007 DSW proposals, corroborating evidence that the DSW final rule may stimulate additional industrial recycling. Following are para-phrased excerpts explaining how recycling of specific types of industrial secondary materials might be stimulated as identified by public commenters. (Source: para-phrased from comments by IPC Association of Connecting Electronics Industries, Commentor ID nr. 2002-0031-0458 and Chevron Corp, Commentor ID nr. 2002-0031-0464, available at http://www.regulations.gov). Summarization of these public comments in this RIA does not constitute OSW endorsement of their content, authors, or sponsoring organizations.

1. Solder: *Solder dross, a byproduct of the soldering process, is sent back to the solder manufacturers and returned to electronics facilities and other solder users. Due to designation as a hazardous waste by many states, solder is infrequently recycled or reclaimed from used electronic components and sweatables (wipers, lead-bearing Q-tips, solder tips, rollers, and personal protective equipment contaminated with solder). Reclamation by the solder manufacturer would occur more frequently if the regulatory barriers were reduced or removed. Sludge*

7 OSW's long-term "vision" of the future of the RCRA waste management program is discussed in the document "Beyond RCRA: Prospects for Waste and Materials Management in the Year 2020," which is available on USEPA's website at: http://www.epa.gov/epaoswer/osw/vision.htm

from the stencil wash evaporator process can also be sent to the solder manufacturer for reclamation and would be done more frequently under less burdensome regulatory schemes.

2. Copper: *Copper containing drill dust (approximately 10% copper) and edger dust (20-25%copper) generated during the manufacture of PCBs is generally not recycled because of the high cost of shipment as compared to landfill disposal. Under the DSW rule this secondary material could be easily combined with copper containing sludge for more efficient shipment and recycling.*

3. Vanadium: *The primary manufacturing process for vanadium production in the US is to adsorb raw vanadium from oil, extract the vanadium from the adsorbent, and produce vanadium products. This sequence of processes occurs at multiple industry sites as do many manufacturing chains today. However, since the adsorbent was also considered to be "spent" in its function as a petroleum catalyst, it was listed as a hazardous waste whether or not it was disposed or processed in the vanadium manufacturing chain. The result of the listing has been that the manufacturing chain became uneconomical for many vanadium sources and the adsorbent containing raw vanadium has been increasingly disposed of as hazardous spent catalyst (K172). The DSW rule may reverse the negative consequences of the listing with its proposal to clarify when a material is not a waste. Over time we anticipate more material containing vanadium will leave the disposal stream and enter the manufacturing chain. We believe this is but one example demonstrating the value of this proposal.*

4. WW sludge: *Hydroxide metal sludge, created through the treatment of printed circuit board [PCB] electroplating wastewater [WW], is one of the many secondary materials that would be affected by the DSW proposal. Under RCRA, metal precipitate sludge produced in this manner is a listed hazardous waste, even when it is being shipped off-site for metals recovery. The hazardous waste designation increases the cost of recycling, resulting in a large quantity of valuable metal bearing sludge being disposed of in hazardous waste landfills rather that being recycled. The 1998 Metal Finishing Common Sense Initiative F006 Benchmarking Study found that landfilling was the dominant choice for final disposal of electroplating sludge.*

5. Plating sludge:*In addition to metal smelters, etchant suppliers are potentially interested in recycling electroplating sludge from printed circuit board (PCB) manufacturers. However the need to become a RCRA-permitted TSDF in order to perform recycling under EPA's RCRA hazardous waste regulations has deterred these facilities from pursuing this type of copper recycling. When electroplating sludge is mixed into spent etchant, the residual acid or alkaline content in spent etchant dissolves the electroplating sludge to produce the same dissolved copper compounds as the spent etch contains. Under current RCRA regulations, etchant suppliers have not been interested in receiving this mixture, as it would require them to become a permitted TSDF. Under the DSW proposal, this combined mixture could be shipped to the etchant supplier for recycling, allowing the PCB manufacturer to eliminate separate shipments of electroplating sludge and etchant. However, because* *landfilling is generally less expensive than metals recovery under current regulatory restrictions, much metals-rich sludge is land filled, wasting valuable resources.*

The prospect for the DSW final rule to reduce existing regulatory barriers to encourage new future recycling was not shared by all industry commentors on the 2003 or 2007 DSW proposals. The Environmental Technology Council (ETC; commentor ID nr. 2002-0031-0119) in its comments on the 2003 DSW proposal stated:

> "*It is very likely that a proper engineering and scientific approach would have shown that there are few barriers to recycling, and that nearly all wastes that are truly amenable to solvent recovery, metals recovery or other recovery are being recycled today. Indeed the only barrier might be permitting costs, but EPA's proposed rule on Standardized Permits will significantly reduce this barrier and cost when finalized. Then the only costs will be minor administrative and recordkeeping costs, which are a small percentage of the savings and other benefits realized from recycling. Likewise, EPA's Uniform and Electronic Manifesting Rule-Making initiatives will reduce these costs further. Throwing out RCRA control for a small increase in recycling ignores the consequences including public health impacts, increased environmental releases and contaminated sites resulting from poor unregulated storage and processing practices.*"

2E. Independent Published Studies Identify RCRA Barriers to Recycling of Industrial Materials

Not represented in the above descriptions of regulatory need and problem statements, are independent published studies on the subject of RCRA regulatory barriers to industrial recycling. In addition to the four sources of regulatory need summarized above, five studies published 1989 to 2001 by independent organizations listed below, also identified the need for reforming the RCRA DSW and identified RCRA regulatory barriers to industrial materials recovery/recycling. These studies do not represent an exhaustive literature search on the subject, but are studies which OSW easily found via an internet search using the key phrase <RCRA regulatory industry recycling barriers>. Summarization of these studies in this RIA does not constitute OSW endorsement of their content, authors or sponsoring organizations.

1. 2001 Rand Corporation: "*The second kind of regulatory barrier derives from the regulation of treatment and recycling activities on site. The RCRA and many state agencies maintain close controls over these activities, often with the result that a firm pursues a treatment or recycling option in the hope of escaping some regulatory burden only to discover that it has traded one regulatory regime for another. Some firms fear that the regulators use control over on-site activities precisely to avoid being displaced by pollution-prevention and other innovative environmental policies.*" (Source: Rand Corporation, Chapter 3 "Chapter Three "Approaches to Environmental Management in Proactive Commercial Firms" by Frank Camm in "Environmental Management in Proactive Commercial Firms: Lessons for Central Logistics Activites in the Department of Defense", 2001, p.39: http://www.rand.org/pubs/monograph_reports/2007/MR1308.pdf).

2. 2000: <u>Progressive Policy Institute</u>: "*Problem: A major pollution problem of the iron and steel industry is the discharge of spent sulfuric, hydrochloric, or mixed acids used to form finished steel. Each year approximately 1.4 billion gallons of spent hydrochloric and sulphuric acids are discharged, primarily to receiving waters, landfills, or injected underground. EPA estimates that only 2 percent are reclaimed and recycled. Barriers: The most immediate barrier to lowering discharges of acids used in the production process is the definition of solid waste in EPA's RCRA regulations, in which used acids must be treated as a RCRA waste if they are to be reclaimed. This requires a firm to apply for a RCRA storage permit, which is difficult and costly to obtain, and adds significant paperwork if the firm wishes to reuse the material in the production process. These requirements escalate the difficulty and cost of recycling so much that it is more economic for most firms to dispose of the acids instead… Bottom Line: EPA should amend the definition of waste to allow reclamation activities to proceed without having the material become a RCRA waste*." (Source: PPI Policy Report 01 Aug 2000, "How Environmental Laws Can Discourage Pollution Prevention: Case Studies of Barriers to Innovation", Byron Swift: <u>http://www.ppionline.org/ppi_ci.cfm?knlgAreaID=116&subsecID=150&contentID=1159)</u>.

3. 1999: <u>Energy & Environmental Research Center</u> "*Regulatory barriers result from the EPA RCRA designation of [coal combustion byproducts] as solid wastes even when they are utilized rather than disposed of. In the absence of special state exemptions from solid waste regulations for beneficial use, the "waste" designation can trigger case-by-case approval and permitting procedures that discourage the use of CCBs because of cost and the time required to complete adjudicatory processes. The ineffectiveness of federal agencies to promulgate regulations and guidelines to overcome this barrier continues to hinder use of byproducts*." (Source: EERC, "Barriers to The Increased Utilization of Coal Combustion/ Desulfurization By-Products by Government And Commercial Sectors – Update 1998", EERC Topical Report, July 1999; p.xix, <u>http://www.osti.gov/bridge/servlets/purl/777109-WOStla/webviewable/777109.PDF</u>).

4. 1998: <u>Resources for the Future</u>: "*Used fixer, even if part of a recycling-based system, is given a "spent material" RCRA classification. An unfortunate consequence of this rule is that, simply by using the product, DuCare customers become hazardous waste generators. According to several people interviewed for the case, regulatory burdens associated with this rule create a powerful motivation to simply discharge used fixer to the drain and POTW [publicly-owned treatment works]. The RCRA classification issue is the largest source of DuCare customer complaints. Its costs are difficult to quantify but are related to several factors. From a customer's standpoint, the spent fixer distribution system requires them to administer special handling and storage, labeling, training, and reporting procedures. Many small printers have never had experience with this sort of regulatory program… The classification also increases the costs of providing the recycling system. As noted earlier, the "reverse distribution" system that sends the fixer back for recycling is a major cost component. The hazardous classification means that the developer and fixer must be shipped separately. The inability to consolidate shipments increases costs, since there are scale economies associated with the transport of loads to the central processing facilities. The licensed transport required for the fixer is approximately twice as expensive as the transport used for the spent developer (spent developer has a less onerous "corrosive" Department of Transportation classification)."* (Source: RFF,"Searching for the Profit in Pollution Prevention: Case

Studies in the Corporate Evaluation of Environmental Opportunities", Discussion Paper 98-30, May 1998, pp.32-33: http://www.rff.org/Documents/RFF-DP-98-30.pdf).

5. 1995: The Reason Foundation: "*So whatever "recycling" is, RCRA applies to it and doesn't apply to "virgin" materials used as commercial products— even though recycling operations are already subject to the same environmental regulations as comparable activities using virgin materials, like the Clean Air Act, the Clean Water Act, the Occupational Safety and Health Act, Superfund, the Emergency Planning and Community Right-to-Know Act, and the Toxic Substances Control Act. Many perfectly acceptable and reusable (and regulated) raw materials—salts of heavy metals, acids, toxic solvents, water-reactive materials, and so on—become RCRA hazardous wastes the moment they are "discarded," whatever that means, which virtually guarantees that few people will recycle them. The market advantage this grants virgin materials should be clear enough ... It is also a hassle for companies that want to send their wastes to be recycled, but are afraid that the recycling facility may eventually be declared a hazardous waste site (and that they may be subject to Superfund liability) because of a process determination, not based on whether or not the product is hazardous. The EPA's distinctions are important because they affect all recycling operations—and sometimes they destroy the incentive to recycle instead of throw away. The laws applying to recycling are difficult to understand and implement, and the consequences of recycling are uncertain. For many, this becomes an unacceptable risk, and this risk often leads to avoidance. Even the EPA concedes that the current regulations are difficult to implement and discourage safe recycling of hazardous waste.*" (Source: The Reason Foundation, "Recycling Hazardous Waste: How RCRA Has Recyclers Running Around in CERCLAS", by Alexander Volokh, Policy Study nr. 197, October 1995 at: http://www.reason.org/ps197.pdf).

6. 1989: The Northwest Policy Center: "[*T]he decision to recycle hazardous wastes on-site becomes less obvious for companies whose alternative costs of disposal are lower, or for whom process changes are more difficult or expensive. For some of these companies there is a delicate balance between on-site recycling and immediate transport, land disposal, or incineration of all wastes generated. This balance can be tipped by the regulatory environment toward the latter, even if the wastes include valuable metals or if re-use of hazardous wastes could decrease the costs for new raw materials... For companies operating batch processes, it may take longer than this 90-day period to accumulate a sufficient quantity of a particular waste to justify recycling. From the first day that even small quantities of these wastes are stored, some companies must also meet EPA and local fire marshal standards, including the ability of the storage area to hold and withstand a continuous stream of water if a fire occurs. Meeting these standards at several locations at a specific facility can create expenses than are far greater than the immediate benefits of recovery. There are extensive requirements for labeling and handling of materials once they are classified as a hazardous waste, which present significant obstacles to recycling these wastes.*" (Source: TNPC "Hazardous Waste Source Reduction: Industry Perception Of Regulatory And Other Impediments", June 1989, pp.7, 8: http://www.p2pays.org/ref/23/22470.pdf).

However, not all independent studies on the topic of RCRA regulatory barriers to industrial secondary materials recovery/recycling agree with the above studies. For example, a 2003 Boston College study concluded:

2003: Boston College: "*One possible solution that bodes well for pollution reduction, or even prevention, has been the concept of eco-industrial development (EID). EID describes a closed-loop industrial cycle where generated materials or by-products are returned to the manufacturing process, either used by another facility, or as feedstock for the production of other products. It has been argued, usually by the regulated community, that environmental regulations create unnecessary impediments to creative solutions like EID. The Resource Conservation and Recovery Act (RCRA) regulations are often cited as the most obstructing… To categorically state that RCRA is a barrier to eco-industrial development, or that such projects are doomed to fail in the U.S. without regulatory restructuring of RCRA, is simply unfounded. First, for RCRA to even apply, the recycled secondary material must be a solid waste, must be hazardous, and must involve one of the regulated secondary materials and recycling methods. Considering the exclusions and exemptions, there appear to be many unregulated recycling possibilities. Second, RCRA's recycling-as-solid-waste definitions are designed to restrict unsafe methods of recycling, not legitimate recycling.*" (Source: Jo Jeanne Lown, Managing Editor, Boston College Environmental Affairs Law Review, Vol.30, Part 2, 2003, pp.275-314).

Chapter 3
Background & Scope of this RIA

3A. Summary of OSW's Prior RIAs for the DSW Rulemaking

- **Recap of OSW's 1995 DSW RIA Methodology Study**

- In support of the work done by OSW's 1992-1994 DSW Task Force, ICF Inc. prepared two RIA documents: (a) 1994 document entitled "Methodology for a Regulatory Impact Analysis for the Definition of Solid Waste", which explored conceptually the approaches that OSW could use to complete an RIA for proposed changes to the DSW; and (b) 30 Sept 1995 "Regulatory Impact Analysis Methodology for the Redefinition of Solid Waste" which proposed impact estimation methodologies and data sources for two separate sets of DSW revision options:
  - Options set #1: RCRA jurisdiction:
    1. In-commerce/minimum conditions
    2. Transfer-based approach (3 sub-options: 1. onsite, 2. intra-industry, 3. inter-industry)
  - Options set #2: Regulated recycling:
    1. Tracking system
    2. Management standards
    3. Approval system
    4. Legitimate recycling
- Disposal switchover to recycling: The 1995 methodology (pages 105-106) also included a proposal to estimate potential switchover from baseline hazardous waste disposal, to new recycling, in addition to estimating the potential de-regulatory cost savings associated with baseline hazardous waste recycling. The Sept 1995 DSW re-definition RIA methodology conceptual study completed by ICF Inc for OSW, outlined a 2-stage impact estimation process involving four parts:
  - Part 1: Identify recycling methods for which baseline costs are expected to be reduced at least 10% by the rule, and the types of wastes being recycled by those methods. For those same waste types identify any tonnages which are subject to baseline disposal rather than recycling.
  - Part 2: Conduct focused evaluation to determine if disposed wastes identified in Part 1 are technically amenable to recycling, for example, by anticipating that shift-over from disposal to recycling is most likely to occur from:
    - Incineration disposal and energy recovery disposal, to solvent recovery; and
    - Stabilization followed by landfill disposal, to metals recovery.
  - Part 3: Estimate the annualized cost for the hypothetical new recycling, and compare it to the estimated cost for the baseline disposal, to determine if the former is lower than the later to signify potential switchover to recycling.

- Part 4: As a supplement to Part 3, search technical literature on recycling to determine the best economic scale of recycling operations (i.e., the minimum tons-per-year of waste feedstock needed for breakeven operation), and compare to the baseline disposal annual tons.

- **Recap of OSW's 2003 RIA for the 2003 DSW Proposed Rule**

- In June 2003, OSW completed an initial RIA[8] for OSW's 28 October 2003 DSW proposed rule[9] to exclude certain types of industrial recycling --- in addition to the current 40 CFR 261.2 industrial recycling exclusions --- from RCRA solid waste regulation.[10]
- The 2003 RIA estimated impacts (i.e., $178 million/year regulatory cost savings) only for the proposed rule's main "4-digit NAICS intra-industry" recycling exclusion option; the 2003 RIA did not estimate impacts for four other industrial recycling exclusion options described in the proposed rule (i.e., "onsite" option, "broad" option w/few conditions, "broad" option w/more conditions, and a "case-by-case" option).
- OSW received review comments on the 2003 RIA from the Environmental Technology Council (ETC) representing the US commercial hazardous waste management industry (see pages 43 to 58 at: http://www.etc.org/ETC_Detailed_Comments.pdf). In addition, eight industrial commentors identified 18 specific hazardous waste categories as potentially impacted and provided related technical suggestions to improve the economic impact estimates. OSW evaluated these other waste categories in the 2007 RIA for the 26 March 2007 DSW revision re-proposal.
- Disposal switchover to recycling: also included in the 2003 RIA in addition to de-regulatory cost savings for baseline recycling. The 2003 RIA identified the primary waste types (by SIC industry code and by physical form code) being reported recycled in the 1999 Biennial Report (BR) database, and assumed that all of these waste types being reported as disposed in 1999 (i.e., landfilled or thermally destroyed by energy recovery, fuel blending, or incineration) had a higher potential for onsite recycling. This assumption yielded eight waste types evaluated using "breakeven" for swichover from disposal to recycling:
    1. Organic liquids generated by SIC 2821, 2834, 2851, 2869 (liquid form codes = B101-B119, B201-B219)
    2. Emission control dust from SIC 3312 (solid form codes B301-B319, B401-B409, sludge forms B501-B519, B601-B609)
    3. Metal-containing liquids from SIC 3672 (liquid form codes)
    4. Electroplating wastewater treatment sludges from SIC 3672 (solid form codes, sludge form codes)
    5. Spent carbon from SIC 2869, 2911 (solid form codes, sludge form codes)
    6. Spent catalysts from SIC 2911 (solid form codes, sludge form codes)

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8 OSW's 27 June 2003 economic analysis in support of the October 2003 DSW proposed rule is available to the public as document number EPA-HQ-RCRA-2002-0031-0002 (274 pages) at http://www.regulations.gov.

9 OSW's "Definition of Solid Waste" (DSW) October 2003 proposed rule website: http://www.epa.gov/epaoswer/hazwaste/dsw/abr.htm

10 For background information about USEPA's RCRA solid and hazardous waste regulations as they pertain to industrial recycling, see: (a) USEPA Office of Solid Waste, "Introduction to: Definition of Solid Waste and Hazardous Waste Recycling (40 CFR §§261.2 and 261.9)", Oct 2001, EPA530-K-02-007I, 23 pages; http://www.epa.gov/epaoswer/hotline/training/defsw.pdf, and/or (b) USEPA's webpage about RCRA hazardous waste recycling at: http://www.epa.gov/epaoswer/hazwaste/recycle/hazrecyc.htm

7. Spent aluminum potliner from SIC 3334 (solid form codes, sludge form codes)
8. Spent pickle liquor from SIC 3312 (liquid form codes)

- **Recap of OSW's 2007 RIA for the 2007 DSW Supplemental Re-Proposal**

- In January 2007, OSW completed an RIA for the 26 March 2007 DSW supplemental re-proposal, which is available at (284 pages) http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/ria.pdf. The 2007 RIA evaluated eight regulatory options for DSW exclusions listed in Exhibit 3A below. RIA "Option 8" was the main option presented in the March 2007 DSW re-proposal, and is the option evaluated in this RIA for the 2008 DSW final rule. For "Option 8", the 2007 RIA estimated a range of $93 million to $205 million per year ("most likely" estimate = $107 million/year) in potential net annual cost savings benefits to between 460 to 570 industries under the main option (i.e., "Option 8"), consisting of:
  - $12 million to $94 million per year in net benefits from inducing between 1,155 to 1,528 LQG and TSDF facilities to switchover between 0.038 million to 0.213 million tons per year of hazardous wastes from current RCRA-regulated disposal in landfills and incinerator, to new DSW-excluded recycling.
  - $81 million to $111 million per year in RCRA de-regulatory cost savings to between 2,420 to 3,860 LQG and TSDF facilities associated with de-regulating between 0.291 million to 1.488 million tons per year of hazardous waste currently recycled as RCRA-regulated wastes.
- Disposal switchover to recycling: also included in the 2007 RIA in addition to de-regulatory cost savings for baseline recycling. The 2007 RIA built upon the eight waste types identified in the 2003 RIA, and incorporated the 18 waste types identified by public commentors on the 2003 RIA, resulting in a list of 12 waste types for breakeven evaluation, consisting of the same eight disposal waste types from the 2003 RIA, plus four other disposal waste types:
  1. Lead acid batteries
  2. Lead-bearing materials
  3. Oil from petrochemical manufacturing plants
  4. Oil refining spent acids

Exhibit 3A
List of 40 CFR 261 DSW Exclusion Options for Industrial Recycling Analyzed in OSW's 22 January 2007 RIA

	DSW Exclusion Option	Brief Description of Option
1	Onsite only	Relatively narrow exclusion for recycling that is done onsite (i.e., at the secondary material generator's facility), originally described in the Oct 2003 DSW proposed rule (p.61575).
2	4-digit NAICS intra-industry transfer	Relatively narrow exclusion for recycling that is done in a "continuous process within the same industry", originally described as the main option of the Oct 2003 DSW proposed rule (p. 61563-61574).
3	Broad inter-industry offsite transfer w/few conditions	Broad exclusion with relatively few conditions, as originally described in the preamble of the Oct 2003 DSW proposed rule (p.61588); the version of this option analyzed in this RIA includes three implementation conditions under the "most-likely"* impact estimate: (1) no speculative accumulation, (2) generator notifies USEPA of recycling activity, and (3)

Exhibit 3A List of 40 CFR 261 DSW Exclusion Options for Industrial Recycling Analyzed in OSW's 22 January 2007 RIA		
		generator re-notifies if recycling activity changes. The Oct 2003 DSW proposed rule listed possible additional conditions for this option (pp.61588-61589).
4	Broad inter-industry offsite transfer w/additional conditions	Same as Option 3 with more comprehensive conditions to prevent "discard"; the "most-likely"* version of this option analyzed includes eight implementation conditions, consisting of the three conditions (1), (2), (3) of Option 3, plus five additional conditions: (4) maintain onsite records of recycling activities, (5) no land placement of materials, (6) recycler has financial assurance, (7) generator exercises "due diligence" of recycler, and (8) export of materials for recycling follows notice and comment requirement.
5	Option 4 as RCRA "exemption" rather than DSW "exclusion"	Same as Option 4 with a conditional "exemption" from the RCRA definition of hazardous waste (40 CFR 261.3, 261.4), rather than "exclusion" from the definition of solid waste (40 CFR 261.2). *Note: Although this option is embedded and displayed as a separate option within the analytic framework and impact tables of the 2007 RIA, because the implementation conditions assigned for impact estimation are identical to Option 4, the estimated impacts for this option in the 2007 RIA are identical to Option 4.*
6	Case-by-case petition	Case-by-case variance mechanism, as described in the Oct 2003 DSW proposed rule (p.61589).
7	Generator controlled	Same as Option 1 but with two additional exclusions for offsite transfers: (a) within the "same company" and (b) with "tolling contractors". *Note: the 2007 RIA dids not separately evaluate the "non land based units" and "land based units" components of this exclusion.*
8	Combination of options 4, 6, 7	Option 4 + Option 6 + Option 7. *Note: this option was not included in the initial analytic framework of the 2007 RIA; consequently, OSW derived an impact estimate for this option by non-duplicative incremental addition of the estimated impacts for two of its constituent options (i.e., Option 4 + Option 6); Option 7 impact was not added because Option 7 impact is nested within Option 4 impact and is therefore not incremental.*
* **Note**: "most-likely" = to account for various sources of economic impact estimation uncertainty for each option, this RIA provides impact estimation ranges consisting of "minimum", "medium" (i.e., most-likely), and "maximum" impact estimates.		

3B. Summary of Public Comments on OSW's 2003 DSW RIA and 2007 DSW RIA

As identified in Exhibit 3B below, OSW received 25 sets of comments from 30 organizations (two comment sets were submitted jointly by more than one organization) on the 2003 and 2007 DSW RIAs, and on related economic analysis sub-topics associated with OSW compliance with Executive Order 12866 procedures for completing Federal government RIAs These 25 comment sets represent 18% of the total 136 "universe" of public comment sets on all topics of both the October 2003 DSW proposed rule and the March 2007 supplemental re-proposal for the DSW rulemaking. OSW received 18 comment sets from 23 organizations on the 2003 RIA, and 10 comment sets from 14 organizations on the 2007 RIA.

Exhibit 3B
Identity of Public Commentors on OSW's 2003 DSW RIA and 2007 DSW RIA

Set	Name of Commentor	Commentor ID nr.*	2003 RIA	2007 RIA

Exhibit 3B **Identity of Public Commentors on OSW's 2003 DSW RIA and 2007 DSW RIA**				
Set	Name of Commentor	Commentor ID nr.*	2003 RIA	2007 RIA
1	American Chemistry Council (ACC)	2002-0031-0093	X	
2	American Ecology Corporation	2002-0031-0193	X	
3	American Iron & Steel Institute	2002-0031-0207	X	
4	Anonymous	2002-0031-0479		X
5	Cement Kiln Recycling Coalition (CKRC)	2002-0031-0172 2002-0031-0548	X	X
6	Chevron Corp.	2002-0031-0464		X
7	Clean Harbors Environmental Services Inc.	2002-0031-0117	X	
8	Congress of the United States	2002-0031-0343	X	
9	Connecticut State Dept of Environmental Protection	2002-0031-0098	X	
10	Earthjustice (jointly filed with Sierra Club, US Public Interest Research Group, National Environmental Trust, Safe Food & Fertilizer)	2002-0031-0559		X (n=5)
11	Eastman Chemical Company	2002-0031-0102	X	
12	Environmental Technology Council (ETC)	2002-0031-0119 2002-0031-0558	X	X
13	International Metals Reclamation Company, Inc.	2002-0031-0178	X	
14	IPC Association of Connecting Electronics Industries	2002-0031-0112 2002-0031-0458	X	X
15	Kentucky State Environmental & Public Protection Cabinet	2002-0031-0130	X	
16	Maine State Dept of Environmental Protection	2002-0031-0095	X	
17	Metals Industries Recycling Coalition	2002-0031-0529		X
18	Newmont Mining Corporation	2002-0031-0089	X	
19	North Carolina State Hazardous Waste Section	2002-0031-0067	X	
20	PPG Industries Inc.	2002-0031-0203	X	
21	Safe Food & Fertilizer	2002-0031-0561		X
22	Safety-Kleen Systems Inc.	2002-0031-0146	X	
23	Sierra Club (jointly flied with US Public Interest Research Group (PIRG), National Environmental Trust, Pacific Environmental Advocacy Center, Safe Food & Fertilizer, Northwest Environmental Defense Center)	2002-0031-0231	X (n=6)	
24	Synthetic Organic Chemical Manufacturers Association (SOCMA)	2002-0031-0471.2		X
25	Tennessee State Dept of Environment & Conservation	2002-0031-0488		X
		Sub-total comment sets =	**18 sets (n=23 organizations)**	**10 sets (n=14 organizations)**
		Total public comments on the two prior RIAs=	**25 sets (n=30 organizations)**	
* Commentor ID nr. as assigned by the Federal regulatory docket at: http://www.regulations.gov for docket nr. EPA-HQ-RCRA-2002-0031.				

Exhibit 3C below presents a summary of the most prevalent sub-topics contained in the 25 sets of comments on the two prior DSW RIAs. These sub-topics reflect specific excerpts from each comment set as parsed and bracketed in summer 2007 by an OSW contractor (ICF Inc). The parsing and bracketing yielded a total of 76 sub-topics from the 25 comment sets pertaining to the DSW RIAs, consisting of 53 sub-topics on the 2003 RIA and 23 sub-topics on the 2007 RIA.

Exhibit 3C
Summary of Public Comment Sub-Topics on OSW's 2003 DSW RIA and 2007 DSW RIA

Rank	Comment Excerpt Sub-Topic*	Commentor ID nr.	Non-duplicative Commentor Count
1	Omitted analyses of potential countervailing risks for this rule such as potential increase in future (a) industrial recycling damage cases and cleanup costs, (b) human exposure and safety risks, (c) misdirected, abandoned and lost shipments, (d) traffic accidents, (e) use of coal to offset loss of hazardous wastes shifting from energy recovery to recycling, (f) commercial hazardous waste industry bankruptcies, (g) impacts of the DSW final rule on the functioning of other environmental and public programs (e.g., effect on "arranger liability" under CERCLA section 107)..	2002-0031-0067 2002-0031-0095 2002-0031-0098 2002-0031-0117 2002-0031-0119 [ETC] 2002-0031-0130 2002-0031-0146 2002-0031-0172 [CKRC] 2002-0031-0193 2002-0031-0231** 2002-0031-0343 2002-0031-0479 2002-0031-0548 [CKRC] 2002-0031-0558 [ETC] 2002-0031-0559*** 2002-0031-0561	16 comment sets (representing 19 organizations)
2	Over-estimated potential future annual industry cost savings and new recycling benefits	2002-0031-0093 2002-0031-0112 2002-0031-0117 2002-0031-0119 [ETC] 2002-0031-0172 [CKRC] 2002-0031-0193 2002-0031-0203 2002-0031-0231** 2002-0031-0548 [CKRC] 2002-0031-0558 [ETC] 2002-0031-0559***	11 comment sets (representing 14 organizations)
3	Did not adequately account for potential impacts on state government agencies (e.g., potential reduction in state hazardous waste fee revenues, potential non-adoption of DSW final rule by states, state cleanup costs for recycling damage cases)	2002-0031-0067 2002-0031-0095 2002-0031-0098 2002-0031-0172 2002-0031-0548 2002-0031-0558	7

Exhibit 3C Summary of Public Comment Sub-Topics on OSW's 2003 DSW RIA and 2007 DSW RIA			
Rank	Comment Excerpt Sub-Topic*	Commentor ID nr.	Non-duplicative Commentor Count
		2002-0031-0561	
4	Mis-specified certain unit costs (e.g., baseline RCRA regulatory paperwork burden unit costs, onsite recycling investment and operating unit costs, market value of recovered constituents, unit cost for environmental permits for new onsite recycling, recoverable constituent concentrations and market values in baseline disposed wastes)	2002-0031-0112 2002-0031-0119 2002-0031-0178 2002-0031-0193 2002-0031-0548	5
5	Incorrectly assumed baseline disposal shift to onsite recycling scenario is not realistic because of the unavailability of (a) investment capital, (b) industrial facility space, (c) technical expertise, (d) skilled labor, and (e) unwillingness to expand beyond core business NAICS code, (f) lack of economies-of-scale for implementing new onsite recycling that some individual facilities cannot support, and (g) superior quality of materials produced by offsite reclaimers/recyclers.	2002-0031-0479 2002-0031-0093 2002-0031-0112 2002-0031-0178 2002-0031-0203	5
6	Under-estimated potential future annual industry cost savings and new recycling benefits	2002-0031-0458 2002-0031-0471.2 2002-0031-0529	3
7	Did not adequately estimate potential beneficial or adverse impacts on small businesses	2002-0031-0146 2002-0031-0458 2002-0031-0471.2	3
8	No rationale to assume in the 2003 RIA that hazardous waste tonnage recycled in 1997 but not in 1999 will again be recycled at some point in the future because of this rule	2002-0031-0119 2002-0031-0213	2
9	Incorrect mathematical treatment of RCRA Biennial Report database hazardous waste tonnage data outliers	2002-0031-0119 2002-0031-0231	2
10	Unsubstantiated desktop analysis assumptions used rather than basing the impact analysis on an industry survey to determine what recycling options are available that are not being pursued today for regulatory reasons and for consideration of hazardous waste characteristics.	2002-0031-0119	1
11	Under-estimated future annual tonnages which may shift from current energy recovery to future recycling	2002-0031-0548	1
12	Over-estimated future annual tonnages which may shift from current energy recovery to future recycling	2002-0031-0119	1
13	Did not include an impact analysis for codification of the "legitimate recycling" criteria	2002-0031-0089	1
14	The 2007 RIA should not have characterized as "transfer effect" the adverse consequences of potential shift of materials away from current energy recovery to future recycling, but should have included this impact as a real resource cost offsetting the de-regulatory cost savings of the rule	2002-0031-0548	1

Explanatory Notes:

* Full texts of public comments are available from the Federal regulatory docket at: http://www.regulations.gov for docket nr. EPA-HQ-RCRA-2002-0031.

** Commentor ID nr. 2002-0031-0231 represents a jointly-submitted set of comments representing six entities: (1) Sierra Club, (2) US Public Interest Research Group, (3) National Environmental Trust, (4) Pacific Environmental Advocacy Center, (5) Safe Food & Fertilizer, (6) Northwest Environmental Defense Center.

*** Commentor ID nr. 2002-0031-0559 represents a jointly-submitted set of comments representing five entities: (1) Earthjustice, (2) Sierra Club, (3) US Public Interest Research Group, (4) National Environmental Trust, (5) Safe Food & Fertilizer.

3C. Components of the 2008 DSW Final Rule Evaluated in this RIA

Compared to the 2007 DSW RIA, there are seven major improvements to the structure and methodology of this RIA, which OSW implemented in large part to address and incorporate public comments on the 2007 RIA. These changes are in addition to updating the hazardous waste data and unit cost data.

1. <u>Disposal switchover to recycling</u>: Revised the methodology for estimating potential baseline disposal switchover to future recycling, to correct for the under-estimation bias of the 2007 RIA methodology alleged by public commentors. This revision consisted of expanding the scope of impact estimation methodology by:
   a. Dropping NAICS code restrictions to baseline disposal data evaluated for potential switchover; five of the 12 waste types evaluated in the 2007 RIA were restricted to only five NAICS codes 32411, 331111, 332813, 33412, 334412; (source: count based on 2007 RIA Exhibit 2E, 2nd column, page 42).
   b. Increasing from a count of 56 primary screening criteria waste codes applied to baseline disposed waste data in our 2007 RIA (source: count based on 2007 RIA Exhibit 2E, 3rd column, page 42), to a count of 67 in this RIA (count based on Exhibit 5F in this RIA), the total count of RCRA Biennial Report database codes (i.e., Wxxx form codes plus Gxxx source codes plus Dxxx, Fxxx, Kxxx regulatory codes) applied for identifying baseline disposed wastes for recycling evaluation.
   c. Including (rather than excluding as was done in the 2007 RIA) both energy recovery (H050) and fuel blending (H061) baseline disposal quantities in the breakeven test evaluation for recycling switchover[11], and

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11 The Cement Kiln Recycling Coalition (CKRC; 2002-0031-0548) commented that the 2007 DW RIA "*[O]nce again simply assumes without supporting facts that the [DSW final rule] will not affect energy recovery from hazardous wastes in cement kilns and does not adequately analyze the degree to which the rule will adversely affect this desirable practice… EPA has ignored or underestimated the extent to which the proposed rule would encourage energy-bearing hazardous secondary materials to move away from energy recovery in cement kilns and towards other less-regulated forms of recycling.*" However, there is not apparently an industry-wide consensus that the DSW final rule may be expected to have an adverse impact, as evidenced by two commentors (ETC & SOCMA) on our prior 2003 and 2007 RIAs who offered the following contrary statements of why it is reasonable to expect a negligible impact in relation to the physical/chemical characteristics of hazardous wastes managed by energy recovery:

- The Environmental Technology Council (ETC, ID nr. 2002-0021-0119) who claimed to be "*speaking from direct experience in the industry in managing [hazardous] wastes on a daily basis for over 20 years*": "*There is no reason to believe that generators will be encouraged to shift the management practices for [hazardous wastes managed by energy recovery]. The aqueous inorganic treatment already realizes RCRA exemptions associated with the wastewater treatment exemptions. In addition, wastewater streams are often dilute and do not contain significant quantities of recoverable constituents. It is therefore doubtful that any of this volume will go to [materials] recovery. Likewise, the volumes currently managed by energy recovery are being done so at a savings and also as a recycling practice. Many states and TRI view energy recovery as recycling. There will be little incentive for generators to switch their management practices and invest capital in alternate recovery processes for these streams. In addition, other than the BTU value, these wastes contain few components that have [materials] recovery value, which is why they are managed by energy recovery or fuel blending currently, as opposed to solvent recovery. The average solids content of fuel-blended waste is about 30%, and many cement kilns are feeding other higher-solids content waste through pails or coal injection systems. In addition, many fuel-blended streams have substantial water content and other organic liquid components that form azeotropes and are not amenable to solvent recovery. At most, 50,000 tons of this [current energy recovery] volume might be routed to other [materials] recovery, but even this is doubtful.*"

d. Broadening the types of disposed wastes evaluated for breakeven switchover to recycling, according to three commodity groups (i.e., metals, solvents, other materials) which resulted in a count of 15 commodity material constituents (i.e., specific types of chemicals and materials such as carbon, chromium, copper, lead, methanol, nickel, zinc, etc.) evaluated in this RIA (source: count based on **Appendix A** of this RIA), compared to a count of 11 commodity materials evaluated in the 2007 RIA (source: Column D of Exhibit 2B, pages 34-35 of 2007 RIA).

2. Disposed waste constituents: Integrated empirical data on hazardous waste constituent characteristics from OSW's 1996 "National Hazardous Waste Constituent Survey" (NHWCS; see item 4 at: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm) into the breakeven test of this RIA, to replace prior "desktop judgment" applied in our 2003 and 2007 RIAs concerning the concentration of commodity-like constituents potentially recoverable from baseline disposed hazardous wastes evaluated for possible future switchover to recycling.

3. Distributional effects: Expanded the scope of "Potential Business Impacts" Chapter 8 of the 2007 RIA, by including additional industries (e.g., intermediate middlemen industries, virgin material producer industries) in Chapter 10 of this RIA.

4. Countervailing risks: Added a new chapter (Chapter 11) which provides a qualitative screening assessment of countervailing risks involving potential adverse environmental and other types potential effects identified by public commentors on the 2003 and 2007 DSW RIAs. The new chapter examines 12 potential countervailing risks: 1. industrial recycling environmental damages, 2. materials testing, 3. community & groundwater, 4. employee safety training & traffic safety, 5. human exposure, 6. material shipments, 7. compliance enforcement, 8. abandoned sites, 9. site inspections, 10. coal mining, 11. bankruptcy, 12. other environmental programs.

5. Sensitivity analysis: Added four new sensitivity analysis factors, making a total of nine factors compared to the five factors from the 2007 RIA: (a) -0.7% to 0% data quality assurance factor to acknowledge that the Biennial Report may contain data on hazardous wastes which have already been de-regulated under prior DSW and RCRA exclusions/exemptions, (b) -21% to 0% physical/chemical quality factor for materials recovery/recycling suitability, (c) -20% to +30% expected impact estimation accuracy factor to reflect the relatively low level-of-detail impact estimation methodology applied in this RIA, and (d) -50% to +50% commodity price factor which applies to price inputs for the baseline disposal switchover to recycling breakeven test.

6. Lifecycle analysis: The 2007 RIA (Appendix D) contained a lifecycle analysis (LCA) which compares the relative unitized energy (per ton) and environmental pollution for two case studies one for reclaiming metals (zinc) from K061 dust, and the

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- The Synthetic Organic Chemical Manufacturers Association (SOCMA, ID nr. 2002-0031-0471.2) claimed that "*Smaller businesses have little leverage with or access to the larger reclamation facilities. Frequently, smaller volume waste streams must be incinerated because commercial reclamation facilities prefer to handle high volumes … Overall, the cleaner a waste solvent is the more value it has either for subsequent use and application as a solvent or for energy recovery. Thus, the ability of a toll contractor to use existing equipment to reclaim even smaller volumes of solvents from toll manufacturing operations is economically a meaningful option to pursue. Relatively cleaner [waste] solvents also typically have a higher BTU value and hence can have greater value for energy recovery*."

other for reclaiming liquid organics for solvent use. These LCA case studies revealed the lack of sufficient and comprehensive LCA data, LCA models, and complex assumptions needed to execute LCAs for estimating comparative material flow, energy flow, and environmental impacts associated with the 100s of different nationwide industries consisting of 1,000s of facilities generating and managing the 10,000s of hazardous waste streams which may be affected by the DSW rule. For example, one limitation of the LCA case studies is that they did not address differences in transportation distances. Another major limitation is the lack of detailed data for all classes of pollutants (e.g., air pollutants) for all pathways involving all hazardous waste management scenarios (i.e., disposal vs recovery/recycling) and virgin raw material production counterparts. The 2007 RIA listed five LCA limitations on pages 237 to 238. In the interim since completing these two LCA studies for the 2007 RIA, OSW did not add new LCA case studies, so this RIA does not provide a LCA appendix.

7. Regulatory options: Furthermore, this RIA only addresses the three exclusions contained in the DSW final rule, not all previous exclusion options evaluated in the 2003 and 2007 RIAs.

- **Exclusion 1: Generator Controlled Recycling Exclusion (amendments to 40 CFR 260.10, 261.2, 261.4)**

Exclusion 1 is similar to "Option 7" of the 2007 RIA. Exclusion 1 pertains to de-regulating three types of baseline RCRA-regulated hazardous waste recycling from the 40 CFR 260 RCRA Definition of Solid Waste, according to the 7 conditions/requirements summarized in Exhibit 3D below:

1. Onsite recycling (addition of 40 CFR 260.10)
   a. Land-based units (addition to 40 CFR 260.10 and addition of 40 CFR 261.4(a)(23))
   b. Non-land based units (addition of 40 CFR 261.2(a)(2(ii))
2. Offsite transfer recycling at a different facility under the control of the generator (addition of 40 CFR 260.10)
3. Offsite transfer recycling under a tolling contract (addition of 40 CFR 260.10)

Generators who currently recycle wastes either onsite or under either of the two offsite transfer arrangements for this exclusion, are expected to realize de-regulatory cost savings. This RIA estimates this potential impact in the form of future annual costs savings to industry, estimated by subtracting the estimated annual cost of future de-regulated recycling under this exclusion, from the estimated baseline (current) annual cost for RCRA-regulated recycling.

Limitations in the Exclusion 1 impact estimation methodology of this RIA are:

- Omission of shared captive recycling: This RIA did not evaluate the potential for generator facilities owned or otherwise under "common control" (40 CFR 260.10(2)) by the same company to construct a shared (captive) offsite recycling unit in order to enhance the economy-of-scale feasibility for switchover from baseline disposal to offsite transfer recycling "within the same company". This potential switchover is excluded from this RIA because of the complexity of the analysis it would require to assess (a) how many recycling units need to be constructed by each multi-facility company, (b) how many facilities might share in the construction and annual operating cost of each recycling unit, and (c) where these units might be constructed in relation to the locations of the multiple generator participants sharing each recycling unit. An indicator of the magnitude of this omission is the ratio of single- and multi-establishment firms in the "Establishment & Firm Size" industry subject series reports published by the Bureau of Census. Although such report is not available for the US manufacturing sector (NAICS 32 & 33) which represents eight of the top-10 4-digit NAICS code industries generating RCRA hazardous waste in 2005 (accounting for 32.45 million tons/year (85%) of the 38.35 million tons/year generation reported in the 2005 Biennial Report (BR) for all industries), there is a report[12] for the NAICS 562 "Waste Management & Remediation Services" industry group which represents the 4th and 10th industries in the 2005 top-10 generator industries (accounting for 2.13 million tons/year (6%) of the 38.35 million tons/year hazardous waste reported generated by all industries in the 2005 BR). For NAICS 562 in year 2002, only 4% of the 15,084 firms (companies) operated more than one establishment (facility). However, this small 4% fraction of multi-facility companies operated 22% of the 18,662 total facilities, and accounted for a large 66% share of the $51.3 billion annual business receipts. To the extent that the quantity of annual hazardous waste generation for any single facility correlates to a large degree with the dollar magnitude of annual business receipts for that facility, this indicates that the omission from this RIA of shared within-company offsite recycling facilities may be a relatively large source of industry cost savings impact under-estimation in this RIA for Exclusion 1.

- Omission of baseline disposal switchover under Exclusion 1: This RIA does not attempt to estimate whether facilities currently disposing wastes either onsite or offsite, may shift the management of their wastes to recycling either onsite, under a tolling arrangement, or offsite "under their control" under Exclusion 1. This omission reflects the reported low likelihood that generators will begin new recycling operations under their control (particularly onsite) according to five industrial public commentors on the 2003 and 2007 DSW RIAs summarized in the next bullet below. If only one or two single industry commentors had indicated a low likelihood involving a small subset of hazardous waste types, OSW would have retained this scenario in this 2008 RIA, but because three commentors represent large associations of diverse industries and hazardous waste types (i.e., chemical mfg industries, metals mfg industries, electronics mfg industries), OSW decided to omit this scenario. The numerical consequence of this omission on the impact estimate of this RIA is indicated by reviewing the contribution of this scenario in the 2007 RIA. It estimated 42,000 tons per year might switchover to "Generator Controlled" onsite recycling (i.e., Option 7 of the 2007 RIA), which represented 71% of the 59,000 tons per year total disposal switchover tonnage, but represented only 6% of the estimated 0.652 million tons per year total affected tonnage for all three exclusions included in the DSW final rule (i.e., Option 8 of the 2007 RIA).

  However, potential baseline disposal switchover to future offsite recycling at commercial TSDRFs is evaluated in conjunction with Exclusion 2 in this RIA.

- Omission of offsite recycling switchover to onsite: This RIA does not attempt to estimate whether facilities currently using offsite recycling may elect to switchover to onsite recycling to take advantage of this exclusion. This potential effect is

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12 Establishment and Firm Size: 2002 Economic Census: Administrative and Support and Waste Management and Remediation Services Subject Series, Nov 2005, report nr. EC02-56SS-SZ: http://www.census.gov/prod/ec02/ec0256ssszt.pdf

excluded from this RIA because of the complexity of such an analysis is beyond this RIA, and this assumption is consistent with the following statements made by five commentors on the 2003 and 2007 DSW proposals:

1. American Chemistry Council (2002-0031-0093): "*[F]acilities within a single NAICS code are likely to produce very similar secondary materials and if they cannot recycle them in an already permissible, closed-loop method, they are unlikely to be able to recycle them at all. It is much more likely that a different industrial operation, with needs for input material different from that of the generating industry, will find a use for the output of the generator… In actuality, like all industrial processes, reclamation is cost effective only with certain economies of scale. Thus it is more likely that a company in another industry will have the expertise and industrial infrastructure to reclaim significant secondary materials from a different generating industry. For example, chemical operations generate secondary metals in catalyst production, but no chemical plant is likely to build a metal processing, beneficiation or smelting operation to address its material flows. It is more likely to seek out a company in the metal processing industry that also accepts and reclaims the secondary materials that others in its generating industry generate. Another example might involve a large company generating many different spent solvent streams at many U.S. sites. While at some sites the volume and quality of spent solvents justifies the expense of installing on-site reclamation facilities, at most sites, the volumes would be too small to justify the capital investment required to reclaim these materials. It is more likely that the materials would be sent off-site for commercial reclamation. Removal of the RCRA regulatory barriers from these streams will not change the economics such that reclamation facilities will be built on site. However, it may very well make the economics more favorable for commercial reclamation instead of disposal by lowering the transportation and management costs now associated with handling the material as a hazardous waste.*"

2. International Metals Reclamation Co (2002-0031-0178): "*[W]hen a generator makes a new capital investment to build a reclamation process on-site and staffs it with newly hired employees, the reclamation activity probably should be viewed as a separate "establishment" from the generator's pre-existing production process … [W]ith respect to the metals sector ... the large capital investment needed to construct and operate a technologically sophisticated and economically efficient reclamation process demands that reclaiming operations be sized so as to realize economies of scale that individual generators cannot support… [R]egulatory-driven, economically inefficient investments in on-site reclamation processes would be avoided, and existing investments in third-party commercial reclamation facilities would not be stranded… [G]enerators would not have to make economically inefficient investments in on-site recovery facilities in order to qualify their secondary materials for the exclusion. Instead they could send their materials for off-site reclamation without regard to the NAICS code of the reclaimer. That would enable them to realize the reduction in regulatory costs without making new capital investments and operating expenditures that would not be made absent a regulatory driver.*"

3. IPC Association of Connecting Electronics Industries (2002-0031-0112): "*EPA's economic analysis of the [October 2003 DSW] proposal's benefits attempts to show how industries could reconstitute their core businesses to encompass on-site recycling operations and thus reuse materials within the same generating industry. In the analysis, EPA attempted to*

quantify the amount of materials that would be recycled by comparing the break-even cost of onsite, within the same generating industry, waste recovery. IPC believes that EPA's analysis overestimates the potential benefit of the proposed rule because it is based on faulty data analysis, makes incorrect assumptions, and fails to analyze other factors contributing to the feasibility of onsite recycling. EPA's analysis did not consider whether the space, investment capital, and skilled labor would be available for the construction and operation of these on-site reclamation facilities. The operation of the type of reclamation facilities envisioned in the economic analysis would require a significant quantity of personnel skilled in a set of operations that are completely divergent from core manufacturing processes. Recent trends in manufacturing operations are towards a focus on core business, with as many ancillary operations as possible being outsourced. EPA's analysis ignores this trend. EPA's analysis also overlooks the difficulty in obtaining environmental permits for onsite reclamation processes, particularly those associated with smelting. Most on-site precipitation recovery systems are well equipped to handle copper based solutions, but have difficulty with concentrated nickel and tin solutions, particularly when combined with chelating agents or fluorides. Facilities desiring to undertake on-site recovery of chelated nickel and tin solutions would face technical challenges in addition to the effort needed to separately package, label, store, and ship these additional metals."

4. PPG Industries Inc. (2002-0031-0203): "*Within our own industries, we are doing as much recycling as is economically feasible. Nor can we envision installing new capital facilities for reclamation without much greater opportunities for available, affordable materials, and those opportunities principally lie between industries, not within them.*"

5. Annonymous (2002-0031-0479): "*[G]enerator's who are recycling for reuse likely will continue to ship their materials [offsite] long distances because of the preference for the quality of the product they are accustomed to receiving from the [offsite] facilities that have been providing such products for years and have the institutional expertise to work closely with generators to produce such quality. As with any consumer, generators purchase not only on price but also on the reclaimer's ability to meet their specifications.*"

- <u>Indirect treatment of tolling arrangements</u>: This RIA does not <u>directly</u> estimate baseline tolling arrangements for hazardous waste recycling, nor does it estimate future new tolling arrangements which may be induced by the DSW final rule. This is probably not a relatively large source of de-regulatory cost savings estimation in this RIA, because baseline offsite recycling (with or without tolling arrangements) is included in the impact estimation methodology of this RIA for Exclusion 2 below. However, this RIA does <u>indirectly</u> include estimation of potential impact on offsite recycling under tolling arrangements, by using NAICS industry code 32519 "Other Organic Chemical Manufacturing" as a proxy indicator for recycling tolling arrangements. This NAICS code most closely (narrowly) represents the specialty batch chemical manufacturing industry as represented by the Synthetic Organic Chemical Manufacturing Association (SOCMA), which requested OSW on 10 Feb 2007 to add "toll manufacturing operations in the specialty batch chemical manufacturing sector" to the DSW final rule exclusions. The 2005 BR database indicates that a relatively small fraction of 2,125 tons/year (i.e., 0.06%) of the 3.82 million tons/year reported for 187 waste streams generated by the NAICS 32519 industry, was managed by offsite recycling (i.e., by H010, H020, or H039).

• Exclusion 2: Transfer-Based Recycling Exclusion (addition of 40 CFR 261.4(a)(24) & 261.4(a)(25))

Exclusion 2 is similar to "Option 4" of the 2007 RIA. Exclusion 2 pertains to de-regulating two categories of offsite transfer of hazardous secondary materials for recycling, according to the 13 conditions/requirements summarized in Exhibit 3D below:

1. Offsite transfer: Materials that are generated and then transferred to another person for recycling (40 CFR 261.4(a)(24))
2. Exports transfer: Materials that are exported from the US for recycling in a foreign country (40 CFR 261.4(a)(25))

This RIA does not separately estimate industry cost savings impacts for these two different types (i.e., offsite and export) of recycling exclusions for Exclusion 2. The generator export tonnages and generator exporter facility counts are embedded in the generator impacts for this exclusion, but not separately reported. On an aggregate (i.e., combined) basis for both of these two exclusions for Exclusion 2, this RIA estimates two potential impacts:

1. Baseline recycling cost savings: Generators who currently recycle wastes offsite under the offsite transfer arrangement eligible for this exclusion, are expected to realize de-regulatory cost savings by either assuming:
    - the baseline offsite commercial hazardous waste recycler (e.g., NAICS 562211) passes through de-regulatory cost savings to the generator by recycling the DSW-excluded material in a non-regulated recycling unit at the same offsite TSDF, or
    - the generator elects to switch to an offsite non-RCRA commercial recycler (e.g., NAICS 56292 materials recovery industry) presumed to offer a lower price in proportion to the de-regulatory costs savings.

   This RIA estimates the potential future annual costs savings to generators for this potential impact by subtracting the estimated annual future cost of de-regulated offsite recycling under Exclusion 2, from the estimated baseline annual cost for RCRA-regulated offsite recycling.
2. Baseline disposal switchover to recycling: Generators currently disposing hazardous wastes either onsite or offsite may find it more economical to switch from disposal to commercial offsite recycling (e.g., NAICS 56292 materials recovery industry) under Exclusion 2. To estimate this potential impact, this RIA conducts a breakeven test (i.e., cost comparison) to determine if it may be economically feasible for generators to switchover disposal to commercial offsite recycling. This test is not conducted to estimate potential switchover to onsite recycling for the same reasons given in Exclusion 1 above.

An additional limitation in the Exclusion 2 impact estimation methodology of this RIA is:

- Indirect inclusion of intermediate middlemen: In addition to generators and recyclers, intermediate (middlemen) facilities (e.g., transfer facilities) are required to comply with the terms of this Exclusion 2. However, this RIA does not include or estimate a separate facility type category to represent intermediate facilities. Based on the 2005 RCRA National Biennial Report (Exhibit 3.9), 359 facilities reported receiving industrial hazardous waste from offsite for purpose of intermediate storage and transfer, representing only about 7% of the 8.5 million tons of hazardous waste shipped offsite in 2005. Given the fact that most of the 359 RCRA-reporting facilities are also TSDRFs involved in providing other waste management services (e.g., disposal, treatment, or recycling), this RIA probably includes most of them indirectly in the TSDRF impact estimates. However, this RIA does not base industry benefits and costs on the larger Economic Census count of potentially affected intermediate facilities which may handle hazardous secondary materials under Exclusion 2. As summarized in Exhibit 10B of this RIA, the 2002 Economic Census implies that 2,565 establishments have product lines involving either hazardous or non-hazardous (a) waste & recycling brokerage (164 establishments), (b) waste & materials transfer or sorting (2,385 establishments), and (c) industrial recyclable materials wholesale distribution (16 establishments). Consequently, this is a potential source of implementation cost under-estimation in this RIA, which may contribute to industry cost savings over-estimation in this RIA.

- **Exclusion 3: Case-by-Case "Non-Waste Determination" Variance (amendments to 40 CFR 260.30 & 260.33 & addition of 260.34)**

Exclusion 3 is similar to "Option 6" of the 2007 RIA. Exclusion 3 adds the following two new materials categories to the three existing 40 CFR 260.30 RCRA non-waste determination variances from classification as a solid waste, according to the 3 conditions/ requirements summarized in Exhibit 3D below:

1. Materials that are reclaimed in a continuous industrial process (addition of 40 CFR 260.30(d))
2. Materials that are indistinguishable in all relevant aspects from a product or intermediate (addition of 40 CFR 260.30(e))

For purpose of estimating the potential impact of this exclusion, there is an existing RCRA hazardous waste program which may provide a preliminary indicator of the number of cases per year that might be expected for this DSW exclusion: the case-by-case RCRA hazardous waste "delisting" program (40 CFR 260.22). According to a review of that program conducted by OSW in June 2002[13], the RCRA delisting program granted a total 136 hazardous waste delistings over its initial 20-year period (1980 to 1999), which represents an average annual case-by-case activity level of about seven delistings completed per year. This RIA uses the average annual affected tonnage per-facility estimated in this RIA for Exclusion 1, for estimating the potential cost savings impact of Exclusion 3. For estimating the affected waste quantities and annual cost savings impacts, the number of affected facilities was determined using an arithmetic series (i.e., cumulative series) with seven facilities per year assumed to apply for a DSW variance (Exclusion 3) over a future 20-year period. This 20-year period mirrors the RCRA "delisting" reference study period. The mean of the 7 per-year arithmetic series over 20 years is 73.5 (say 74) average annual affected facilities. This RIA uses an annual average of 74 affected facilities for estimating the potential annual impact of this Exclusion.

[13] USEPA Office of Solid Waste, Economics, Methods & Risk Analysis Division (EMRAD), "RCRA Hazardous Waste Delisting: The First 20 Years (Program Evaluation)", prepared by Abt Associates and Glenn Farber (EMRAD Regulatory Impact Analyst), June 2002, 32 pages; http://www.epa.gov/epaoswer/hazwaste/id/delist

- **Legitimate Recycling Criteria (addition of 40 CFR 261.2(g))**

The 2008 DSW final rule adds the following four "legitimate recycling" criteria to the 40 CFR 261.2 RCRA Definition of Solid Waste. The 1st two criteria are "requirements" that "must" be met (i.e., mandatory), and the 2nd two criteria are "factors" that "need to be considered" and "should" be met (i.e., non-mandatory):

- Mandatory requirements:

1. Recycling must involve material that provides useful contribution to the recycling process or product (40 CFR 261.2(g)(2)(i))
2. Recycling must produce a valuable product or intermediate (40 CFR 261.2(g)(2)(ii)

- Non-mandatory factors to consider:

3. The generator and recycler should manage the material as a valuable commodity (40 CFR 261.2(g)(3)(i))
4. Whether the product of the recycling process contains significant concentrations of hazardous constituents or exhibits a hazardous characteristic (40 CFR 261.2(g)(3)(ii))

Note: Because these four legitimacy criteria have been defined in USEPA guidance since 1989 ("Lowrance Memo"; OSWER directive 9441.1989(19), 26 April 1989), and applied by state governments to determine "legitimate" from "sham" industrial recycling, this RIA assumes that the 2008 DSW final rule's codification of the legitimacy criteria will have a small impact not quantified in this RIA. The basis for this assumption is the DSW final rule legitimacy criteria are not substantively different than OSW's longstanding policy since 1989, as OSW explained in the 2007 DSW supplemental re-proposal:

> "*As part of proposing regulatory provisions on the legitimacy of recycling, we are simply reorganizing, streamlining, and clarifying the existing legitimacy principles. We believe that the regulatory definition of legitimate recycling, when applied to specific recycling scenarios, will result in determinations that are consistent with the earlier policy. Therefore, we generally do not see the need for the regulated community or overseeing agencies to revisit previous determinations and expect any written determinations from these agencies to, in effect, be grandfathered.*" (p.14198 of OSW's 26 March 2007 DSW supplemental re-proposal).

Chapter 4
Data for Baseline Industrial Recycling Potentially De-Regulated by the DSW Final Rule

4A. Primary Data Source for Identifying Industries, Facilities & Hazardous Wastes Potentially Affected

The 2008 DSW final rule potentially impacts industrial hazardous secondary materials that are already defined in the 40 CFR 261.2 RCRA Definition of Solid Waste (DSW) regulations as "solid wastes" and are being managed as RCRA "hazardous wastes" under current RCRA Subtitle C regulations (40 CFR 260 to 299). The 2008 DSW final rule is designed to revise the RCRA DSW by excluding certain RCRA hazardous wastes recycled for metal, solvent or other materials (e.g., acid recovery). These wastes will be considered as "hazardous secondary materials" under the DSW rule and will not be defined as "solid wastes" subject to RCRA Subtitle C regulation. This chapter defines the dataset of currently regulated hazardous waste recycling that may become de-regulated under the DSW rule by excluded designation as "hazardous secondary materials" rather than as RCRA "hazardous wastes", which forms the physical basis in this RIA for estimating potential industry cost savings from de-regulation of baseline recycling.

As of 2007, RCRA regulations (i.e., 40 CFR 261.2(3) and 261.4(a)) provide 16 DSW exclusions for recycling of certain types of industrial hazardous secondary materials (see Exhibit 2A). The earliest DSW exclusion dates back to 1985. Consequently, the respective counts of industries, facilities, and waste streams potentially affected by the 2008 DSW revisions final rule does not apply to these currently excluded industries and hazardous secondary materials. OSW does not have data on the nationwide annual quantities of hazardous wastes which are excluded form the DSW and which are no longer subject to biennial reporting to the USEPA under the RCRA Subtitle C hazardous waste regulations.

The RCRA Hazardous Waste Biennial Report (http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm) is a census of the company identity, location, industrial sources, waste types, waste quantities, and methods of hazardous waste generation, shipment, receipt, and management (i.e., treatment, disposal, recovery) at two classes of RCRA-regulated facilities:

- LQGs: RCRA hazardous waste large quantity generators (i.e., sites which generate 1,000 kilograms (2,200 pounds) or more of hazardous waste in any single calendar month). LQGs are required to complete a single "**Form GM**" for each hazardous waste generated in each data year. In 2005, **16,191 LQGs** submitted **225,139GM forms** to the Biennial Report The count of GM forms indicates the count of waste streams generated by LQGs in each data year.

- TSDRFs: RCRA-permitted hazardous waste treatment, storage, disposal, and recycling facilities. TSDRFs are required to complete a "**Form WR**" for all hazardous wastes received in the data year. Each Form WR contains three separate "waste blocks" for reporting data on up to three separate waste streams received from different generators. In 2005, **1,550 TSDRFs** submitted **831,701 WR form waste blocks** to the Biennial Report. The count of WR form waste blocks indicates the count of waste streams received by TSDRFs in each data year.

The Biennial Report (BR) includes both one-time generated industrial wastes (e.g., equipment closure, corrective action site cleanup) as well as annually recurring generated industrial process wastes. This database is the primary source used in this RIA to identify the current (i.e., baseline) hazardous wastes generated that have the potential to become excluded from RCRA Subtitle C jurisdiction under the 2008 DSW final rule. Small quantity generators (i.e., SQGs which generate between 100 and 1,000 kilograms per month) and conditionally exempt small quantity generators (i.e., CESQGs which generate less than 100 kilograms per month) are not required to submit hazardous waste data to the BR. However, SQG waste quantities may be reflected in the BR because SQGs typically rely on offsite commercial TSDRFs for management of their hazardous wastes.

The BR is the most complete set of data on industrial hazardous waste generation available given it is a census of LQGs and TSDRFs. It is the best existing database for evaluating changes to RCRA regulations, given the fact that data are reported on the waste stream level by single facilities (some facilities may generate multiple and different waste streams within any given year). As mentioned previously, the Biennial Report does not explicitly include data for SQGs and CESQGs. Consequently, the regulatory cost savings estimates might be expected to increase if the universe of SQGs and CESQGs were explicitly included in this RIA. However, this increase would mostly occur from addition of SQG data because CESQGs are already excluded from most RCRA regulations.[14]

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14 SQGs: The exclusion of SQGs from this analysis reflects the RCRA exclusion of SQGs from reporting to the RCRA Hazardous Waste Biennial Report. Consequently, USEPA does not collect regularly updated data on RCRA waste volumes generated by SQGs. Omission of explicit data on SQGs does not necessarily mean that this analysis excludes small and medium size companies for the following reasons:

- Not all SQGs necessarily represent small or medium size companies, and not all LQGs represent large companies, based on either (a) company employee count or (b) company annual sales revenues, two alternative measures used by the Small Business Administration to define “small business” (http://www.sba.gov/size).
- Furthermore, many SQGs are not in the same industries and markets with LQGs; for example, the top-5 largest LQG industries in 2003 based on annual tons waste generated are (1) NAICS 3251 Basic Chemical Mfg, (2) NAICS 3241 Petroleum & Coal Products Mfg, (3) NAICS Waste Treatment & Disposal, (4) NAICS 3252 Resin, Synthetic Rubber, Synthetic Fibers & Filaments Mfg, and (5) NAICS 3311 Iron & Steel Mills & Ferroalloy Mfg, all of which are capital-intensive industries predominantly populated with relatively larger size companies (source: Exhibit 1.9 at: http://www.epa.gov/epaoswer/hazwaste/data/br03/national03.pdf). In contrast, SQGs are predominantly in different industries; for example, the top-5 SQG industries in aggregate constituting 98.3% SQGs and only 1.7% LQGs are (1) NAICS 8111 Automotive Repair & Maintenance, (2) NAICS 3231 Printing & Related Support Activities, (3) NAICS 332 Fabricated Metal Product Mfg , (4) NAICS 4411 Motor Vehicle & Parts Dealers, and (5) NAICS 5111 Print Publishing Industries, based on estimated establishment counts in OSW’s July 2003 economic impact analysis for the RCRA spent solvent industrial wipes proposed rule (see page 90 of document ID nr. EPA-HQ-RCRA-2003-0004-0004 at http://www.regulations.gov).
- Although there is not necessarily a high degree of correlation in any single industry between RCRA regulatory status (i.e., LQG, SQG, CESQG) and facility size measured by employee count or annual revenues, comparison of respective RCRA biennial hazardous waste generation volumes (i.e., tons per year) indicate that SQGs are probably much smaller in average size than LQGs. Consequently, most SQGs send their wastes offsite for treatment, disposal or recycling by commercial hazardous waste management facilities because they lack economy-of-scale to manage the wastes themselves, and for other business reasons. Based on 1997 data (source: Steven Brown, Margaret James & Gary Light, ICF Consulting, “SQG Up-Date” 31 July 2000 memorandum to Peggy Vyas, OSW), there are about 114,000 SQGs which generate a total of between 600,000 to 930,000 tons/year of RCRA hazardous waste, which represents an average SQG waste size of 5.3 to 8.2 tons/year. As an example, if this average SQG volume consisted of spent solvents, it would be equivalent to 24 to 37 barrels per year, or 2 to 3 barrels per month (@8 lbs/gallon and @55 gallons/barrel). Compared to the 17,700 LQGs which generate 30,176,000 tons for an average LQG waste size of 1,705 tons/year (as of 2003) --- which represents 7,750 barrels per year or 646 barrels per month of spent solvent as an example waste material --- SQGs are only 0.3% to 0.5% the size of an average LQG. OSW does not expect SQGs will experience an adverse disproportional

4B. 2005 Baseline Hazardous Waste Industrial Recycling Data

Exhibits 4A to 4G below summarize the Biennial Report (BR) dataset for baseline hazardous waste recycling for data year 2005. Data year 2005 is used in this RIA to represent the current (i.e., baseline) year because the more recent data year 2007 will not be available until December 2008[15]. The BR database only contains the primary NAICS code for each waste generator and waste management facility. However, many industrial facilities have more than one NAICS code corresponding to different types of industrial operations within a single facility, but the entire quantity of hazardous waste undergoing recycling is reported under a single NAICS code for each single facility in the BR dataset.

For each BR historical data year (i.e., 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005) the national total "management" quantity (tons) does not necessarily equal the national total "generation" quantity (tons) because: (a) some hazardous waste tonnages may be double-counted in "management" because they undergo two or more management steps in a management train, (b) some wastes may have been generated near year-end but managed (i.e., treated, recycled or disposed) in the next year, (c) export of generated wastes for management in other countries, and (d) import of wastes generated in other countries for management in the US.

Exhibit 4A below summarizes the three types of recycling included in the RCRA Biennial Report, and their associated 2005 count of facilities and hazardous waste management tonnages, distinguished between onsite and offsite recycling.

effect of the DSW final rule if SQGs lack economy-of-scale to justify capital investment in new generator controlled recycling operations, because SQGs are alternatively eligible for DSW offsite transfer recycling exclusion (i.e., Exclusion 2 in this RIA).

15 According to USEPA's Biennial Report website (as of March 2008), the 2007 Biennial Report data will not be published on the internet until December 2008: http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm

Exhibit 4A Three Categories of RCRA Hazardous Waste Baseline Recycling (2005*)								
	A	B	C	D	E (C+D)	F	G	H (F+G)
	2005 count of facilities generating wastes that are recycled	2005 count of waste streams that are recycled	2005 Count of Facilities Recycling			2005 Quantity Recycled (tons per year)		
Hazardous Waste Recycling Category (Biennial Report management code**)			Onsite	Offsite (Received from offsite)	Total facilities	Onsite	Offsite (Received from offsite)	Total (tons/year)
H010: Metals recovery: high temperature metals recovery, retorting, secondary smelting, & other metals recovery (e.g., ion exchange, reverse osmosis, acid leaching).	2,352	5,335	57	96	137	233,214	1,187,107	1,420,320 (69%)
H020: Solvents recovery: fractionation/ distillation, thin film evaporation, & solvent extraction.	2,466	6,322	444	57	493	69,565	227,117	296,681 (15%)
H039: Other recovery: acid regeneration, waste oil recovery, non-solvent organic liquids recovery, & other miscellaneous recovery methods except energy recovery or use as fuel.	829	1,733	45	36	74	153,345	174,834	328,180 (16%)
Non-duplicative totals =	4,809	**13,348**	529 (81%)	159 (24%)	**656 (100%)**	456,124 (22%)	1,589,058 (78%)	**2.045 million (100%)**

Explanatory Notes:

- * All data represents counts and quantities included in the 2005 National Biennial Report: http://www.epa.gov/epaoswer/hazwaste/data/br05/national05.pdf. Some facilities recycled wastes in more than one management method, and some facilities both generated onsite and received from offsite. Thus, the facility counts and percentages will sum to more than 100%.
- ** Beginning with BR data year 2001, USEPA changed the BR hazardous waste management codes. For a comparison of the new waste management codes with pre-2001 codes, see p.81 of “2001 Hazardous Waste Report Instructions and Forms”: http://www.epa.gov/epaoswer/hazwaste/data/brs01/ins-frms.pdf

Exhibit 4B below compares the 2005 aggregate recycling data (Columns E & F) to data on hazardous waste total generation (Columns A & B) and total management (Columns C & D), according to 2-digit NAICS codes which indicate the respective activities by economic sub-sector.

Exhibit 4B
Identity of Industries Generating & Recycling RCRA Hazardous Wastes Which are Currently Recycled (2005)*

			A	B	C	D	E	F	G	H
									(F/D)x100	(100%-G)
			Waste Generation		Waste Management		Waste Recycling			
Item	Economic Sub-Sector (2-digit NAICS Code)		Count of LQGs	Tons Per Year Generated	Count of TSDFs	Tons Per Year Managed	Count of Recyclers	Tons Per Year Recycled	% Recycled	% Not Recycled
1	11	Ag, Forestry, Fishing, Hunting	14	5,833	-	-	-	-	-	-
2	21	Mining	118	37,427	3	70,571	1	3	< 0.1%	>99.9%
3	22	Utilities	474	194,090	9	1,469	3	54	3.7%	96.3%
4	23	Construction	232	18,084	6	118	4	11	9.5%	90.5%
5	31	Manufacturing	160	14,145	10	5,091	5	350	6.9%	93.1%
6	32	Manufacturing	4,150	29,211,960	492	32,449,736	232	575,988	1.8%	98.2%
7	33	Manufacturing	6,234	5,746,674	547	4,649,586	252	1,215,208	26.1%	73.9%
8	42	Wholesale Trade	567	188,008	27	128,978	11	19,298	15.0%	85.0%
9	44	Retail Trade	359	23,599	1	8	1	8	100.0%	0.0%
10	45	Retail Trade	28	3,008	-	-	-	-	-	-
11	48	Transportation	798	157,075	23	609,197	7	177	< 0.1%	>99.9%
12	49	Postal, Couriers, Warehousing	231	140,023	8	120,477	0	0	0.0%	100.0%
13	51	Information	119	3,938	51	14,038	2	12,781	91.0%	9.0%
14	52	Finance & Insurance	3	356	-	-	-	-	-	-
15	53	Real Estate, Rental & Leasing	77	14,423	10	966	2	2	0.2%	99.8%
16	54	Prof, Scientific & Tech Services	522	27,203	34	60,432	8	9	< 0.1%	>99.9%
17	55	Mgt of Companies/Enterprises	12	868	2	156,889	0	0	0.0%	100.0%
18	56	Admin, Waste Mgt, Remediation	615	2,344,388	182	5,513,610	65	220,824	4.0%	96.0%
19	61	Educational Services	439	33,719	37	164	22	78	47.6%	52.4%
20	62	Health Care, Social Assistance	235	11,322	27	2,833	24	153	5.4%	94.6%
21	71	Arts, Entertainment, Recreation	34	5,165	1	3	1	3	100.0%	0.0%
22	72	Accommodation & Food Services	2	157	-	-	-	-	-	-
23	81	Other Services	303	24,261	9	3,699	3	13	0.4%	99.6%
24	92	Public Administration	465	141,287	71	135,998	13	222	0.2%	99.8%
25	??	NAICS code not provided	0	0	-	-	-	-	-	-
		Column totals =	16,191	38,347,011	1,550	43,923,861	656	**2.045 million**	**4.7%**	**95.3%**

- Source: USEPA 2005 RCRA Hazardous Waste Biennial Report: http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm; 1 ton = 2,000 pounds ("short-ton").
- (-) No management was reported in 2005. Recycling can not be determined for wastes that have no management information (excluding management by storage).

Exhibit 4C below presents the 2005 data for the three recycling methods (i.e., H010, H020, H039) according to 2-digit NAICS economic sub-sector.

Exhibit 4C Annual Quantity of RCRA Hazardous Wastes Which are Currently Recycled by Type of Generator Industry (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Generator Industry 2-digit NAICS code		Managed by H010 Metals Recovery (tons per year)	Managed by H020 Solvents Recovery (tons per year)	Managed by H039 Other Recovery (tons per year)	Row Totals Managed by Recovery (tons per year)	
1	11	Ag, Forestry, Fishing, Hunting	-	-	-	-	-
2	21	Mining	0	0	3	3	< 0.1%
3	22	Utilities	53	1	0	54	< 0.1%
4	23	Construction	0	11	0	11	< 0.1%
5	31	Manufacturing	0	350	0	350	< 0.1%
6	32	Manufacturing	251,577	107,363	217,048	575,988	28.2%
7	33	Manufacturing	1,157,453	10,280	47,475	1,215,208	59.4%
8	42	Wholesale Trade	2357	14,873	2,068	19,298	0.9%
9	44	Retail Trade	0	8	0	8	< 0.1%
10	45	Retail Trade	-	-	-	-	-
11	48	Transportation	145	32	0	177	< 0.1%
12	49	Postal, Couriers, Warehousing	0	0	0	0	0.0%
13	51	Information	0	12,781	0	12,781	0.6%
14	52	Finance & Insurance	-	-	-	-	-
15	53	Real Estate, Rental & Leasing	0	2	0	2	< 0.1%
16	54	Prof, Scientific & Tech Services	0	9	0	9	< 0.1%
17	55	Mgt of Companies/Enterprises	0	0	0	0	0.0%
18	56	Admin, Waste Mgt, Remediation	8,581	150,840	61,402	220,824	10.8%
19	61	Educational Services	26	51	1	78	< 0.1%
20	62	Health Care, Social Assistance	85	62	6	153	< 0.1%
21	71	Arts, Entertainment, Recreation	0	3	0	3	< 0.1%
22	72	Accommodation & Food Services	-	-	-	-	-
23	81	Other Services	9	4	0	13	< 0.1%
24	92	Public Administration	34	10	178	222	< 0.1%
25	??	NAICS code not provided	0	0	0	0	0.0%
Column totals =			1,420,320	296,681	328,180	**2.045 million**	**100.0%**

- (-) No management was reported in 2005 (excluding management by storage). Recycling can not be determined for wastes that have no management information (including storage of wastes).

Exhibit 4D below presents the same 2005 recycling data according to the types of industrial processes (i.e., Biennial Report Gxxx codes) which generated the hazardous waste that is being recycled.

Exhibit 4D Industrial Process/Activity Sources of Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Industrial Process/ Activity Hazardous Waste Generation Source Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
1	G01	Dip, flush or spray rinsing	0	4,392	170	4,562	0.2%
2	G02	Stripping and acid or caustic cleaning	0	0	257	257	< 0.1%
3	G03	Plating & phosphating	6,006	22	0	6,028	0.3%
4	G04	Etching	0	32	172	204	< 0.1%
5	G05	Metal forming & treatment	1,773	0	0	1,773	0.1%
6	G06	Painting & coating	0	4,001	15	4,015	0.2%
7	G07	Product & by-product processing	171,889	19,217	15,579	206,685	10.1%
8	G08	Removal of spent process liquids or catalysts	442	2,374	14,573	17,389	0.9%
9	G09	Other production or service-related processes	2,355	4,526	141	7,022	0.3%
		Subtotal daily production, service or maintenance processes =	182,466	34,564	30,905	247,935	12.1%
10	G11	Discarding off-spec or out-of-date chemicals or products	1,588	361	28,733	30,682	1.5%
11	G12	Lagoon or sediment dragout and leachate collection	0	0	0	0	0.0%
12	G13	Cleaning-out process equipment	0	17,673	1,661	19,334	0.9%
13	G14	Removal of tank sludge, sediments or slag	588	134	7,006	7,728	0.4%
14	G15	Process equipment change-out or discontinuation of use	0	18	62	81	< 0.1%
15	G16	Oil changes and filter or battery replacement	2	0	5	7	< 0.1%
16	G19	Other one-time or intermittent processes	31	0	124	155	< 0.1%
		Subtotal one-time or intermittent events or processes =	2,210	18,186	37,590	57,986	2.8%
17	G21	Air pollution control devices	8,758	0	280	9,038	0.4%
18	G22	Lab analytical wastes	6	99	167	272	< 0.1%
19	G23	Wasetewater treatment	369	0	3,292	3,661	0.2%
20	G24	Solvent or product distillation or recovery	2	7,969	24,856	32,827	1.6%
21	G25	Hazardous waste management	22,313	3,362	649	26,324	1.3%
22	G26	Leachate collection	0	0	0	0	0.0%
23	G27	Residual from treatment or recovery of universal waste	16,685	0	29	16715	0.8%
		Subtotal pollution control & waste management residuals =	48,133	11,430	29,274	88,837	4.3%
24	G31	Accidental contamination of materials, containers	0	0	0	0	0.0%
25	G32	Cleanup of spill residues (infrequent, not routine)	0	0	0	0	0.0%
26	G33	Leak collection & floor sweeping ongoing, routine)	37	0	0	37	< 0.1%
27	G39	Other cleanup of current contamination	0	0	0	0	0.0%
		Subtotal spills & accidental releases =	37	0	0	37	< 0.1%
28	G41	Closure of haz waste management unit under RCRA	0	0	0	0	0.0%

Exhibit 4D Industrial Process/Activity Sources of Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Industrial Process/ Activity Hazardous Waste Generation Source Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
29	G42	Correction action at solid waste mgmt unit under RCRA	0	315	49,140	49,456	2.4%
30	G43	Remedial action or emergency response under CERCLA	0	0	0	0	0.0%
31	G44	State program or voluntary cleanup	0	1,250	0	1,250	0.1%
32	G45	Underground storage tank cleanup	0	0	693	693	< 0.1%
33	G49	Other remediation	0	0	5,593	5,593	0.3%
Subtotal remediation of past contamination =			0	1,565	55,426	56,992	2.8%
34	G61	Received from offsite for storage/bulking for transfer	0	3,820	21	3,840	0.2%
35	G63 to G75	Imported from a foreign country	0	0	0	0	0.0%
Subtotal not physically generated onsite =			0	3,820	21	3,840	0.2%
36	G??	Source code not provided	1,187,107	227,117	174,834	1,589,058	77.7%
Column totals =			1,420,320	296,681	328,180	**2.045 million**	**100.0%**

Exhibit 4E below presents the same 2005 recycling data according to the types of chemical/physical forms of the wastes (i.e., Biennial Report Wxxx codes) which are being recycled.

Exhibit 4E Physical Form of Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Biennial Report Physical Form Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
1	W001	Lab packs w/out acute haz waste	44	16	1	61	< 0.1%
2	W002	Contaminated debris	1,228	5,386	3	6,617	0.3%
3	W004	Lab packs w/acute haz waste	1	0	0	1	< 0.1%
4	W301	Contaminated soil	74	48	21,949	22,071	1.1%
5	W309	Batteries, battery parts, cores, casings	813,751	< 1	3,453	817,205	40%
6	W310	Filters, adsorbents, ion exchange resins, spent carbon	138	2,279	9,222	11,639	0.6%
7	W320	Electrical devices	559	0	1	560	< 0.1%
8	W512	Sediment or lagoon dragout, drilling or other muds	3	0	129	131	< 0.1%
9	W801	Compressed gases	2,556	1	1	2,558	0.1%
Subtotal mixed media/debris/devices =			818,354	7,731	34,759	860,843	42.1%
10	W101	Very dilute aqueous waste >99% water	1,489	3,089	44,297	48,876	2.4%
11	W103	Spent concentrated acid	16,496	30	2,550	19,077	0.9%

Exhibit 4E Physical Form of Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Biennial Report Physical Form Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
12	W105	Acidic aqueous wastes <5% acid	258	1	18	277	< 0.1%
13	W107	Aqueous waste containing cyanides	614	0	0	614	< 0.1%
14	W110	Caustic aqueous waste or wastewaters	7,290	26	279	7,595	0.4%
15	W113	Other aqueous waste or wastewaters	7,293	4,420	10	11,723	0.6%
16	W117	Waste liquid mercury	80	< 1	< 1	81	< 0.1%
17	W119	Other inorganic liquid	6,544	803	5,506	12,852	0.6%
		Subtotal inorganic liquids =	40,065	8,370	52,660	101,094	4.9%
18	W200	Still bottoms liquid form	114	3,340	241	3,695	0.2%
19	W202	Concentrated halogenated solvent	0	25,469	885	26,355	1.3%
20	W203	Concentrated non-halogenated solvent	3	104,945	729	105,677	5.2%
21	W204	Concentrated halogenated/non-halo solvent mixture	< 1	14,544	4,016	18,560	0.9%
22	W205	Oil-water emulsion/mixture	0	1,289	3,993	5,283	0.3%
23	W206	Waste oil	0	7	14	21	< 0.1%
24	W209	Paint, ink, lacquer or varnish	15	10,902	20	10,937	0.5%
25	W210	Reactive or polymerizable organic liquids/adhesives	0	899	1,359	2,258	0.1%
26	W211	Paint thinner or petroleum distillates	< 1	46,737	0	46,737	2.3%
27	W219	Other organic liquid	49	12,187	83,833	96,069	4.7%
		Subtotal organic liquids =	182	220,321	95,090	315,593	15.4%
28	W303	Ash	7,039	0	0	7,039	0.3%
29	W304	Slags, drosses, other solid thermal residues	57,088	0	59	57,147	2.8%
30	W307	Metal scale, filings, scrap (including drums)	39	< 1	< 1	39	< 0.1%
31	W312	Cyanide or metal cyanide bearing solids, salts, chems	16	0	0	16	< 0.1%
32	W316	Metals salts or chemicals w/out cyanide	568	1	157	727	< 0.1%
33	W319	Other inorganic solids	479,845	870	14,816	495,531	24.2%
		Subtotal inorganic solids =	544,596	871	15,032	560,499	27.4%
34	W401	Pesticide solids	0	< 1	0	< 1	< 0.1%
35	W403	Solid resins, plastics, polymerized organics	3	250	3,419	3,671	0.2%
36	W405	Explosives or reactive organic solids	3	0	0	3	< 0.1%
37	W409	Other organic solids	2,315	2,695	18,990	24,000	1.2%
		Subtotal organic solids =	2,320	2,945	22,409	27,674	1.4%
38	W501	Lime or metal hydroxide sludges	1,126	0	0	1,126	0.1%
39	W503	Gypsum sludges from wastewater or air treatment	9	0	0	9	< 0.1%
40	W504	Other sludges from wastewater or air treatment	455	0	0	455	< 0.1%
41	W505	Metal bearing sludges	346	1	< 1	347	< 0.1%
42	W506	Cyanide-bearing sludges	4	0	0	4	< 0.1%
43	W519	Other inorganic sludges	505	19	271	794	< 0.1%
		Subtotal inorganic sludges =	2,445	20	271	2,736	0.1%

Exhibit 4E Physical Form of Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	Biennial Report Physical Form Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
44	W603	Oily sludge	0	193	5,068	5,262	0.3%
45	W604	Paint or ink sludges, still bottoms	0	1,714	7	1,721	0.1%
46	W606	Resins, tars, polymer, tarry sluge	0	24	1,638	1,662	0.1%
47	W609	Other organic sludge	3	433	4,897	5,332	0.3%
		Subtotal organic sludges =	3	2,364	11,610	13,977	0.7%
48	W???	Physical form code not provided	12,356	54,061	96,348	162,766	8.0%
		Totals =	1,420,320	296,681	328,180	**2.045 million**	**100.0%**

Exhibit 4F below presents the same 2005 recycling data according to the types of RCRA Subtitle C hazardous waste designation regulatory codes (i.e., Dxxx, Fxxx, Kxxx, Pxxx, Uxxx codes) which are being recycled.

Exhibit 4F RCRA Subtitle C Regulatory Waste Codes Assigned to Recycled RCRA Hazardous Wastes (2005)							
A	B		C	D	E	F (C+D+E)	
Item	RCRA Waste Code		H010 Metals Recovery (tons/year)	H020 Solvents Recovery (tons/year)	H039 Other Recovery (tons/year)	Total Recovery (tons/year)	
1	Dxxx	1 or more toxicity leaching test waste codes only	899,716	134,402	198,166	1,232,284	60.3%
2	Fxxx	1 or more non-specific industrial source waste codes only	4,029	46,017	12,799	62,846	3.1%
3	Kxxx	1 or more specific industrial source waste codes only	481,123	0	23,263	504,386	24.7%
4	Pxxx	1 or more “acutely hazardous” discarded or off-spec commercial chemical products, container residues & spill residues thereof	0	0	96	96	< 0.1%
5	Uxxx	1 or more “toxic waste” commercial chemical products, manufacturing intermediates, or off-spec commercial chemical products	< 1	610	3,097	3,708	0.2%
6	Mixed	Assigned with 2 or more waste code categories above	35,124	95,767	90,748	221,639	10.8%
7	????	Waste code not provided	328	19,885	9	20,223	1.0%
		Column totals =	1,420,320	296,681	328,180	**2.045 million**	**100.0%**

Exhibit 4G below indicates the respective fractions (i.e., associated tonnages and percentages) for each of the three recycling methods which involve recycling “acute” hazardous wastes. Solid wastes shall be listed under RCRA Subtitle C as “*acute hazardous wastes*” if they either:

- Have been found to be fatal to humans in low doses, or
- Have been shown in studies to have an oral LD 50 toxicity (rate) of less than 50 milligrams per kilogram, an inhalation LC 50 toxicity (rat) of less than 2 milligrams per liter, or a dermal LD 50 toxicity (rabbit) of less than 200 milligrams per kilogram, or
- Are otherwise capable of causing or significantly contributing to an increase in serious irreversible, or incapacitating reversible, illness (Source: 40 CFR 261.11(a)(2)).

As codified in the 01 July 2006 version of the Code of Federal Regulations (CFR), RCRA "*acute hazardous wastes*" are designated with the hazard code (H) and include:

- All 239 Pxxx codes in the table at 40 CFR 261.33(e) are designated as "*acute hazardous (H)*" wastes.
- Six of the 28 Fxxx codes in the table at 40 CFR 261.31 are designated as "*acute hazardous (H)*" wastes: F020, F021, F022, F023, F026, and F027.

Exhibit 4G
Prevalence of RCRA "*Acute Hazardous*" Waste Recycling (2005)

Recycling method (Biennial Report management code) Recycling method definition	2005 BR annual total tons recycled (onsite + offsite tons)	2005 Quantity of "*acute hazardous*" waste recycled* (onsite + offsite tons)	% of RCRA hazardous waste recycling involving "*acute hazardous*" wastes (onsite + offsite)
H010: Metals recovery	1,420,320	334	0.02%
H020: Solvents recovery	296,681	19,885	0.97%
H039: Other recovery	328,180	161	0.01%
Column totals =	**2.045 million**	**20,381**	**1.00%**

Explanatory Notes:
Source: Query of USEPA 2005 RCRA Biennial Report (BR) based on selecting recycleing data corresponding to (a) all of the Pxxx codes and (b) the six of the 28 Fxxx codes which are designated as “acute” hazardous wastes in the Code of Federal Regulations.

Chapter 5
Data for Identifying Potential Switchover of Baseline Disposal to Recycling

5A. Identification of Hazardous Waste Disposal Baseline

The DSW rule may induce more recycling of hazardous wastes which are disposed, because the potential for net cost savings under the new DSW exclusions if wastes are recycled, may provide an economic incentive for some facilities to switchover from disposal to recycling, either by using offsite commercial recyclers, or by investing and operating onsite recycling operations. This RIA only evaluates the possibility of disposal switchover to commercial offsite recycling for the reasons given in Chapter 3 (Section 3C). The entire quantity of each waste potentially switching-over to recycling is used to estimate total cost savings post-rule, not just the valuable portion (i.e., constituent) of the waste. The generator sends along all the waste to the recycler and then the recoverer extracts the valuable constituent. So, when calculating cost savings to the generators it's the entire quantity (i.e., waste matrix mass) that is relevant.

The disposal baseline forms the basis in this RIA, for evaluating the potential for disposed wastes to switch from disposal to recycling, based on (a) the market value of the primary constituent material (e.g., metal or organic solvent) in the disposed waste, in comparison to (b) their current estimated average annual cost for disposal. This RIA estimates the future potential for switchover by applying a "breakeven test" which determines on a micro-level waste stream-by-waste stream basis (i.e., not on either a facility-by-facility basis nor industry-by-industry basis), whether the net annual market value of the recovered metal, solvent or other material, would at least offset by a minimum of $0.01, the current average annual cost for disposing the waste stream.

The series of Exhibits 5A to 5E below provide an overview of the 2005 RCRA hazardous waste disposal baseline. As displayed in Exhibit 5A below, note that two <u>beneficial disposal</u> methods are included in this RIA (i.e., H050 onsite burning waste as fuel, and H061 blending waste for use as fuel offsite), in addition to 22 <u>non-beneficial disposal</u> methods. Although H050 energy recovery and H061 fuel blending are in-eligible methods for the DSW final rule exclusions, these two methods are included in this section of the RIA only for the purpose of evaluating them for potential switchover to future recycling.[16]

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16 In its comments to the Docket on OSW's 26 March 2007 DSW re-proposal (comment ID nr. 2002-0031-0548), the Cement Kiln Recycling Coalition (CKRC) specifically requested that OSW analyze "the degree to which the [DSW revisions final] rule will adversely affect this desirable practice [of energy recovery from hazardous wastes in cement kilns]" and ."would encourage energy-bearing hazardous secondary materials to move away from energy recovery in cement kilns and towards other less-regulated forms of recycling."

Exhibit 5A Summary of Total Baseline Disposed RCRA Hazardous Wastes by Ultimate* Disposal Method (2005)									
A	B	C	D	E	F	G	H	I	J (H+I)
			Count of disposed waste streams	2005 Count of Facilities Disposing			2005 Tons Disposed (management quantity)		
Item	Disposal method Code	Disposal description		Onsite	Offsite (Received)	Total facilities (non-duplicative)	Onsite (tons/year)	Offsite (tons/year)	Total (tons/year)
A. Beneficial Disposal Methods (n=2):									
1	H050	Energy Recovery	9,341	70	44	99	668,669	1,050,721	1,719,390
2	H061	Fuel Blending	37,393	34	87	105	152,994	1,021,631	1,174,625
		Subtotal beneficial disposal =	46,296	102	118	188	821,663	2,072,352	2,894,015
B. Non-Beneficial Disposal Methods (n=22):									
1	H040	Incineration	63,402	114	88	164	890,681	547,315	1,437,996
2	H071	Chemical Reduction	1,928	69	28	95	309,722	38,377	348,099
3	H073	Cyanide Destruction	335	33	10	43	70,817	1,582	72,399
4	H075	Chemical Oxidation	229	4	9	13	1,386	55,266	56,652
5	H076	Wet Air Oxidation	14	1	2	3	2	36	38
6	H077	Other Chemical Precipitation	4,598	75	29	103	1,080,828	147,569	1,228,397
7	H081	Biological Treatment	1,310	29	16	41	1,352,875	52,098	1,404,974
8	H082	Adsorption	165	14	9	22	1,308,179	5,069	1,313,248
9	H083	Air Or Steam Stripping	81	15	1	16	637,876	25	637,901
10	H101	Sludge Treatment And/or Dewatering	222	42	11	52	28,522	660	29,182
11	H103	Absorption	61	8	1	9	486,817	4	486,820
12	H111	Stabilization Or Chemical Fixation	11,137	104	43	140	52,920	371,654	424,573
13	H112	Macro-Encapsulation	729	12	10	21	898	460	1,358
14	H121	Neutralization Only	3,081	116	36	148	1,470,724	70,276	1,541,000
15	H122	Evaporation	155	51	3	52	27,821	1,836	29,657
16	H123	Settling Or Clarification	65	13	2	15	19,845	15,977	35,822
17	H124	Phase Separation	177	18	10	26	12,240	148	12,388
18	H129	Other Treatment	3,637	142	60	193	2,402,527	200,160	2,602,687
19	H131	Land Treatment Or Application	1,082	11	10	20	3,204	44	3,248
20	H132	Landfill Or Surface Impoundment	9,526	45	44	68	601,437	1,436,105	2,037,543
21	H134	Deepwell Or Underground Injection	1,635	39	13	46	21,517,154	329,538	21,846,692
22	H135	Discharge To Sewer/POTW Or NPDES	1,018	94	27	118	2,457,774	976,216	3,433,990
		Subtotal non-beneficial disposal =	102,443	805	224	944	34,734,248	4,250,416	38,984,665
		Column totals =	**211,791****	870 (84%)	274 (27%)	1,032 (100%)	35,555,911 (85%)	6,322,769 (15%)	**41.879 million (100%)**

Explanatory Notes: * Ultimate disposal = Some hazardous wastes undergo one or more sequential treatment methods prior to ultimate disposal (i.e., final disposition.) This exhibit represents ultimate disposal methods from Form GM, Section 2 for onsite disposal, and from Form WR for offsite disposal. Tonnages for management method code H141 (wastes stored/bulked, transferred without treatment, recovery or disposal at the transferring site) are not included in this exhibit because transfer does not represent ultimate disposal. ** However, waste stream counts in this exhibit include wastes managed by H141 only, of which there were a total of 64,666 Form GMs. 146,019 Form GMs reported wastes managed exclusively by some disposal method (i.e., were not also managed by a recycle method, ignoring null and storage (H141) codes on form). Thus, 1,106 Form GMs reported wastes managed by a mix of recycle and disposal methods.

Exhibit 5B **Identity of Industries Generating & Disposing Total Baseline Disposed RCRA Hazardous Wastes (2005)**										
			A	B	C	D (B+C)	E	F	G	H (F+G)
			Generation Location of Disposed (Tons Per Year)*				Disposal Location of Disposed (Tons Per Year)			
Item	Economic Subsector (2-digit NAICS Code)		Count of facilities	Generation disposed Onsite	Generation shipped offsite for disposal	Total generation disposed	Count of facilities	Beneficial disposal**	Non-beneficial disposal***	Total disposal
1	11	Agriculture, Forestry, Fishing, Hunting	14	0	9,315	9,315	-	-	-	-
2	21	Mining	98	1,185	32,346	33,531	3	69,381	1,188	70,569
3	22	Utilities	380	8	189,634	189,641	8	2	1,414	1,415
4	23	Construction	200	103	16,660	16,763	2	0	107	107
5	31	Manufacturing	141	4,741	6,984	11,725	5	< 1	4,740	4,741
6	32	Manufacturing	3,628	29,420,925	1,974,949	31,395,874	292	1,800,449	30,073,299	31,873,748
7	33	Manufacturing	5,281	3,406,745	1,539,132	4,945,877	329	93	3,434,285	3,434,378
8	42	Wholesale Trade	476	95,741	61,238	156,978	18	2,805	106,876	109,680
9	44	Retail Trade	264	0	8,640	8,640	-	-	-	-
10	45	Retail Trade	22	0	2,810	2,810	-	-	-	-
11	48	Transportation	657	608,595	106,809	715,403	16	13	609,007	609,020
12	49	Postal, Couriers, Messengers, Storage	197	11,010	142,686	153,696	8	83,099	37,378	120,477
13	51	Information	91	1,257	485	1,741	50	0	1,257	1,257
14	52	Finance & Insurance	3	0	318	318	-	-	-	-
15	53	Real Estate, Rental & Leasing	69	1	9,404	9,405	10	0	964	964
16	54	Professional, Scientific & Tech Services	453	60,056	20,723	80,779	27	0	60,422	60,422
17	55	Mgt of Companies/Enterprises	12	156,886	833	157,720	2	0	156,889	156,889
18	56	Admin, Waste Mgt & Remediation	585	1,652,856	1,567,260	3,220,116	163	938,069	4,354,717	5,292,786
19	61	Educational Services	365	71	26,715	26,786	21	2	84	86
20	62	Health Care, Social Assistance	182	39	7,016	7,054	7	3	2,677	2,679
21	71	Arts, Entertainment, Recreation	27	0	4,975	4,975	-	-	-	-
22	72	Accommodation & Food Services	2	0	157	157	-	-	-	-
23	81	Other Services	202	3,416	14,709	18,125	6	0	3,686	3,686
24	92	Public Administration	386	132,278	119,918	252,196	65	100	135,677	135,777
Column totals =			13,735	35,555,911	5,863,715	**41.879 million**	1,032	2,894,015 (7%)	38,984,665 (93%)	**41.879 million (100%)**

Explanatory Notes:
* Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report (BR): http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
** Beneficial disposal = H050+H061
*** Non-beneficial = H040+H071+H073+H075+H076+H077+H081+H082+H083+H101+H103+H111+H112+H121+H122+H123+H124+H129+H131+H132+H134+H135.

Exhibit 5C Industrial Process/Activity Sources of Total Baseline Disposed RCRA Hazardous Wastes (2005)					
			A	B	C (A+B)
Item	Industrial Process/ Activity Hazardous Waste Generation Source Code		Beneficial disposal* (tons/year)	Non-beneficial disposal** (tons/year)	Total disposal (tons/year)
1	G01	Dip, flush or spray rinsing	181	218,696	218,877
2	G02	Stripping and acid or caustic cleaning	70	256,099	256,169
3	G03	Plating & phosphating	0	565,432	565,432
4	G04	Etching	< 1	656,479	656,479
5	G05	Metal forming & treatment	< 1	196,975	196,976
6	G06	Painting & coating	452	7,118	7,571
7	G07	Product & by-product processing	130,096	9,202,390	9,332,487
8	G08	Removal of spent process liquids or catalysts	101,663	3,676,031	3,777,694
9	G09	Other production or service-related processes	65,677	3,124,046	3,189,723
		Subtotal daily production, service or maintenance processes =	298,141	17,903,268	18,201,408
10	G11	Discarding off-spec or out-of-date chemicals or products	1,034	33,227	34,261
11	G12	Lagoon or sediment dragout and leachate collection	0	2,389	2,389
12	G13	Cleaning-out process equipment	2,172	423,798	425,970
13	G14	Removal of tank sludge, sediments or slag	54	5,945	5,999
14	G15	Process equipment change-out or discontinuation of use	12	513	524
15	G16	Oil changes and filter or battery replacement	460	351	811
16	G19	Other one-time or intermittent processes	2	57,846	57,848
		Subtotal one-time or intermittent events or processes =	3,734	524,068	527,802
17	G21	Air pollution control devices	1	2,705,462	2,705,462
18	G22	Lab analytical wastes	6,027	3,956	9,983
19	G23	Wasetewater treatment	18,430	3,377,729	3,396,159
20	G24	Solvent or product distillation or recovery	307,916	2,821,083	3,128,998
21	G25	Hazardous waste management	78,043	2,087,197	2,165,240
22	G26	Leachate collection	0	514,715	514,715
23	G27	Haz residual from treatment or recovery of universal waste	0	6,317	6,317
		Subtotal pollution control & waste management residuals =	410,417	11,516,459	11,926,875
24	G31	Accidental contamination of products, materials, containers	< 1	3,815	3,815
25	G32	Cleanup of spill residues (infrequent, not routine)	13	2,384	2,397
26	G33	Leak collection & floor sweeping ongoing, routine)	0	1,446	1,446
27	G39	Other cleanup of current contamination	0	96	96
		Subtotal spills & accidental releases =	13	7,741	7,754
28	G41	Closure of haz waste management unit under RCRA	2	43,251	43,253
29	G42	Correction action at solid waste mgmt unit under RCRA	0	4,130,721	4,130,721
30	G43	Remedial action or emergency response under CERCLA	0	124,202	124,202
31	G44	State program or voluntary cleanup	0	146,941	146,941

Exhibit 5C Industrial Process/Activity Sources of Total Baseline Disposed RCRA Hazardous Wastes (2005)					
			A	B	C (A+B)
Item	Industrial Process/ Activity Hazardous Waste Generation Source Code		Beneficial disposal* (tons/year)	Non-beneficial disposal** (tons/year)	Total disposal (tons/year)
32	G45	Underground storage tank cleanup	0	3	3
33	G49	Other remediation	< 1	236,548	236,548
		Subtotal remediation of past contamination =	3	4,681,666	4,681,669
34	G61	Received from offsite for storage/bulking for transfer offsite	98,216	99,833	198,048
35	G63 to G75	Imported from a foreign country	11,140	1,215	12,355
		Subtotal not physically generated onsite =	109,356	101,047	210,403
36	G??	Source code not provided (Form GM)	0	0	0
37	G??	Source code not available (Form WR)	2,072,352	4,250,416	6,322,769
		Column totals =	2,894,015 (7%)	38,984,665 (93%)	**41.879 million (100%)**

Explanatory Notes:
Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report (BR): http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
* Beneficial disposal = H050 + H061
** Non-beneficial disposal = H040 + H071 + H073 + H075 + H076 + H077 + H081 + H082 + H083 + H101 + H103 + H111 + H112 + H121 + H122 + H123 + H124 + H129 + H131 + H132 + H134 + H135

			A	B	C (A+B)
Exhibit 5D Physical Form of Total Baseline Disposed RCRA Hazardous Wastes (2005)					
Item	Biennial Report Physical Form Code		Beneficial disposal* (tons/year)	Non-beneficial disposal** (tons/year)	Total disposal (tons/year)
1	W001	Lab packs w/out acute haz waste	2,122	10,967	13,088
2	W002	Contaminated debris	4,416	257,213	261,630
3	W004	Lab packs w/acute haz waste	317	1,541	1,858
4	W301	Contaminated soil	1,144	441,580	442,723
5	W309	Batteries, battery parts, cores, casings	69	19,370	19,439
6	W310	Filters, adsorbents, ion exchange resins, spent carbon	3,152	27,452	30,604
7	W320	Electrical devices	92	1,123	1,215
8	W512	Sediment or lagoon dragout, drilling or other muds	1	39,341	39,342
9	W801	Compressed gases	6,610	4,368	10,978
		Subtotal mixed media/debris/devices =	17,922	802,954	820,875
10	W101	Very dilute aqueous waste >99% water	7,125	12,599,999	12,607,124
11	W103	Spent concentrated acid	1,545	1,276,756	1,278,301
12	W105	Acidic aqueous wastes <5% acid	2,671	4,815,506	4,818,176
13	W107	Aqueous waste containing cyanides	133	83,839	83,971
14	W110	Caustic aqueous waste or wastewaters	1,748	1,119,752	1,121,500
15	W113	Other aqueous waste or wastewaters	28,559	5,618,002	5,646,561
16	W117	Waste liquid mercury	25	14	38
17	W119	Other inorganic liquid	3,186	860,770	863,956
		Subtotal inorganic liquids =	44,990	26,374,638	26,419,628
18	W200	Still bottoms liquid form	35,775	61,143	96,918
19	W202	Concentrated halogenated solvent	15,349	40,146	55,494
20	W203	Concentrated non-halogenated solvent	294,378	104,452	398,830
21	W204	Concentrated halogenated/non-halo solvent mixture	530,935	128,223	659,158
22	W205	Oil-water emulsion/mixture	11,659	44,402	56,061
23	W206	Waste oil	27,883	6,758	34,641
24	W209	Paint, ink, lacquer or varnish	95,431	13,466	108,897
25	W210	Reactive or polymerizable organic liquids/adhesives	16,323	42,627	58,950
26	W211	Paint thinner or petroleum distillates	127,682	6,014	133,696
27	W219	Other organic liquid	1,011,857	7,647,476	8,659,334
		Subtotal organic liquids =	2,167,273	8,094,707	10,261,980
28	W303	Ash	3	190,006	190,008
29	W304	Slags, drosses, other solid thermal residues	20	559,547	559,567
30	W307	Metal scale, filings, scrap (including drums)	183	20,459	20,641
31	W312	Cyanide or metal cyanide bearing solids, salts, chems	< 1	25,665	25,665
32	W316	Metals salts or chemicals w/out cyanide	147	25,902	26,049

Exhibit 5D Physical Form of Total Baseline Disposed RCRA Hazardous Wastes (2005)					
			A	B	C (A+B)
Item	Biennial Report Physical Form Code		Beneficial disposal* (tons/year)	Non-beneficial disposal** (tons/year)	Total disposal (tons/year)
33	W319	Other inorganic solids	2,686	503,996	506,682
		Subtotal inorganic solids =	3,037	1,325,575	1,328,612
34	W401	Pesticide solids	103	5,815	5,918
35	W403	Solid resins, plastics, polymerized organics	7,148	30,235	37,383
36	W405	Explosives or reactive organic solids	6	22,806	22,812
37	W409	Other organic solids	56,208	101,662	157,870
		Subtotal organic solids =	63,465	160,518	223,983
38	W501	Lime or metal hydroxide sludges	50	179,873	179,923
39	W503	Gypsum sludges from wastewater or air treatment	86	3,005	3,092
40	W504	Other sludges from wastewater or air treatment	1,285	91,342	92,627
41	W505	Metal bearing sludges	37	330,994	331,031
42	W506	Cyanide-bearing sludges	16	4,659	4,676
43	W519	Other inorganic sludges	242	20,013	20,256
		Subtotal inorganic sludges =	1,716	629,887	631,603
44	W603	Oily sludge	25,553	67,481	93,034
45	W604	Paint or ink sludges, still bottoms	11,324	1,482	12,806
46	W606	Resins, tars, polymer, tarry sluge	37,624	2,803	40,427
47	W609	Other organic sludge	56,586	155,711	212,297
		Subtotal organic sludges =	131,087	227,476	358,563
48	W???	Physical form code not provided	464,525	1,368,911	1,833,436
		Totals =	2,894,015 (7%)	38,984,665 (93%)	**41.879 million (100%)**

Explanatory Notes:
Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report (BR): http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
* Beneficial disposal = H050 + H061
** Non-beneficial disposal = H040 + H071 + H073 + H075 + H076 + H077 + H081 + H082 + H083 + H101 + H103 + H111 + H112 + H121 + H122 + H123 + H124 + H129 + H131 + H132 + H134 + H135

Exhibit 5E Waste Codes Assigned to Total Baseline Disposed RCRA Hazardous Wastes (2005)						
			A	B	C (A+B)	
Item	RCRA Waste Code		Beneficial disposal* (tons/year)	Non-beneficial disposal** (tons/year)	Total disposal (tons/year)	
1	Dxxx	1 or more toxicity leaching test waste codes only	1,189,414	21,595,447	22,784,861	54%
2	Fxxx	1 or more non-specific industrial source waste codes only	118,323	1,550,660	1,668,983	4%
3	Kxxx	1 or more specific industrial source waste codes only	75,372	2,720,143	2,795,515	7%
4	Pxxx	1 or more "acutely hazardous" discarded or off-spec commercial chemical products, container residues & spill residues thereof	85	153,084	153,169	<1%
5	Uxxx	1 or more "toxic waste" commercial chemical products, manufacturing intermediates, or off-spec commercial chemical products	6,435	250,852	257,287	<1%
6	Mixed	Assigned with multiple waste codes from 2 or more categories above	1,234,460	12,288,403	13,522,863	32%
7	????	Waste code not provided	269,927	426,076	696,003	2%
		Column totals =	2,894,015	38,984,665	**41.879 million**	**100%**

Explanatory Notes:
Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report (BR): http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
* Beneficial disposal = H050 + H061
** Non-beneficial disposal = H040 + H071 + H073 + H075 + H076 + H077 + H081 + H082 + H083 + H101 + H103 + H111 + H112 + H121 + H122 + H123 + H124 + H129 + H131 + H132 + H134 + H135

5B. Methodology for Identifying Potentially Recyclable Wastes Currently Disposed

This section presents the data screening (i.e., data selection) criteria applied in this RIA to the baseline disposal data displayed in Exhibits 5A to 5E above. As described below, this screening process involves two steps:

- Step1: Primary screening criteria to identify disposed wastes containing constituents of potential commodity value
- Step 2: Secondary screening criteria to identify commodity-containing wastes of sufficient physical quality for recovery

The purpose of these complementary screening steps is to identify the baseline disposal quantities (i.e., 2005 tons per year) that may be physically and chemically sufficient for potential future switchover to recycling under the DSW final rule exclusions. The baseline disposal types and associated annual quantities which remain after applying this two-step data screening process, are applied in this RIA as inputs to the spreadsheet computations for the disposal switchover breakeven test described in Chapter 8 of this RIA. The breakeven test is executed in this RIA on a micro (i.e., waste stream-by-waste stream) basis, not on a facility-by-facility basis or industry-by-industry basis. The breakeven test represents a micro-economic financial test to determine if facilities may change their management practices for individual waste streams to obtain the potential economic benefits of the DSW final rule.

- **Step 1: Primary Screening Criteria Applied to Baseline Waste Disposal Data (Commodity Values)**

The first data screening step is structured according to each of the three RCRA baseline recycling methods (i.e., metals recovery, solvent recovery, and other recovery). Each materials recovery method is assigned as a "commodity group" according to the respective types of materials involved in each of these three recovery methods. Exhibit 5F below presents the primary data screening criteria applied in this RIA according to these three commodity groups. The screening criteria consist of three sequentially applied "if then" data selection criteria involving 67 different Biennial Report (BR) and RCRA waste codes:

- Wxxx: 16 BR physical/chemical form codes
- Gxx: 4 BR industrial process/activity source codes
- Dxxx, Fxxx, Kxxx: 47 RCRA regulatory waste codes

OSW identified and assigned the screening codes in each criteria based on determining whether each of these codes pertained to metals, solvents, or to other types of materials contained in the wastes which might be amenable for recovery in the three commodity groups.

The disposed quantities (i.e., 2005 tons) presented in Exhibits 5A to 5E above will not match the disposed quantities presented in Exhibits 5F to 5J below (which are applied in the breakeven test of this RIA). Exhibits 5A to 5E (except for column B of Exhibit 5B as noted previously) present the national baseline disposal picture based on the 2005 National Biennial Report (NBR) reporting logic. Given the numbers in Exhibits 5A to 5E are intended to add-up to the totals presented in the 2005 RCRA National Biennial Report, a compatible Biennial Report database query logic was used to complete those exhibits. However, the resultant disposed quantities presented in Exhibits 5A to 5E are higher than those used in the breakeven test as presented in Exhibits 5F to 5J. The difference in disposed quantities between these two sets of exhibits are due to the following technical reasons pertaining to (a) how the Biennial Report data reporting forms are structured/designed and (b) there are different BR data reporting forms which separately target LQGs (i.e., "Form GM") and TSDFs (i.e., "Form WR"):

1. The onsite quantity disposed totals in Exhibit 5A (column G) from the 2005 NBR are sums of the numbers reported in Biennial Report Form GM, Sec. 1, F. Quantity Generated in 2005 (see attached 2005 BR Form GM). The on-site quantity disposed totals used in the analysis are those reported in Form GM, Sec. 2, On-site Process System 1 and On-site Process System 2. These numbers sometimes do not match because either there is a reporting/data entry error, not all of the quantity generated is recovered (i.e., some may be disposed), or not all of the quantity generated in 2005 was recovered in 2005.

2. Source code G61 (received from offsite for storage/bulking for transfer offsite) waste is excluded in the breakeven test of this RIA given the waste is not physically generated on site (see Exhibit 5C, Item 34) by the generator.
3. The off-site management totals in Exhibit 5A (column H) from the 2005 NBR are based on waste receipts (i.e., wastes reported received from off site for management on Form WR). The off-site management totals used in the cost analysis are based on reported shipments on Form GM. The quantities reported shipped for off-site recovery in Form GM, Sec. 3, Site 1, Site 2, and Site 3 are used.
4. Step 2 of this data screening methodology Exhibit 5F and Exhibit 5G present screening selection criteria that eliminate much of the disposed quantities presented in Exhibits 5A through 5F.

Exhibit 5F
Primary Screening Selection Criteria Applied to Baseline Disposal Data for Evaluating Potential Future Switchover to Recycling Under the DSW Final Rule Exclusions
(Note: the three criteria in this exhibit represent "IF THEN" criteria*)

Criterion A	Criterion B	Criterion C
BR Physical/Chemical Form Codes**	BR Industrial Process/ Activity Generation Source Codes**	RCRA Regulatory Codes**
Commodity Group #1: For Possible Metal Recovery:		
Include form codes: (n=10) • W107 wastes containing cyanides • W117 waste liquid mercury • W303 ash • W304 slags, drosses, other solid thermal residues • W307 metal scale, filings & scrap (metal drums) • W312 cyanide or metal cyanide solids, chemicals • W316 metal salts or chemicals w/out cyanides • W501 lime and/or metal hydroxide sludges/solids • W505 metal bearing sludges w/out cyanide • W506 cyanide-bearing sludges (non cont.soils)	For wastes with no reported form codes include source codes: (n=2) • G03 plating & phosphating • G04 etching	For wastes with no reported form codes and no reporting source codes G03 or G04 include RCRA waste codes: (n=38) • D005 barium • D006 cadmium • D007 chromium • D008 lead • D009 mercury • D010 selenium • D011 silver • F006, F007, F008, F009 metal electroplating • F010, F011, F012 metal heat treating • F019 sludge from conversion coating of aluminum • F035 inorganic wood preservative waste (arsenic or chromium) • K002, K003, K004, K005, K006, K007, K008 inorganic pigment mfg sludge & residues (listed for chromium) • K064, K065, K066, K069, K086, K100 lead- or chromium-bearing • K061 iron & steel mfg emission dust • K071, K073, K106, K176, K177, K178 inorganic chemical mfg • K171, K172 petroleum refining spent catalysts
Commodity Group #2: For Possible Solvent Recovery:		
Include form codes: (n=5)	For wastes with no reported	For wastes with no reported form codes and no reporting G01 or G06

Exhibit 5F Primary Screening Selection Criteria Applied to Baseline Disposal Data for Evaluating Potential Future Switchover to Recycling Under the DSW Final Rule Exclusions (Note: the three criteria in this exhibit represent "IF THEN" criteria*)		
Criterion A	Criterion B	Criterion C
BR Physical/Chemical Form Codes**	BR Industrial Process/ Activity Generation Source Codes**	RCRA Regulatory Codes**
• W202 concentrated halogenated organic liquids • W203 concentrated non-halogenated organic liquids • W204 concentrated halo/non-halogenated solvents • W209 paint, ink, lacquer or varnish • W211 paint thinner or petroleum distillates	form codes include source codes: (n=2) • G01 dip, flush or spray rinsing (using solvents) • G06 painting & coating	include RCRA waste codes: (n=8) • F001, F002, F003, F004, F005 spent solvents • F024, F025 chlorinated aliphatic mfg • K086 solvent washes of ink equipment
Commodity Group #3: For Possible Other Recovery (Carbon Regeneration and Sodium Fluoride)*		
Include form codes: (n=1) • W310 filters, solid adsorbents, ion exchange resins and spent carbon (this RIA evaluates carbon only) • Note: not included are spent acids >5% (W103)***	---	For wastes with no reported form codes include RCRA waste codes and form code W312 reported with K088 waste code move from Category 1 to Category 3: (n=1) • K088 aluminum production spent potliners (sodium fluoride)
Total codes A =16	Total codes B =4	Total codes C =47

Explanatory Notes:
* IF THEN = The three criteria in this exhibit represent sequential database query criteria within each waste type row. First the waste code data were pulled (criterion A), and for remaining data with missing waste codes, the regulatory waste code data were pulled (criterion B), then for remaining data with missing waste codes, the source code data were pulled (criterion C).
**There are a total 47 Wxxx codes, 47 Gxxx codes, 40 Dxxx codes, 28 Fxxx codes, 120 Kxxx, codes, 205 Pxxx codes, and , 612 Uxxxx codes defined for data reporting to the RCRA Biennial Report (BR): .for complete lists see pp. 49 to 54 of the 2005 BR instructions book at: http://www.epa.gov/epaoswer/hazwaste/data/br05/05report.pdf
*** Upon review of W103 spent acids > 5%, G02 stripping and acid or caustic cleaning, and G05 metal forming and treatment waste streams nearly all the waste is not suitable for switchover to off-site other recovery. Much of the waste are dilute acid wastes that are disposed in on-site wastewater treatment systems followed by POTW/sewer or NPDES discharge or disposed by Class I UIC permitted deep-well injection. These disposal methods are cheap compared to offsite recovery. It will not be more economical to ship these wastes offsite for other recovery. It is beyond the time and resource constraints of this RIA to individually carry these records through the analysis. A small quantity (< 4,000 tons) of spent pickle liquor (K062) was identified. The quantity is too small to carry forward through the analysis.

- **Step 2: Secondary Screening Criteria Applied to Baseline Waste Disposal Data (Physical Quality)**

Exhibit 5G below presents the secondary screening criteria applied to baseline disposal wastes The purpose of these secondary screening criteria are to introduce a consideration of the anticipated physical quality of baseline disposed waste streams, prior to evaluating them in the disposal-switchover-to-recycling breakeven test of this RIA. The secondary screening criteria consist of six elements as follows:

(1) Remove disposed waste records that were residuals from hazardous waste management processes. Residuals generated by either (a) current materials recovery operations (H010, H020, H039), (b) energy/fuel recovery operations (H050, H061), or (c) thermal destructive treatment processes (H040), are assumed not to have a high content of recoverable material and are assumed will continue to be disposed. This corresponds to removing baseline disposal data records with source code G25. Disposed wastes with RCRA waste codes F006 and F007 were retained because these potentially recoverable wastes were often reported using this source code because they are derived from wastewater treatment processes.

(2) Remove disposed waste records that were wastes generated from industrial processes that are not continuous (e.g., those generated from remediation or one-time industrial activities). The material values from these wastes are less likely to be recoverable given they are not generated in a controlled process environment (i.e., remediation wastes involve spills and releases to the environment). Given their one-time nature of generation, generators are unlikely to go through the notification process to the agency for an exclusion from the definition of solid waste for a one-time waste generation event. This corresponds to removing baseline disposal data records corresponding to three sets of non-continuous source codes: (a) spills and accidental releases G31, G32, G33, G39, (b) remediation of past contamination G41, G42, G43, G44, G45, G49, and (c) non-periodic activities G12, G15, G19.

(3) Remove disposed wastes with waste descriptions containing the word "debris" from the data set. The material values from these wastes are less likely to be recoverable given they are not generated in a controlled process environment. Given their one-time nature of generation, generators are unlikely to go through the notification process to the agency for an exclusion from the definition of solid waste for a one-time waste generation event.

(4) Remove wastes with waste descriptions indicating they are "rinsewaters"or "groundwaters" to ensure the physical quality of the waste (i.e., the minimal recoverable material concentration) is technically sufficient for recovery. These dilute aqueous-based wastes typically do not contain recoverable fractions of valuable materials. This screening criteria was only applied to waste streams with no reported form code. Normally wastes like these would have a reported form code of W101 very dilute aqueous waste containing more than 99% water and W105 acidic aqueous wastes less than 5% acid.

(5) Remove some miscellaneous disposed wastes:

    a. Onsite Commodity Group #2 baseline disposal quantities were primarily disposed by non-beneficial incineration (H040), or by beneficial energy recovery (H050), or beneficial fuel blending (H061). For the purposes of this RIA, it is assumed that facilities which both generate and dispose wastes on site via beneficial energy or fuel recovery (i.e., H050 or H061) will not change to a materials recovery process under the DSW final rule exclusions. All these processes require relatively large onsite capital investments and air pollution control permitting costs, which make it less likely that onsite H040, H050 or H061 disposed wastes will switchover to materials recovery under the DSW exclusions. This corresponds to removing baseline disposal data records for onsite waste generation GM Form Section 2 H040, H050 and H061. However, this RIA subjects the disposal data records corresponding to offsite disposal Form GM involving these three waste codes (i.e., H040, H050, H061) to the breakeven test for switchover to recovery/recycling.

b. All records with form code W310 not containing the word "carbon" or "charcoal" in the waste description were deleted from the list of disposed spent carbon wastes. This is necessary because the definition of the W310 physical/chemical form code allows reporting together in this single code, four different types of materials: (1) filters, (2) solid adsorbents, (3) ion exchange resins, and (4) spent carbons. Because of lack of characterizing data on the other three waste types, only spent carbon from these four waste types is evaluated in this RIA for potential switchover to recovery.

(6) Because of the fact there are tens of thousands of individual waste streams in the Biennial Report database for any given data year, it is beyond the time and resource constraints of this RIA to individually examine each narrative comment for baseline disposed wastes containing these "other" code sub-categories to determine whether they should be included in the breakeven test of this RIA. This corresponds to removing baseline disposal data records for H129 "other treatment". However, this RIA does include the H039 "other recovery or reclamation" catch-all sub-category in the baseline recycling data records analyzed elsewhere in this RIA for potential DSW exclusion de-regulatory cost savings. The "other" form codes already were removed by their exclusion from the "primary" screening selection criteria.

Exhibit 5G
Summary of Outcome of Primary & Secondary Screening Criteria
Applied to Baseline Disposal Wastes to be Evaluated for Switchover to Recycling

Secondary Selection Criteria	Remaining & Removed Disposal Quantities (2005 tons per year)	Total Remaining Baseline Disposal Quantity (2005 tons per year)
A. Primary Selection Criteria:		
Commodity Group 1	1,687,044	
Commodity Group 2	1,247,510	
Commodity Group 3	161,961	
Total Baseline Disposed Quantity Remaining	3,096,515	3,096,515
B. Secondary Screening Criteria:		
1. Remove Source Code G25	-624,668	2,471,847
2. Remove Wastes Generated by Non-Continuous Processes	-73,671	2,398,176
3. Remove Debris-Wastes	-23,225	2,374,951
4. Remove Rinsewaters and Groundwaters	-8,913	2,366,038
5. Remove Other Waste Specific Quantity	-235,443	2,130,595
6. Remove "Other Treatment" Quantity	-45,953	2,084,642
	Column Total =	**2.085 million**

5C. Resultant Screening Selection Quantities of Baseline Disposal that May Switchover to Recycling

Exhibits 5H through 5J below present the resultant types and quantities (i.e., tons per year in relation to the baseline data year 2005 applied in this RIA) of the baseline disposed hazardous waste data selected by the screening listed in Exhibits 5F and 5G above, which are applied in the new recycling "breakeven test" in this RIA (Chapter 8).

Exhibit 5H
Screening Selection Results of Baseline Disposal for Recycling Breakeven Test by Ultimate* Disposal Method (2005)

Item	Disposal Method Code	Disposal Description	2005 Count of Facilities Disposing			2005 Tons Disposed (management quantity)		
			Onsite	Offsite (Shipped)	Total Facilities	Onsite (tons/year)	Offsite (tons/year)	Total (tons/year)
A. Beneficial Disposal Methods (n=2):								
1	H050	Energy Recovery	3	945	946	1	155,333	155,334
2	H061	Fuel Blending	0	4,822	4,822	0	304,363	304,363
		Subtotal beneficial disposal =	---	---	---	1	459,696	459,697
B. Non-Beneficial Disposal Methods (n=23):								
1	H040	Incineration	21	2,319	2,330	2,497	120,724	123,222
2	H071	Chemical Reduction	9	103	110	7,108	6,103	13,210
3	H073	Cyanide Destruction	29	85	109	65,671	1,052	66,722
4	H075	Chemical Oxidation	0	17	17	0	320	320
5	H076	Wet Air Oxidation	0	3	3	0	26	26
6	H077	Other Chemical Precipitation	11	188	197	1,023	11,864	12,886
7	H081	Biological Treatment	0	22	22	0	8,385	8,385
8	H082	Adsorption	0	8	8	0	21	21
9	H083	Air Or Steam Stripping	0	8	8	0	480	480
10	H101	Sludge Treatment And/or Dewatering	28	53	77	1,257	1,350	2,607
11	H103	Absorption	0	9	9	0	140	140
12	H111	Stabilization Or Chemical Fixation	13	855	862	8,157	154,442	162,599
13	H112	Macro-Encapsulation	4	42	44	288	959	1,247
14	H121	Neutralization Only	5	56	58	13	300	314
15	H122	Evaporation	10	7	15	1,873	39	1,912
16	H123	Settling Or Clarification	5	6	9	24	487	511
17	H124	Phase Separation	3	16	17	5	160	165
18	H129	Other Treatment	0	0	0	0	0	0
19	H131	Land Treatment Or Application	4	124	125	40	31,323	31,363
20	H132	Landfill Or Surface Impoundment	10	570	577	88,864	349,272	438,136
21	H134	Deepwell Or Underground Injection	0	38	38	0	4,032	4,032
22	H135	Discharge To Sewer/POTW Or NPDES	10	42	50	294,096	2,110	296,207

23	H141	Site receiving waste stored/bulked & transferred the waste with no treatment or recovery, fuel blending, or disposal at the receiving site.	62	3,728	3,765	87,821	372,600	460,421
24	H???	Disposal method not provided	0	1	1	0	18	18
		Subtotal non-beneficial disposal =	---	---	---	558,737	1,066,207	1,624,944
		Column totals =	---	---	---	558,738 (27%)	1,529,903 (73%)	**2.085 million (100%)**

Note: * Ultimate disposal = Some hazardous wastes undergo one or more sequential treatment (e.g., chemical neutralization) methods prior to ultimate disposal (i.e., final disposition). Generators report the ultimate disposal of their hazardous wastes on Form GM, Sec. 2 and Sec. 3.

Exhibit 5I
Screening Selection Results of Baseline Disposed Hazardous Wastes for Recycling Breakeven Test
By Identity of Industries Generating & Disposing RCRA Hazardous Wastes Which are Currently Disposed (2005)*

			A	B	C (A+B)	D	E	F (D+E)
			Location of Generation Tons Per Year			Location of Disposal Tons Per Year		
Item	Economic Subsector (2-digit NAICS Code)		Generation disposed onsite	Generation disposed offsite (shipped)	Total generation disposed	Beneficial disposal*	Non-beneficial disposal**	Total disposal
1	11	Ag, Forestry, Fishing & Hunting	0	3	3	0	0	0
2	21	Mining	0	4,522	4,522	11,475	761	12,236
3	22	Utilities	0	10,632	10,632	0	12	12
4	23	Construction	0	4,418	4,418	1	0	1
5	31	Manufacturing	0	5,263	5,263	0	0	0
6	32	Manufacturing	295,316	509,245	804,561	145,162	439,346	584,508
7	33	Manufacturing	177,120	770,386	947,506	0	179,650	179,650
8	42	Wholesale Trade	62	10,173	10,236	3,120	3,065	6,185
9	44	Retail Trade	0	94	94	0	0	0
10	45	Retail Trade	0	148	148	0	0	0
11	48	Transportation	100	23,583	23,683	246	295	541
12	49	Postal, Couriers, Messengers Storage	4	10,768	10,772	4,686	1,336	6,022
13	51	Information	0	2,223	2,223	50	42	91
14	52	Finance & Insurance	0	18	18	0	0	0
15	53	Real Estate, Rental & Leasing	0	410	410	10	27	37
16	54	Prof, Scientific & Tech Services	42	10,024	10,066	17	323	340
17	55	Mgt of Companies/Enterprises	0	14	14	0	0	0
18	56	Admin, Waste Mgt & Remediation	86,045	147,983	234,028	289,798	951,401	1,241,199
19	61	Educational Services	0	3,093	3,093	2	186	187
20	62	Health Care, Social Assistance	0	2,396	2,396	0	0	0
21	71	Arts, Entertainment, Recreation	0	277	277	0	36	36
22	72	Accommodation & Food Services	0	0	0	0	0	0
23	81	Other Services	0	2,971	2,971	0	3	3
24	92	Public Administration	48	7,260	7,308	0	147	147
25	??	NAICS code not reported	0	0	0	5,130	48,315	53,445
		Column totals =	558,738 (27%)	1,525,904 (73%)	**2,085 million (100%)**	459,697 (22%)	1,624,945 (78%)	**2,085 million (100%)**

Explanatory Notes:
Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report (BR): http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
* Beneficial disposal = H050 + H061; ** Non-beneficial disposal = H040 + H071 + H073 + H075 + H076 + H077 + H081 + H082 + H083 + H101 + H103 + H111 + H112 + H121 + H122 + H123 + H124 + H129 + H131 + H132 + H134 + H135 + H141

Exhibit 5J

Screening Selection Results of Baseline Disposal for Recycling Breakeven Test by Industries Generating Disposed Hazardous Wastes (2005)

			A	B	C	D
Item	Economic Subsector (2-digit NAICS Code)		Commodity Group 1 disposal	Commodity Group 2 disposal	Commodity Group 3 disposal	Total Disposal
1	11	Agriculture, Forestry, Fishing & Hunting	0	3	0	3
2	21	Mining	110	2,774	1,637	4,522
3	22	Utilities	611	10,019	3	10,632
4	23	Construction	300	4,119	0	4,418
5	31	Manufacturing	1,890	3,366	7	5,263
6	32	Manufacturing	340,311	459,945	4,305	804,561
7	33	Manufacturing	854,418	92,834	254	947,506
8	42	Wholesale Trade	1,306	8,879	51	10,236
9	44	Retail Trade	0	94	0	94
10	45	Retail Trade	4	144	0	148
11	48	Transportation	20,338	3,326	19	23,683
12	49	Postal, Couriers, Messengers, Storage	564	10,117	91	10,772
13	51	Information	0	2,200	22	2,222
14	52	Finance & Insurance	0	18	0	18
15	53	Real Estate, Rental & Leasing	4	407	0	411
16	54	Professional, Scientific & Tech Services	396	9,656	14	10,066
17	55	Mgt of Companies/Enterprises	0	14	0	14
18	56	Admin, Waste Mgt & Remediation	171,796	62,032	200	234,028
19	61	Educational Services	112	2,975	6	3,093
20	62	Health Care, Social Assistance	20	2,376	0	2,396
21	71	Arts, Entertainment, Recreation	1	276	0	277
22	72	Accommodation & Food Services	0	0	0	0
23	81	Other Services	86	2,885	0	2,971
24	92	Public Administration	3,754	3,470	84	7,308
25	??	NAICS code not provided	0	0	0	0
		Column totals =	1,396,019 (67%)	681,928 (33%)	6,694 (<1%)	**2.085 million (100%)**

Exhibit 5K Screening Selection Results of Baseline Disposal for Recycling Breakeven Test by Physical Form of Total Baseline Disposed RCRA Hazardous Wastes (2005)						
			A	B	C	D (A+B+C)
Item	Biennial Report Physical Form Code		Commodity Group 1 disposal	Commodity Group 2 disposal	Commodity Group 3 disposal	Total disposal
1	W001	Lab packs w/out acute haz waste	0	0	0	0
2	W002	Contaminated debris	0	0	0	0
3	W004	Lab packs w/acute haz waste	0	0	0	0
4	W301	Contaminated soil	0	0	0	0
5	W309	Batteries, battery parts, cores, casings	0	0	0	0
6	W310	Filters, adsorbents, ion exchange resins, spent carbon	23	0	5,084	5,107
7	W320	Electrical devices	0	0	0	0
8	W512	Sediment or lagoon dragout, drilling or other muds	0	0	0	0
9	W801	Compressed gases	0	0	0	0
		Subtotal mixed media/debris/devices =	23	0	5,084	5,107
10	W101	Very dilute aqueous waste >99% water	0	0	0	0
11	W103	Spent concentrated acid	0	0	0	0
12	W105	Acidic aqueous wastes <5% acid	0	0	0	0
13	W107	Aqueous waste containing cyanides	89,361	0	1,610	10,214
14	W110	Caustic aqueous waste or wastewaters	0	0	0	0
15	W113	Other aqueous waste or wastewaters	0	0	0	0
16	W117	Waste liquid mercury	134	0	0	134
17	W119	Other inorganic liquid	0	0	0	0
		Subtotal inorganic liquids =	89,495	0	1,610	91,105
18	W200	Still bottoms liquid form	0	0	0	0
19	W202	Concentrated halogenated solvent	0	12,394	0	12,394
20	W203	Concentrated non-halogenated solvent	0	259,999	0	259,999
21	W204	Concentrated halogenated/non-halo solvent mixture	0	160,478	0	160,478
22	W205	Oil-water emulsion/mixture	0	0	0	0
23	W206	Waste oil	0	0	0	0
24	W209	Paint, ink, lacquer or varnish	0	79,946	0	79,946
25	W210	Reactive or polymerizable organic liquids/adhesives	0	0	0	0
26	W211	Paint thinner or petroleum distillates	0	36,663	0	36,663
27	W219	Other organic liquid	0	0	0	0
		Subtotal organic liquids =	0	549,480	0	549,480
28	W303	Ash	61,400	0	0	61,400

Exhibit 5K
Screening Selection Results of Baseline Disposal for Recycling Breakeven Test by Physical Form of Total Baseline Disposed RCRA Hazardous Wastes (2005)

			A	B	C	D (A+B+C)
Item	Biennial Report Physical Form Code		Commodity Group 1 disposal	Commodity Group 2 disposal	Commodity Group 3 disposal	Total disposal
29	W304	Slags, drosses, other solid thermal residues	320,361	0	0	320,361
30	W307	Metal scale, filings, scrap (including drums)	27,586	0	0	27,586
31	W312	Cyanide or metal cyanide bearing solids, salts, chems	1,184	0	0	1,184
32	W316	Metals salts or chemicals w/out cyanide	28,444	0	0	28,444
33	W319	Other inorganic solids	11,068	0	0	11,068
		Subtotal inorganic solids =	450,043	0	0	450,043
34	W401	Pesticide solids	0	0	0	0
35	W403	Solid resins, plastics, polymerized organics	0	0	0	0
36	W405	Explosives or reactive organic solids	0	0	0	0
37	W409	Other organic solids	0	0	0	0
		Subtotal organic solids =	0	0	0	0
38	W501	Lime or metal hydroxide sludges	124,120	0	0	124,120
39	W503	Gypsum sludges from wastewater or air treatment	0	0	0	0
40	W504	Other sludges from wastewater or air treatment	0	0	0	0
41	W505	Metal bearing sludges	412,633	0	0	412,633
42	W506	Cyanide-bearing sludges	161,257	0	0	161,257
43	W519	Other inorganic sludges	0	0	0	0
		Subtotal inorganic sludges =	573,890	0	0	573,890
44	W603	Oily sludge	0	0	0	0
45	W604	Paint or ink sludges, still bottoms	0	0	0	0
46	W606	Resins, tars, polymer, tarry sluge	0	0	0	0
47	W609	Other organic sludge	0	0	0	0
		Subtotal organic sludges =	0	0	0	0
48	W???	Physical form code not provided	158,450	132,449	0	290,899
		Totals =	1,396,019 (67%)	681,928 (33%)	6,694 (<1%)	**2.085 million (100%)**

Notes: Data Source: USEPA 2005 RCRA Hazardous Waste Biennial Report: http://www.epa.gov/epaoswer/hazwaste/data/br05/index.htm
* Beneficial disposal = H050 + H061; ** Non-beneficial disposal = H040 + H071 + H073 + H075 + H076 + H077 + H081 + H082 + H083 + H101 + H103 + H111 + H112 + H121 + H122 + H123 + H124 + H129 + H131 + H132 + H134 + H135 + H141.

Chapter 6
Estimate of Potential Reduction in RCRA Regulatory Burden on Affected Industries

6A. Regulatory Burden Reduction Estimation Methodology

This chapter quantifies and monetizes potential changes in the regulatory compliance burden (i.e., administrative paperwork plus technical standards) associated with changes in RCRA regulatory status of the industrial materials and industrial facilities under each DSW final rule exclusion. Baseline RCRA regulatory burdens on the regulated community (i.e., industrial hazardous waste generators, transporters, receivers) include different types of paperwork reporting to USEPA-authorized state governments, onsite recordkeeping, RCRA permitting of waste management units, waste transport manifesting, and meeting technical standards for design, construction, operation and closure of waste management units. Essentially, these are the baseline compliance costs associated with administering a facility's RCRA hazardous waste program. For this chapter, potential impacts are estimated by comparing (a) the baseline cost for current RCRA Subtitle C compliance of affected materials and facilities, to (b) the expected future de-regulated costs under each DSW exclusion, where the difference between these two costs is the potential "net cost savings" estimate.

- Baseline burden (pre-rule): Labor hour estimates for current RCRA paperwork tasks coincide with Information Collection Request (ICR) supporting statements for the RCRA hazardous waste program.[17] An ICR describes reporting, record keeping, survey, or other information collection requirements imposed on the public (e.g., households, industry) by a Federal agency such as the USEPA. The ICR provides an overview of the collection, and estimates the cost and time for the public to respond. ICR paperwork burden, referred to as RCRA administrative requirements in this chapter, are evaluated for compliance with 40 CFR 262 generator standards such as manifest, pre-transport, recordkeeping, reporting, and differences in regulatory requirements for facilities that are LQGs verses SQGs or CESQGs.
- New burden (post-rule): For example, notification to RCRA-authorized state governments (or USEPA regional offices) for excluded materials will be required, which represents an implementation cost for de-regulation The burden of this exclusion notification is signing by a corporate official, requiring notification of the receiving facility, submitting an annual report on recycling activities, and maintaining onsite records of excluded recycling activities.

Exhibit 6A presents 14 baseline RCRA regulatory burden requirements itemized according to RCRA-regulatory facility status as LQGs, SQGs, CESQGs, and TSDFs. The generator status of a facility may change when recycled wastes are no longer counted as

[17] The RCRA hazardous waste program ICRs from which unit costs are applied in this RIA are ICR 2106.01, ICR 801, ICR 820, ICR 976, ICR 1189.14, ICR 1572, and ICR 1573. USEPA ICRs are available from OMB's Federal agency ICR inventory at: http://www.reginfo.gov/public/do/PRAMain

hazardous waste under the DSW rule, resulting in different RCRA administrative requirements. The non-recycled quantity of hazardous waste a facility generates will determine its post-rule generator status and RCRA requirements. Some facilities may generate no RCRA hazardous waste post-rule. Also, if LQGs, SQGs, and CESQGs recycle more waste they may further reduce their generator status (i.e., switch from large to small or conditionally exempt or from small to conditionally exempt or may no longer be a generator). A summary of potential cost impacts for each regulatory requirement, pre- and post-rule, are included in Exhibit 6A that may result from the DSW rule. As noted above, CESQGs already have exclusions from many RCRA administrative requirements because of their small annual generation rate (less than 100 kilograms per month or 1.3 tons per year).

Exhibit 6A
Summary of 14 Baseline RCRA Subtitle C Regulatory Requirements by Facility Classification

Item	RCRA Subtitle C Requirement	Facility Regulatory Classification				Assumed Regulatory Burden Cost Impacts on Facilities
		LQG	SQG	CESQG	TSDRF	
1	Obtain USEPA ID Number	Required	Required	Not required	Required	Assumed no cost savings because generators already have incurred costs for obtaining USEPA ID numbers
2	Personnel Training	Required (40 CFR 262.34)	Basic training required (40 CFR 262.34)	Not required	Required	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
3	Recordkeeping	Required for manifests, exception report, and biennial report.	Required for manifests and exception reports.	Not required	Required for manifests, exception report, and biennial report	Cost savings incurred if recycled waste not defined as a hazardous waste or if generator becomes a SQG or CESQG with exclusion .
4	Exception Report	Required within 45 days of hazardous waste being accepted by initial transporter	Required within 60 days of hazardous waste being accepted by initial transporter	Not Required	See Generator Requirements	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
5	Biennial Reporting	Required	Not required	Not required	Required	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
6	Storage Requirements for Accumulated Hazardous Waste	Full compliance with management of containers or tanks	Basic requirements with technical standards for containers or tanks	None	Full compliance with management of containers or tanks	Assumed no cost savings if generator status changes because facilities already have incurred costs.
7	Part B Permit Renewal	None	None	None	Required	Costs savings incurred by permitted recycling facilities with exclusion. If they only recycle waste, they will incur facility-wide permit renewal savings. Otherwise, they only will incur savings associated with the permit renewal for the storage area

Exhibit 6A Summary of 14 Baseline RCRA Subtitle C Regulatory Requirements by Facility Classification						
Item	RCRA Subtitle C Requirement	Facility Regulatory Classification				Assumed Regulatory Burden Cost Impacts on Facilities
		LQG	SQG	CESQG	TSDRF	
						associated with the recycling process.
8	Use Manifests	Required	Required, unless the waste is reclaimed under a contractual agreement	Not required	See Generator Requirements	Cost savings incurred if recycled waste not defined as a hazardous waste or if generator becomes a SQG (with contract agreement) or CESQG with exclusion.
9	Preparadeness & prevention	Required	Not Required	Not Required	Required	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
10	Contingency Plan	Required	Not required	Not required	Permit Requirement	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
11	Emergency Plan	Required	Not required	Not required	Permit Requirement	Cost savings incurred if generator becomes a SQG or CESQG with exclusion.
12	Facility closure	Not required	Not required	Not Required	Required	
13	Post-closure care	Not required	Not required	Not required	Required	
14	Accumulation Time	90 days "Speculative accumulation" provisions (40 CFR 261.1(c)(8)) require that during a calendar year the amount of material that is recycled, or transferred to a different site for recycling, must equal at least 75% by weight or volume of the material at the beginning of the period.	180 days [or 270 days if transported more than 200 miles] "Speculative accumulation" provisions (40 CFR 261.1(c)(8)) require that during a calendar year the amount of material that is recycled, or transferred to a different site for recycling, must equal at least 75% by weight or volume of that material at the beginning of the period.	None	90 days	Cost savings incurred if generator becomes a SQG or CESQG with exclusion. Cost savings for longer speculative accumulation time limits for recycled materials.
Column total requirements =		**11**	**7**	**0**	**14**	

6B. Unit Costs for Baseline RCRA Regulatory Burden

This section describes how the RCRA baseline unit cost estimates were developed. Cost estimates are not developed for RCRA requirements where no changes in costs are anticipated pre- and post-DSW rule or because it is an infrequent event, for example:

- Obtaining an USEPA identification number
- Preparing an exception report (this is an unpredictable event that does not frequently occur)
- Complying with storage requirements for accumulated hazardous waste

Exhibit 6B provides a summary of 14 RCRA baseline unit costs applied in this RIA to estimate the potential net cost savings estimates for the DSW rule. **Appendix B** to this RIA provides the data and computations for these baseline RCRA regulatory unit costs.

Exhibit 6B
Summary of 14 Baseline RCRA Regulatory Burden Unit Costs
For RCRA Hazardous Wastes Potentially Affected by the DSW Rule

A	B	C	D	E	F	G
	Baseline RCRA hazardous waste (Subtitle C) regulatory requirements					
Item	Activity	40 CFR Citation	Type of applicable facility*	Average unit cost & cost frequency per RCRA regulatory burden activity by type of facility which incurs this baseline regulatory cost	How this cost element is applied for cost savings estimation in this RIA	Unit cost supplemental information & references**
1	EPA ID Number	262.12 264.11	LQGs, SQGs TSDRFs	---	---	Unit cost not estimated. Assumed no cost savings.
2	Personnel training	262.34, 264.16 & 265.16	LQGs, SQGs TSDRFs	• Haz Waste Handling: o LQG: $2,726/year o SQG: $847/year o CESQG: $0/year • Manifest Preparation: o LQG/SQG: $335/year o CESQG: $0/year	Annual for facilities that change generator status (i.e., LQGs which are estimated to become SQGs, and for SQGs which are estimated to become CESQGs)	Supporting Statement for ICR Number 820.10 Hazardous Waste Generator Standards, Jan 2008
3	Record-keeping	262.40 263.22 264.74 & 265.75	LQGs, SQGs Transporters TSDRFs	• LQG: $702/year • SQG: $468/year • CESQG: $234/year	Annual for facilities that change generator status	DPRA professional judgment
4	Manifest Exception Report	262.42	LQGs, SQGs. TSDRFs	---	---	Not estimated; unpredictable event does not frequently occur.
5	Biennial reporting	262.41 264.75 & 265.75	LQGs TSDRFs	LQG: $364/year	Annual for facilities that change generator status	Supporting Statement for USEPA ICR Number 976.13 "The 2007 Hazardous Waste Report", Sept 18, 2007

<table>
<tr><th colspan="7">Exhibit 6B
Summary of 14 Baseline RCRA Regulatory Burden Unit Costs
For RCRA Hazardous Wastes Potentially Affected by the DSW Rule</th></tr>
<tr><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th></tr>
<tr><th rowspan="2">Item</th><th colspan="3">Baseline RCRA hazardous waste (Subtitle C) regulatory requirements</th><th rowspan="2">Average unit cost & cost frequency per RCRA regulatory burden activity by type of facility which incurs this baseline regulatory cost</th><th rowspan="2">How this cost element is applied for cost savings estimation in this RIA</th><th rowspan="2">Unit cost supplemental information & references**</th></tr>
<tr><th>Activity</th><th>40 CFR Citation</th><th>Type of applicable facility*</th></tr>
<tr><td>6</td><td>Storage requirements for accumulated Has Waste</td><td>265 Subparts I, J, W, AA, BB & CC</td><td>LQGs, SQGs, TSDRFs</td><td>---</td><td>---</td><td>Unit cost not estimated. Assumed there would be no incremental cost savings.</td></tr>
<tr><td>7</td><td>RCRA Subtitle C Part B permit renewal</td><td>270</td><td>TSDRFs</td><td>• Metal Type Wastes: $2,445 to $4,890/year
• Solvent/Acid Type Wastes: $2,418 to $4,836/year</td><td>Annual for permitted recycling facilities</td><td>USEPA, Office of Regulatory Enforcement, Estimating Costs for the Economic Benefits of RCRA Noncompliance, Sept 1994.</td></tr>
<tr><td rowspan="3">8</td><td rowspan="3">Use manifest</td><td>262 Sub B</td><td>LQGs, SQGs</td><td rowspan="3">• LQG: $48.30/manifest
• SQG & Nonhazardous Shipments: $47.63/manifest</td><td rowspan="3">Annual for facilities that change generator status</td><td rowspan="3">Supporting Statement for ICR Number 801.15 "Requirements for Generators, Transporters, & Waste Management Facilities Under the RCRA Hazardous Waste Manifest System.", Dec 30, 2004</td></tr>
<tr><td>263 Sub B</td><td>Transporters</td></tr>
<tr><td>264.71 & 265.71</td><td>TSDRFs</td></tr>
<tr><td>9</td><td>Preparedness & prevention</td><td>264/265 Subpart C</td><td>TSDRFs</td><td>See Items 2, 10, 11</td><td>Annual for facilities that change generator status</td><td>See Items 2, 10, 11</td></tr>
<tr><td>10</td><td>Contingency plan</td><td>264/265 Subpart D</td><td>TSDRFs</td><td>• LQG: $733/year
• SQG: $0/year
• CESQG: $0/year</td><td>Annual for facilities that change generator status</td><td>Supporting Statement for ICR Number 820.10 Hazardous Waste Generator Standards, Jan 2008</td></tr>
<tr><td>11</td><td>Emergency plan</td><td>264/265 Subpart D</td><td>TSDRFs</td><td>• LQG: $482/year
• SQG: $94/year
• CESQG: $0/year</td><td>Annual for facilities that change generator status</td><td>Supporting Statement for ICR Number 820.10 Hazardous Waste Generator Standards, Jan 2008</td></tr>
<tr><td>12</td><td>Closure</td><td>264/265 Subpart G</td><td>TSDRFs</td><td>• Metal Type Wastes: $3,340/year
• Solvent/Acid Type</td><td>Annual for facilities that switch from disposal to recycling</td><td>DPRA professional judgment using RACER 2005 unit costs inflated to</td></tr>
</table>

Exhibit 6B Summary of 14 Baseline RCRA Regulatory Burden Unit Costs For RCRA Hazardous Wastes Potentially Affected by the DSW Rule						
A	B	C	D	E	F	G
	Baseline RCRA hazardous waste (Subtitle C) regulatory requirements			Average unit cost & cost frequency per RCRA regulatory burden activity by type of facility which incurs this baseline regulatory cost	How this cost element is applied for cost savings estimation in this RIA	Unit cost supplemental information & references**
Item	Activity	40 CFR Citation	Type of applicable facility*			
				Wastes: $2,266/year		2007 dollars using GDP implicit price deflator.
13	Post-closure	264/265 Subpart G	TSDRFs	see Item 12	Annual for facilities that switch from disposal to recycling	see Item 12
14	Accumulation Time	261.1(c)(8) & 262.34	LQGs, SQGs, TSDRFs	• Commercial Recovery Acid Recovery: $171/ton Solvent Recovery: $785/ton Metal Recovery: $345/ton • Waste Testing $346/load • Transport for Disposal Acid Residual: $1,659/load Solvent Residual: $2,444/load Metal Residual: $2,144/load • Transport for Recovery Acid Recovery: $2,135/load Solvent Recovery: $2,169/load Metal Recovery: $3,248/load	Annual for facilities that change generator status	DPRA professional judgment using RACER 2005 unit costs inflated to 2007 dollars using GDP implicit price deflator.

6C. Estimate of Potential RCRA Regulatory Burden Cost Savings

Excluding metals, solvents, and other "hazardous secondary materials" from RCRA regulation will make it more economical for generators and recycling facilities to recover the commodity-valued constituents from these materials. Savings to generators and handlers from reduced baseline RCRA regulatory burden are expected to result from the following:

- Paperwork burden reduction: Generators, transporters, and baseline recyclers may economically benefit from removal of RCRA regulatory paperwork burden requirements. This RIA estimates potential de-regulatory burden reduction cost savings for all of the relevant baseline regulatory cost items listed above in Exhibit 6B for both generators and transporters under all three DSW final rule exclusions. However, because baseline TSDRF recyclers (particularly commercial TSDRF recyclers) may operate multiple types of hazardous waste management units at their facilities (thus not completely removing their TSDRF regulatory status under Subtitle C), this RIA only estimates potential de-regulatory cost savings for one of the TSDRF recycler cost elements listed in Exhibit 6B above (i.e., Exhibit 6B row item 7 "Part B permit renewal" cost savings).
- Removal of LQG status: Given that the excluded "hazardous secondary materials" are no longer considered RCRA-regulated hazardous "wastes" if recycled according to the conditions/requirements of the DSW final rule exclusions, the generator status of the facility may switch from LQG, to SQG or CESQG regulatory status concerning the status of any other hazardous "wastes" it may generate that are not subject to the DSW recycling exclusions. SQGs and CESQGs have fewer RCRA regulatory administrative requirements than LQGs under Part 262 of RCRA, i.e., RCRA personnel training, biennial reporting of hazardous waste generation and management activities, and preparation of contingency plans.

Not all baseline recycling facilities may benefit from a DSW exclusion. If it is estimated that generators/facilities will incur additional costs under the DSW rule under a financial test (i.e., breakeven test), it is assumed that they will not submit an exclusion notification. The estimated total count of currently regulated hazardous waste recycling facilities that may become exempt (i.e., file an exclusion notification) and the affected annual quantities (i.e., tons per year) for each DSW final rule exclusion are presented in Exhibits 6C and 6D below.

Exhibit 6C Estimate of Annual Net Cost Savings to Industry For Removal of 14 RCRA Regulatory Requirements Under the DSW Exclusions (Note: impacts in this Exhibit based on tonnages from baseline recycling + baseline disposal switchover to recycling)						
Item	RCRA Requirement		Exclusion 1 Generator-controlled	Exclusion 2 Offsite transfers	Exclusion 3 Case-by-case	Combined Impact (Exclusions 1+2+3)
1	Obtain USEPA ID number		Assumed $0	Assumed $0	Assumed $0	Assumed $0
2	RCRA Personnel Training		$128,088	$3,227,580	$25,903	$3,381,571
3	Recordkeeping Note: the cost savings for this row item include (net-out) the incremental costs for row items 6 & 7 in Exhibit 7C (i.e., offsite recycling shipment recordkeeping and receipt notices, respectively)		$17,089	$466,323	$3,455	$486,867
4	Manifest exception reporting		Assumed $0	Assumed $0	Assumed $0	Assumed $0
5	Biennial Reporting		$21,846	$456,209	$4,417	$482,472
6	Storage requirements for hazardous wastes		Assumed $0	Assumed $0	Assumed $0	Assumed $0
7	Part B permit renewal		$0	$1,620,000	$0	$1,620,000
8	Use Manifests		$42,760	$713,532	$8,647	$764,939
9	Preparedness & prevention		Included in Items 2, 10 & 11	Included in Items 2, 10 & 11	Included in Items 2, 10 & 11	Included in Items 2, 10 & 11
10	Contingency Plan		$43,992	$186,965	$8,897	$239,854
11	Emergency Planning		$24,480	$555,144	$4,951	$584,575
12	Facility closure		$0	($1,190,745)	$0	($1,190,745)
13	Facility post-closure		Included in Item 12	Included in Item 12	Included in Item 12	Included in Item 12
14	Accumulation time Note: the cost savings for this row item include (net-out) the incremental costs for row 11 in Exhibit 7C (i.e., recycling residuals management costs)	Transportation = Loading = Recycling = Waste/Resid. Disposal = Waste Characterization = Row 14 subtotal =	$4,974,809 $0 $0 $1,239,189 $306,277 $6,520,875	$40,530,443 ($70,345) $24,557,143 $19,410,294 $6,754,191 $91,181,727	$1,006,062 $0 $0 $250,603 $62,060 $1,318,724	$46,511,314 ($70,345) $24,557,143 $20,900,086 $7122,528 $99,021,326
		Column totals =	$6,799,130	$97,216,735	$1,374,994	**$106.4 million**

Exhibit 6D below presents the estimated potential shift in RCRA regulatory generator classification (i.e., status) as a result of the DSW final rule exclusions. This potential change in RCRA status is a driver (i.e., determinant) for five of the 14 RCRA regulatory paperwork burden elements itemized in Exhibit 6B (i.e., row items 2, 3, 8, 10, 11, as determined by different unit costs for LQGs, SQGs, CESQGs shown in Column E of Exhibit 6B), and thus a driver for five of the 14 annual cost savings estimates displayed in

Exhibit 6C above. To a much lesser extent, RCRA generator status is also a determinant of one of the elements in Exhibit 7B (i.e., row item 6 of Exhibit 7B).

The estimate of potential change in generator status in this RIA is in relation to the entire annual tonnage of RCRA wastes generated or managed at each potentially affected facility (i.e., the facility-wide total annual tonnage for all hazardous waste streams generated or managed at a single facility), not just in relation to the sub-set of annual hazardous waste stream tonnage which may be affected by the DSW final rule recovery/recycling exclusions. Thus, this potential shift in RCRA regulatory status for generators is potentially more beneficial to the relatively large number of small-sized facilities (e.g., small businesses) which generate a relatively small number (i.e., <5)) of small tonnage hazardous wastes annually, and less beneficial to the relatively small number of large-sized facilities (e.g. large companies) which generate a large number (i.e., >5) of hazardous waste streams annually.

Exhibit 6D
Generator RCRA Regulatory Status:
Baseline Status Compared to Estimated Change Under the DSW Rule
(Note: impacts in this Exhibit based on tonnages from baseline recycling + baseline disposal switchover to recycling)

	A	B	C	D	E	F	G	H	I (H-D)
	Baseline Facility Status Counts				Post-Rule Facility Status Counts				
Generator Status*	Facilities Affected by Exclusion 1	Facilities Affected by Exclusion 2	Facilities Affected by Exclusion 3	Combined (Exclusions 1+2+3)	Facilities Affected by Exclusion 1	Facilities Affected by Exclusion 2	Facilities Affected by Exclusion 3	Combined (Exclusions 1+2+3)	Impact (incremental change)
LQG	284	4,176	Not estimated	4,460	224	3,129	Not estimated	3,353	-1,107
SQG	19	923	Not estimated	942	66	1,319	Not estimated	1,385	+396
CESQG	5	83	Not estimated	88	18	734	Not estimated	752	+651
Column totals	308	5,182	74	**5,564**	308	5,182	74	**5,564**	0

Explanatory Notes:
* The current facility generator status is determined from the total generation reported by the facility in the Biennial Report. If a facility reported a total generation quantity between 1.3 and 13.2 tons/year they are counted as SQGs. If they reported a total generation quantity of less than 1.3 tons per year they were counted as CESQGs even if they become non-generators post rule. Facilities included in the Biennial Report typically are classified as a LQG, regardless of the total generation they are reporting for that year. Acute waste determinations of generator status are not taken into consideration.

Chapter 7
Estimate of Potential Industry Costs for Complying with DSW Exclusion Conditions/Requirements

This chapter estimates the potential cost to industry for complying with the 13 potential implementation condition impacts associated with the three DSW final rule exclusions. Implementation of the DSW rule may cause facilities to incur costs for meeting certain conditions/ requirements under the DSW exclusions, which may affect facility onsite waste accumulation practices, waste shipping, site closure/post-closure, and waste treatment residual management operations. Compliance with the conditions of DSW exclusions may also result in secondary impacts such as:

- The resulting changes in generator status from LQG to SQG, to CESQG, or to non-generator status, will allow longer accumulation times, resulting in larger truckloads for shipment. With larger truckloads minimum management charges (higher unit costs, $/ton) may be avoided. Longer accumulation times will result in few shipments and reduced total shipping costs.
- The DSW rule may cause residuals (e.g., ash, distillation bottoms) generated from the recycling processes to be no longer regulated as "derived-from" RCRA hazardous wastes (RCRA 40 CFR 261.3(c)(2)(I)). Management of previously "listed" hazardous residuals may shift from RCRA Subtitle C regulated hazardous waste management to de-regulated management, although RCRA "characteristic" hazardous waste residuals will continue to need to be managed as hazardous waste (40 CFR 261 Subpart C of the RCRA regulations defines "characteristic" hazardous wastes according to four classifications: 261.21 ignitability, 261.22 corrosivity, 261.23 reactivity, and 261.24 toxicity).

Exhibit 7A below presents a summary of the 13 conditions/requirements for the three DSW final rule exclusions, and Exhibit 7B displays the average unit costs estimated in this RIA for each. Additional unit cost details are provided in **Appendix C** to this RIA. Exhibit 7C presents the estimated annual cost for all affected facilities to comply with these conditions/requirements.

Exhibit 7A
13 Implementation Conditions/Requirements for the 2008 DSW Amendments Final Rule Recycling Exclusions

Conditions/ Requirements		Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Variance	Potential Cost Impacts
1	No speculative accumulation	Yes	Yes	N/A	"Speculative accumulation" provisions (see 40 CFR 261.1(c)(8)) require that during a calendar year (beginning January 1) the amount of material that is recycled, or transferred to a different site for recycling, must equal at least 75% by weight or volume of the amount of that material at the beginning of the period. Impact not estimated in this RIA.
2	Generator notifies	Yes	Yes	N/A	Costs were estimated for generators to complete a notification of

Exhibit 7A 13 Implementation Conditions/Requirements for the 2008 DSW Amendments Final Rule Recycling Exclusions					
	Conditions/ Requirements	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Variance	Potential Cost Impacts
	USEPA initially & every 2-years				RCRA exclusion for their recycled wastes every 2-years.
3	Notification signed by corporate official	Yes	Yes	N/A	Additional costs will be incurred in the notification process to brief and obtain the signature of a corporate official.
4	Generator re-notifies USEPA in the event of a change	Yes	Yes	N/A	Costs will be incurred if industrial process changes make the secondary materials a solid waste. Costs associated with this provision are intermittent and not estimated in this RIA.
5	Generator submits petition to USEPA to demonstrate that materials are not solid wastes	N/A	N/A	Yes	Costs will be incurred to conduct waste characterization (totals and TCLP) to demonstrate waste has metal, solvent or other material values warranting recovery.
6	Maintain records of all offsite shipments for recycling	No (onsite) Yes (if involving offsite company affiliate, or tolling agreement)	Yes	N/A	Costs will be incurred by generator to maintain records of materials shipments to offsite recycling.
7	Confirmation of shipment receipt	Yes	Yes	N/A	Costs will be incurred by (a) offsite recycler to confirm to generator receipt of shipment, and (b) generator to maintain record of confirmation receipts.
8	Recycler has liability insurance for accidents	No	Yes	N/A	This RIA assumes no additional costs will be incurred because assumes all affected facilities currently have liability insurance for accidents as part of standard industry practice.
9	Recycler has financial assurance for closure	No	Yes	N/A	Costs incurred by recycler for obtaining financial assurance for closure/post closure of secondary materials storage containers.
10	Materials must be contained	Yes	Yes	Yes	This RIA assumes no additional costs because assumes all affected facilities will ensure containment to avoid CERCLA liability and RCRA corrective action for leaks/spills.
11	Residuals derived from recycling managed in environmentally-protective manner	No	Yes	N/A	Assume all affected entities are currently treating residuals as listed waste, so cost savings will be incurred because "listed" waste definitions will no longer be attached to residuals.
12	Generator exercises due diligence	No	Yes	N/A	Generator incurs cost for conducting due diligence on offsite recycler.

Exhibit 7A 13 Implementation Conditions/Requirements for the 2008 DSW Amendments Final Rule Recycling Exclusions					
	Conditions/ Requirements	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Variance	Potential Cost Impacts
	reasonable efforts to ensure offsite recycling is legitimate				
13	Export of materials for recycling requires notice & consent and filing of an annual report documenting the actual number of shipments and quantity of material exported	N/A	Yes	N/A	Costs incurred by generator to notify foreign recycling facility of the requirements of the DSW exclusions and file an annual report on materials exported. This RIA does not estimate the annual fraction (percentage) of affected hazardous secondary materials which may be exported for recycling. However, this is a baseline RCRA Subtitle C requirement (40 CFR 262.53; 40 CFR 262.56), so no incremental cost impact.
	Column total conditions* =	**7**	**12**	**2**	

Explanatory Notes:

- N/A = Not applicable.
- * Total counts in this Exhibit (a) do not include the four "legitimate recycling" factors (2 mandatory factors, plus 2 non-mandatory factors) which are common to all DSW recycling exclusions, (b) do not distinguish and include the five sub-elements of item 12 due diligence for Exclusion 2, and (c) do not distinguish and include the nine criteria for making a non-waste determination under Exclusion 3.. This more detailed sub-itemization of requirements exceeds the impact estimation level-of-detail of this RIA Addition of these 18 omitted sub-items would increase the total count of conditions to 11 for Exclusion 1, to 21 for Exclusion 2, and to 15 for Exclusion 3.

Exhibit 7B Summary of Estimated Unit Costs for Industry Compliance with 13 DSW Exclusion Conditions/Requirements (Source: Assumptions, Data, & Computations Presented in Appendix C)						
Item	DSW Exclusion Condition/ Requirement	40 CFR Equiva-lence	Type of Applicable Industrial Facility	Average Unit Cost Per Condition	Frequency of Compliance with Condition	Description as Applied in this RIA (note: see the 2008 DSW final rule for exact description)
1	No speculative accumulation)	261.1(c)(8) & 262.34	LQGs, SQGs	Generators may pay surcharges to TSDRFs for more frequent pick-up of less than full loads: • Commercial Recovery Acid Recovery: $171/ton Solvent Recovery: $785/ton Metal Recovery: $345/ton • Waste Testing $346/load • Transport for Disposal Acid Residual: $1,659/load Solvent Residual: $2,444/load Metal Residual: $2,144/load • Transport for Recovery Acid Recovery: $2,135/load Solvent Recovery: $2,169/load Metal Recovery: $3,248/load	Varies by recycled tons, recycling type and changes in generator status	• "Speculative accumulation" provisions (40 CFR 261.1(c)(8)) require that during a calendar year (beginning Jan 1) the amount of material that is recycled, or transferred to a different site for recycling, must equal at least 75% by weight or volume, of material at the beginning of the period. • Cost savings incurred if generator becomes a SQG or CESQG under the DSW exclusions. • DPRA professional judgment using RACER 2005 unit costs inflated to 2007 dollars using GDP implicit price deflator.
2	Generator notifies USEPA initially & every 2-years	New	LQGs, SQGs, CESQGs	$122/notification	Once	DPRA professional judgment; applies to generators to complete an initial notification of RCRA exclusion/ exemption for their materials. Subsequent revised notifications not estimated. Supporting Statement for EPA Information Collection Request Number 261.14 "Notification of Regulated Waste Activity" - Sept 1, 2002 Using Exhibit 1
3	Notification signed by corporate official	New	LQGs, SQGs, CESQGs	$123/certification	Once	DPRA professional judgment; Additional costs will be incurred in the notification process to brief and obtain the signature of a corporate official.
4	Generator re-notifies USEPA in the event of a change	New	LQGs, SQGs, CESQGs	$122/notification	Not estimated because infrequent and many facilities may never need to re-notify because their production	• Cost incurred if changes are made to the production/ process involving the recycled material(s), relative to initial notification of excluded materials. • Costs associated with this notification process are intermittent and not

Exhibit 7B Summary of Estimated Unit Costs for Industry Compliance with 13 DSW Exclusion Conditions/Requirements (Source: Assumptions, Data, & Computations Presented in Appendix C)						
Item	DSW Exclusion Condition/ Requirement	40 CFR Equiva-lence	Type of Applicable Industrial Facility	Average Unit Cost Per Condition	Frequency of Compliance with Condition	Description as Applied in this RIA (note: see the 2008 DSW final rule for exact description)
					process may not change.	estimated.
5	Generator submits petition to USEPA to demonstrate that materials are not solid wastes	New	LQGs, SQGs, CESQGs	$11,415/variance	Once	Assume administrative burden cost to industry is identical to the USEPA Supporting Statement for ICR nr 1189.14 Identification, Listing, & Rulemaking Petitions, Sept 13, 2004; To conduct waste characterization (totals and TCLP) to demonstrate waste has metal, solvent or other material values warranting recycling.
6	Maintain records of all offsite shipments for recycling	New	LQGs, SQGs, CESQGs	• LQG: $702/year • SQG: $468/year • CESQG: $234/year	Annual for facilities that change generator status	DPRA professional judgment; Cost incurred by generator to maintain records of offsite recycling shipments. Estimated by generator status.
7	Confirmation of shipment receipt		TSDRFs	See Item 6	Every shipment	See Item 6
8	Recycler has liability insurance for accidents	New if not a permitted TSDRF; Otherwise, 264.147 for permitted TSDRF	TSDRFs	$0	Annual	Assumed no cost because affected facilities assumed to have liability insurance.
9	Recycler has financial assurance for closure	264/265 Subpart H	TSDRFs	$1,397 + 1.5% of Closure Costs	Annual for facilities that switch from disposal to recycling	USEPA-OSW-EMRAD Sept 2000 *Unit Cost Compendium (UCC)*; Costs incurred by recycler for obtaining financial assurance for closure/post closure of secondary materials storage tanks.
10	Materials must be contained	New	LQGs, SQGs, TSDRFs	$0	Annual	This RIA assumes no additional costs because all affected facilities will ensure containment (a) to avoid CERCLA liability costs, and (b) to avoid RCRA corrective action for leaks/spills.
11	Residuals	New	LQGs, SQGs,	• Metals	Annual	• Cost savings are incurred because

Exhibit 7B Summary of Estimated Unit Costs for Industry Compliance with 13 DSW Exclusion Conditions/Requirements (Source: Assumptions, Data, & Computations Presented in Appendix C)						
Item	DSW Exclusion Condition/ Requirement	40 CFR Equiva-lence	Type of Applicable Industrial Facility	Average Unit Cost Per Condition	Frequency of Compliance with Condition	Description as Applied in this RIA (note: see the 2008 DSW final rule for exact description)
	derived-from recycling managed in environmental ly-protective manner		CESQGs	(stabilization/landfill): $223/hazardous ton; $2,004 min. charge per haz load; $37/nonhaz ton; $337 min. charge per nonhazardous load; • Solvents (fuel blending): $226/ton; $2,352 min. charge per load; • Acids (precipitation/ dewatering/ stabilization/ landfill): $378/ton; $3,722 min. charge per load		"listed" waste definitions will no longer be attached to residuals and accumulation times are longer and shipments are bigger with changes in generator status. • Cost savings are for changes in generator status allowing longer storage times and larger shipments resulting in avoided minimum disposal charges. • Residuals continue to be treated as listed wastes.
12	Generator exercises due diligence to ensure offsite recycling is legitimate	New	LQGs, SQGs, CESQGs	$1,761 per each generator facility per each "due diligence" event conducted by a generator on a recycler.	Annual	Generator incurs cost to conduct "due diligence" on recycler, consisting of "reasonable efforts" to ensure recycling is legitimate.
13	Export for recycling requires notice & consent and filing annual reports documenting number of shipments and quantity of materials exported	262 Subpart E	LQGs, SQGs, CESQGs	$7 per shipment for notice & consent plus per facility costs for assembling and filing an annual report	Varies by count of annual export shipments	• Costs incurred by generator for notification of foreign recycling facility of the requirements for the exclusion/exemption. • Costs incurred by generator for assembling and filing an annual report • This RIA does not estimate the annual fraction (percentage) of affected hazardous secondary materials which may be exported for recycling. However, this is a baseline RCRA Subtitle C requirement (40 CFR 262.53; 40 CFR 262.56), so no incremental cost impact estimated in this RIA.
Explanatory Notes: "Legitimate recycling" criteria are not included as conditions in this Exhibit because the legitimacy criteria are separable but common to all three exclusions.						

Exhibit 7C
Summary of Industry Annual Costs to Meet the 13 Conditions/Requirements of the DSW Final Rule Exclusions
(Note: impacts in this Exhibit based on tonnages from baseline recycling + baseline disposal switchover to recycling)

A	B	C	D	E	F (C+D+E)
Item	RCRA Requirement	Exclusion 1	Exclusion 2	Exclusion 3	Combined Exclusions 1+2+3
1	No speculative accumulation	$0	$0	N/A = not applicable	$0
2	Generator notifies USEPA initially & every 2-years	$18,909	$367,787	N.A	$386,696
3	Notification signed by corporate official	$18,909	$367,787	N/A	$386,696
4	Generator re-re-notifies in the event of a change	$0	$0	N/A	$0
5	Generator submits petition to USEPA to demonstrate materials are not solid wastes	N/A	N/A	$79,905	$79,905
6	Maintain records of all offsite shipments for recycling	Included in Exhibit 6C Item 3	Included in Exhibit 6C Item 3	N/A	Included in Exhibit 6C Item 3
7	Confirmation of shipment receipt	Included in Item 6	Included in Item 6	N/A	Included in Item 6
8	Recycler has liability insurance for accidents	N/A	$0	N/A	$0
9	Recycler has financial assurance for facility closure	N/A	$1,819,707	N/A	$1,819,707
10	Materials must be contained	$0	$0	$0	$0
11	Residuals derived from recycling managed in environmentally-protective manner	N/A	Included in Exhibit 6C Item 14	N/A	Included in Exhibit 6C Item 14
12	Generator exercises due diligence reasonable efforts to ensure offsite recycling is legitimate	N/A	$12,610,993	N/A	$12,610,993
13	Export of materials for recycling requires notice & consent and filing of an annual report	N/A	$0	N/A	$0
	Column totals =	$37,818	$15,165,474	$79,905	**$15.3 million**
	Total count* of requirements =	**7**	**12**	**2**	

Explanatory Notes:

- $0 in this exhibit either designates (a) that this RIA assumes these cost elements will not change relative to baseline, or (b) that these cost elements are expected to be relatively small and not estimated in this RIA.
- * Total counts in this Exhibit (a) do not include the four "legitimate recycling" factors (2 mandatory factors, plus 2 non-mandatory factors) which are common to all DSW recycling exclusions, (b) do not distinguish and include the five sub-elements of item 12 due diligence for Exclusion 2, and (c) do not distinguish and include the nine criteria for making a non-waste determination under Exclusion 3.. This more detailed sub-itemization of requirements exceeds the impact estimation level-of-detail of this RIA Addition of these 18 omitted sub-items would increase the total count of conditions to 11 for Exclusion 1, to 21 for Exclusion 2, and to 15 for Exclusion 3.

Chapter 8
Micro-Economic Breakeven Test
to Estimate Potential Baseline Disposal Switchover to Recycling

8A. Breakeven Test Methodology

This chapter presents estimates of the potential new future industrial recycling that may be induced by the DSW exclusions. The induced new recycling estimates are based on applying a financial "breakeven test" to estimate the portion of baseline hazardous wastes which might switchover from baseline disposal (either onsite or offsite disposal) to future offsite recycling. This impact is relevant to both Exclusion 1 and Exclusion 2, so this breakeven test is conducted simultaneously for both exclusions to eliminate double-counting and over-estimation of this potential switchover impact.

Note: This RIA does not include a breakeven test to estimate possible (a) switchover of baseline offsite recycling to onsite recycling, or (b) switchover of baseline disposal to onsite recycling, as a result of the DSW final rule. This RIA does not apply the breakeven test to estimate new onsite recycling for three reasons: (a) the broad array of 100s of different industries consisting of 1,000s of industrial facilities generating or managing 10,000s of industrial hazardous waste streams potentially affected by the DSW final rule prohibits a meaningful analysis in this RIA that would reflect the unique onsite plant and business conditions required to formulate an accurate, nationwide estimate, and (b) some large industrial associations and large industrial companies representing a large fraction of the industries most likely affected by the DSW final rule commented to OSW that new investments in onsite recycling is an unlikely scenario for many diverse industries because of engineering, technical, financial, and business reasons.[18] On the other hand, OSW does anticipate that the DSW final rule may induce future switchover of hazardous secondary materials from offsite disposal and offsite recycling, to onsite recycling in some industries, because such switchovers have been reported in recent technical literature

18 Although OSW did not independently evaluate their claims, five public commentors on OSW's 2003 and 2007 DSW RIAs challenged the reasonableness of assuming that hazardous waste generators may invest in onsite recycling. Four of the five commentors are industrial associations and companies which represent a large fraction of the industries which may be most affected by the DSW final rule: (a) American Chemical Council commentor ID nr. 2002-0031-0093, (b) IPC Association of Connecting Electronics Industries commentor ID nr. 2002-0031-0112, (c) International Metals Reclamation Company Inc commentor ID nr. 2002-0031-0178, and d) PPG Industries Inc commentor ID nr. 2002-0031-0203. They indicated that a baseline disposal switchover to future onsite recycling scenario is not reasonable because (a) facilities within a single NAICS code industry are unlikely to be able to recycle them at all if they cannot recycle them in already DSW-excluded closed loop processes, and because of the unavailability of (b) investment capital, (c) industrial facility space, (d) technical expertise, and (e) skilled labor business constraints for some individual industrials facilities, and because (e) it is more likely that a company in another industry will have the required economies-of-scale expertise and infrastructure to reclaim significant quantities of secondary materials from a different industry, for example, no chemical plant is likely to build a metal processing, beneficiation or smelting operation to address its secondary metal-bearing material flows (comments are available at http://www.regulations.gov according to their commentor ID numbers for docket nr. EPA-HQ-RCRA-2002-0031).

in absence of the DSW final rule.[19] Consequently, this limitation in the methodology of this RIA probably results in a lower new recycling impact estimate in this chapter.

Compared to the potential future cost savings estimated in this RIA for exclusion of hazardous wastes currently being recycled, this switchover impact represents in this RIA, a relatively less certain, hypothetical future scenario. It is important to emphasize that this disposal switchover to recycling scenario does not represent a "prediction" or "forecast" in this RIA, but represents a "futures analysis" method often used by USEPA:[20]

"*Scenarios are not predictions. They are stories of how the future might unfold — plausible stories that reflect information about trends and potential future developments. [Scenarios may be] designed to span a range of potential future conditions. The actual future is not likely to match any one of [alternative] depictions, but it will probably fall somewhere within the range of possibilities that [scenarios] explore.*"

The underlying rationale for this disposal switchover scenario is that excluding metal-, solvent-, and other chemical-bearing wastes that are recycled, is expected to make it more economical for waste generators and for waste recycling facilities to recover valuable chemical constituents from these wastes. Therefore, induced new recycling impacts may result in additional savings to generators from at least three sources:

1. Relaxed waste accumulation time limits.
2. De-regulation of waste management residuals (e.g. ash, sludges, leachates) from recycled materials; i.e., if wastes are no longer considered a listed hazardous waste, the residuals generated by the waste recycling processes may no longer be regulated as "hazardous waste" under the RCRA "Derived-from Rule" (40 CFR 261.3(c)(2)(i)). Therefore, the management of these residuals might shift from RCRA Subtitle C (hazardous waste) to Subtitle D (nonhazardous waste) disposal if the residuals do not test characteristically hazardous (40 CFR 261 Subpart C).
3. Reduction and elimination of baseline costs for RCRA regulatory paperwork burden to affected entities (e.g., for manifesting, for maintaining RCRA waste management permits).

However, possibly offsetting some fractions of these potential RCRA regulatory cost savings, are the incremental costs to affected facilities, associated with complying with the implementation conditions/requirements of each DSW exclusion. Induced new recycling impacts are a combination of:

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19 For example, a manufacturer of optical photoconductors in Chesapeake VA reportedly in the late 1990s shifted its offsite disposal (at offsite cement kilns for energy recovery incineration destruction) of spent tetrahydrofuran (THF) solvent – "*highly unstable and explosive, forming peroxides in the presence of oxygen*" --- to onsite recycling via a distillation-based technique that recovers the spent THF solvent for onsite reuse. Source: "Safe Recovery of a Hazardous Solvent", Chemical Engineering, Oct 2001, p.95, http://www.che.com/articles/2001/EngKirk/EngKirk10012001_04.html.

20 Source: USEPA Office of Chief Financial Officer, http://www.epa.gov/cfo/futures/env_scen.htm.

- RCRA regulatory paperwork burden costs savings to industry
- DSW exclusion condition implementation costs to industry
- State government hazardous waste fee cost savings to industry
- Waste management costs (i.e., current waste disposal cost compared to new recycling cost) to industry waste generators
- Potential market value to recyclers of the recovered material commodities (if hypothetically recycled rather than disposed)

All of these elements are integrated in the micro-economic (i.e., facility- and waste-specific) financial breakeven test to determine which facilities may be induced to switchover from baseline disposal to future recycling under the DSW exclusions.

8B. Key Assumptions Applied to Breakeven Test

- Recycled materials markets: The breakeven test does not include an evaluation of whether the US or global markets for recycled industrial secondary materials are large enough to absorb the potential increase in supply of recycled materials estimated in this RIA. Market conditions for recycled secondary materials can vary considerably over time. Demand for recycled solvent, for example, is largely dependent on the petroleum market: because virgin solvent is made from petroleum products, high petroleum prices encourage solvent recycling. Similarly, high metals prices obviously favor the recycling of metal-bearing secondary materials.
- National average unit costs: The breakeven test assumes national average unit costs for industrial recycling equipment/operations, and does not account for variability in regional or local industrial and recycling market conditions.
- Quality & technical feasibility: The resultant baseline disposal wastes quantities selected according to the primary and secondary screening criteria in Chapter 5 of this RIA, are assumed to have yielded a subset of disposed waste types/quantities which of sufficient physical quality and technical acceptability for potential materials recovery.
- Spreadsheet computation: This breakeven test is structured according to an "IF statement" cost comparison structure which compares baseline disposal costs for each waste category, to the hypothetical alternative cost for each facility to switch management of wastes to offsite commercial recycling under Exclusion 2. This cost comparison indicates that facilities may switch to new recycling if the hypothetical cost for recycling is less than the baseline disposal cost. The breakeven test was not applied to the case-by-case Exclusion 3, because this RIA assumes that baseline disposal switchover will not occur under Exclusion 3 which involves case-by-case variances.

8C. Summary of Breakeven Test Results

Exhibit 8A presents the micro-economic breakeven points as measured by the minimum annual tonnage of waste generated which may be more economical to offsite commercial recycle (under Exclusion 2), compared to the cost of their baseline disposal. This breakeven test is not applied to the relative small number of average annual facilities and associated small waste quantities (tons per year) which may become excluded under Exclusion 3.

The breakeven test compared five categories of cost elements for baseline RCRA-regulated waste disposal, to hypothetical switchover to DSW-excluded recycling:

1. Potential cost savings from reduced RCRA regulatory burden associated with baseline disposal, as described in **Chapter 6.**
2. Potential offsetting costs to generators and recyclers for compliance with the conditions/requirements of the DSW final rule exclusions as presented in **Chapter 7.**
3. Potential cost savings to generators from reduced hazardous waste taxes paid to state governments as presented in **Chapter 10**.
4. Potential market value of recoverable commodities contained in the baseline disposed wastes as presented in **Appendix A**.
5. Differences in baseline disposal costs as compared to offsite commercial recycling prices, as presented in **Appendix D.**

Exhibit 8A Breakeven Point (tons/year) Where Offsite Recycling is Potentially More Economical than Baseline Disposal					
A	B	C	D	E	F
Item	Baseline disposal category	Baseline disposal method	Assumed offsite recycling method	Micro-economic breakeven for switchover to offsite recycling (tons/year)	Baseline disposal exceeding breakeven (tons/year)
Commodity Group #1: Metals					
1A	Metal Containing Liquids	H071/H077 Chemical Precipitation	Offsite Ion Exchange Metals Recovery	Not economical at any reported quantity	0
1B	Metal Containing Solids	H111 stabilization & H132 landfill	Offsite Smelting	≤ 36.5 tons/yr if LQG pre-rule. 28<x<36.5 tons/yr if change to lower generator status	2,489
1C	Metal Containing Sludges	H111 stabilization & H132 landfill	Offsite Smelting	≤ 30.9 tons/yr if LQG pre-rule	5,082
1D	Emission Control Dust	H111 stabilization & H132 landfill	Offsite Smelting	≤ 22 tons/yr if LQG pre-rule	4.5
1E	Catalyst	H111 stabilization & H132 landfill	Offsite Smelting	≥ 0 tons/yr if LQG pre-rule	10,947
Commodity Group #2: Solvents					
2A	Solvent Bearing Liquids	H050 Energy Recovery	Offsite Fractionation/ Distillation	≤ 15.2 tons/yr if change in generator status from LQG	2,682
2B	Other Organic Liquids	H050 Energy Recovery	Offsite Fractionation/ Distillation	≤ 17.1 tons/yr if change in generator status from LQG	1,073
Commodity Group #3: Other Materials					
3A	Carbon	H040 incineration	Offsite Carbon Regeneration	≤ 32 tons if LQG pre-rule.	1,136
3B	Sodium Fluoride	H111 stabilization & H132 landfill	Offsite Fluoride Recovery using Vortec technology	Not economical at any reported quantity (no commercial capacity has been constructed)	0
				Column total =	**23,413**

8D. Market Value of Recoverable Commodities in Baseline Disposal for Recycling Switchover

Exhibit 8B below presents estimates of the potential market value embedded in the potentially recoverable materials for the 11 disposed waste types potentially affected by the DSW final rule. In the exhibit, the potential market value is based on an assumption that 100% of the waste tonnage per year shifts from baseline disposal to future recycling as a result of the DSW rule, according to the assumed (a) concentration, (b) recovery yield, and (c) market price for each commodity recovered from the waste (see **Appendix A** for data references). However, for whom the cost of recycling becomes more favorable than their baseline cost for disposal, will be determined in the breakeven test presented elsewhere in this RIA.

The market value estimate incorporates a factor to account for possible quality losses in the purity or effectiveness of the recoverable product. The potential market value of recoverable constituents is estimated in this RIA using commercial market values. As listed below, there are at least three important factors which determine the potential market value of recoverable constituents, pertaining to the relative quality (i.e., physical/chemical composition) of the constituents in the secondary materials:

- Constituent type: The chemical type and concentration of constituents present in the secondary material impacts the cost for reclaimers to manage the waste, and the cost of reclamation is influenced by the market price the recyclers can obtain for the constituents they recover.
- Multiple constituents: The presence of multiple metals and/or other chemical constituents may impact both the marketability and feasibility of reclamation. While the waste may contain multiple recoverable metals or other chemical constituents, reclaimers prefer that generators not co-mingle multiple metals, solvents, etc. in their secondary materials. For example, reclaimers prefer to accept wastes that have been segregated into a mono-metal or bi-metal sludge. (Source: Borst, Paul A., USEPA Office of Solid Waste, Economic, Methods and Risk Analysis Division, "Recycling of Wastewater Treatment Sludges from Electroplating Operations," F006, 18th AESF/EPA Pollution Prevention and Control Conference, January 27-29, 1997, p. 179.). In certain instances, reclaimers face higher costs to handle impurities (i.e., metal/chemical constituents considered not to be of market value by the offsite reclaimer) in excess of a specified concentration. (Source: Lamancusa, James P., "Strategies at a Decorative Chromium Electroplating Facility: On-line vs. Off-line Recycling," Plating and Surface Finishing, April 1995, p.48.)
- Constituent quality: Generators may attempt to improve the quality of their secondary materials containing potential recoverable materials, in order to improve the productivity of reclamation, thereby allowing them to accumulate more cost-effective quantities for reclamation.

Exhibit 8B Market Value of Recoverable Commodities in Baseline Disposed Wastes Meeting the Recycling Switchover Breakeven Test							
A	B	C	D	E	F	G (B x C x D x E)	H (F x G)
Type of commodity in baseline disposed wastes	Baseline disposed Waste quantity meeting breakeven test (tons/year)	Typical recoverable commodity concentration in disposed waste (% waste tonnage)	Percentage of baseline disposed wastes which may contain the commodity	Breakeven test spread sheet calibration factor	Commodity value @90% market price for virgin materials ($/ ton)	Quantity of commodities potentially recoverable from disposed waste (tons/year)	Potential annual market value of recoverable commodities @90% virgin material price
Commodity Group #1: Metals							
1A. Metal Containing Liquids (copper, lead, zinc)	0	0.025%	100%	0%	$2,063	0	$0
1B. Metal Containing Solids (copper, lead, zinc)	2,489	4.152%	36%	100%	$2,072	37.2	$77,086
1C. Metal Containing Sludges (chromium, copper, nickel, zinc)	5,082	1.004%	7%	100%	$9,413	3.6	$33,619
1D. Emission Control Dust (zinc)	4.5	2.451%	62%	100%	$1,908	0.07	$130
1E. Catalyst (molybdenum disulfide)	10,947	5%	90%	16.7%	$43,390	82.3	$3,569,552
Group #1 subtotal =	18,522.5					123.2	$3,680,400
Commodity Group #2: Solvents							
2A. Solvent Bearing Liquids (alkyl benzenes, toluene, xylene, methanol)	2,682	37.85%	56%	100%	$845	568.5	$480,363
2B. Other Organic Liquids (acetone, methyl ethyl ketone, toluene, xylene)	1,073	27.31%	37%	100%	$909	108.4	$98,557
Group #2 subtotal =	3,755					676.9	$578,900
Commodity Group #3: Other Materials							
3A. Carbon	1,136	90%	100%	10%	$4,289	102.2	$438,500
3B. Sodium Fluoride	0	2%	100%	0%	$39,051	0	$0

Exhibit 8B Market Value of Recoverable Commodities in Baseline Disposed Wastes Meeting the Recycling Switchover Breakeven Test							
A	B	C	D	E	F	G (B x C x D x E)	H (F x G)
Type of commodity in baseline disposed wastes	Baseline disposed Waste quantity meeting breakeven test (tons/year)	Typical recoverable commodity concentration in disposed waste (% waste tonnage)	Percentage of baseline disposed wastes which may contain the commodity	Breakeven test spread sheet calibration factor	Commodity value @90% market price for virgin materials ($/ ton)	Quantity of commodities potentially recoverable from disposed waste (tons/year)	Potential annual market value of recoverable commodities @90% virgin material price
Group #3 subtotal =	1,136					102.2	$438,500
Column Total =	**23,413**					**902.3**	**$4.7 million**

Explanatory Notes:

- Column A: Assumed commodity constituents in baseline disposed wastes identified based on data and references presented in **Appendix A** to this RIA.
- Column B: Tonnage is output of the spreadsheets used for the Chapter 8 micro-economic breakeven test of this RIA (based on 2005 RCRA Biennial Report).
- Column C: "Typical" concentrations calculated to represent tonnage-weighted mean (i.e., harmonic mean) concentrations relative to the entire quantity of the waste matrix for wastes with the chemical present (i.e., >0ppm) , based on parts-per-million (ppm) data and references presented in **Appendix A** to this RIA. For purpose of converting ppm data to percentages, the number 1,000,000 ppm is numerically equivalent to 100% of the entire waste tonnage, 500,000 ppm equals 50% of the waste tonnage, 100,000 ppm equals 10% of the waste tonnage, and .10,000 ppm equals 1% of the waste tonnage.
- Column D: Derived from the data and references presented in **Appendix A** to this RIA.
- Column E: Calibration factor applied to the micro-economic breakeven test spreadsheets (Chapter 8 of this RIA) in order to calibrate the breakeven calculations so that the spreadsheets do not estimate that baseline disposed hazardous wastes would be expected to switch to recycling without de-regulatory industry cost savings from exclusions under the DSW final rule. This calibration factor can be interpreted as a numerical adjustment to offset and compensate for the lack of highly-detailed and exact unit cost estimates for each of the nationwide 100s of different industries consisting of 1,000s of facilities which are generating and managing 10,000s of individual waste streams which may be affected by the DSW rule, and which are evaluated in the breakeven spreadsheets (a total of 14,144 baseline disposal waste streams are evaluated in the breakeven spreadsheets). A 100% calibration factor in this Exhibit indicates no adjustment was required for the particular waste type. Calibration factors <100% in this Exhibit indicate the breakeven test spreadsheets estimated that the alternative cost for recycling the particular waste type in absence of the DSW exclusion cost savings was already lower than the current baseline hazardous waste disposal cost. For all such cases in the breakeven spreadsheets, the estimated recovered commodity market value component of the alternative recycling cost was multiplied by the <100% factor to achieve parity in the estimated recycling cost with baseline disposal cost, absent the estimated cost savings of the DSW exclusions.
- Column F: Derived from the data and references in **Appendix A** to this RIA; 90% market price applied to account for perceived or real lower quality.

Chapter 9
De-Regulatory Cost Savings Net Impact Estimates

This chapter contains a series of exhibits which present the outcome of the impact estimation spreadsheet computations for this RIA. The net impact estimates represent the net effects of de-regulation of baseline recycling plus potential switchover of baseline disposal to new future recycling, as described and based on the data presented in the previous chapters of this RIA. The following exhibits parse the impact (i.e., net cost savings) estimates for each Exclusion according to 2-digit NAICS code economic sub-sectors:

- Exhibit 9A presents estimated counts of affected waste streams
- Exhibit 9B presents estimated counts of affected entities
- Exhibit 9C presents estimated affected annual tonnages of affected hazardous wastes
- Exhibit 9D presents the dollar-value of estimated annual net cost savings to industry
- Exhibits 9E and 9F present supplementary exhibits which display other facets of the impacts. Exhibit 9E presents the combined impact for all three exclusions according to two impact components: (a) baseline recycling impact, and (b) baseline disposal switchover to recycling impact.

Note that each exhibit of this chapter does not present Exclusion 3 as a separate exhibit column according to the 2-digit NAICS code itemization, because Exclusion 3 is estimated in this RIA based on a simple methodology outside of the baseline recycling and baseline disposal datasets applied in the de-regulatory cost savings and disposal switchover breakeven test analyses used to estimate impacts for Exclusion 1 and Exclusion 2. For this reason, only the aggregate annual impact estimate for Exclusion 3 is presented as a bottom row of each exhibit.

Exhibit 9A
Estimated Average Annual Count of Affected Hazardous Waste Streams (2005)
(Count of Baseline Recycling Waste Streams + Count of Baseline Disposal Waste Streams Which May Switchover to Recycling)

			A	B	C	D	E (A+B+C+D)
Item		Industry 2-digit NAICS code	Exclusion 1A (Generator onsite)	Exclusion 1B (Same co. offsite)	Exclusion 1C (offsite tolling)*	Exclusion 2 (Transfer-based)**	Combined Exclusions 1+2
1	11	Ag, Forestry, Fishing, Hunting					
2	21	Mining					
3	22	Utilities					
4	23	Construction					
5	31	Manufacturing					
6	32	Manufacturing					
7	33	Manufacturing					
8	42	Wholesale Trade					
9	44	Retail Trade					
10	45	Retail Trade					
11	48	Transportation					
12	49	Postal, Messengers, Storage					
13	51	Information					
14	52	Finance & Insurance					
15	53	Real Estate, Rental & Leasing					
16	54	Prof, Scientific & Tech Services					
17	55	Mgt of Companies/Enterprises					
18	56	Admin, Waste, & Remediation					
19	61	Educational Services					
20	62	Health Care, Social Assistance					
21	71	Arts, Entertainment, Recreation					
22	72	Accommod & Food Services					
23	81	Other Services					
24	92	Public Administration					
25	??	NAICS code not provided					
		Column totals =					
						Sub-total offsite tonnage excluded (Columns B+C+D) =	
						Impact for Exclusion 3 (NAICS code industry-by-industry impact for Exclusion 3 not estimated) =	74***
						Combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =	

Explanatory Notes:
* Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.
*** Exclusion 3 average annual waste stream count estimated by assuming one waste stream excluded per average annual affected facility.

Exhibit 9B Estimated Count of Affected Facilities (i.e., Existing Facilities Which May Become Eligible for the Three DSW Final Rule Exclusions)							
			A	B	C	D	E (A+B+C+D)
Item	Industry 2-digit NAICS code		Exclusion 1A (Generator onsite)	Exclusion 1B (Same co. offsite)	Exclusion 1C (offsite tolling)*	Exclusion 2 (Transfer-based)**	Combined Exclusions 1+2
1	11	Ag, Forestry, Fishing, Hunting	0	0	0	3	3
2	21	Mining	0	0	0	23	23
3	22	Utilities	0	2	0	105	107
4	23	Construction	1	0	0	23	24
5	31	Manufacturing	0	0	0	38	38
6	32	Manufacturing	55	5	102	1,309	1,471
7	33	Manufacturing	40	10	0	2,497	2,547
8	42	Wholesale Trade	1	0	0	117	118
9	44	Retail Trade	0	0	0	33	33
10	45	Retail Trade	0	0	0	5	5
11	48	Transportation	1	0	0	116	117
12	49	Postal, Messengers, Storage	0	1	0	31	32
13	51	Information	1	0	0	11	12
14	52	Finance & Insurance	0	0	0	0	0
15	53	Real Estate, Rental & Leasing	0	6	0	9	15
16	54	Prof, Scientific & Tech Services	1	1	0	177	179
17	55	Mgt of Companies/Enterprises	0	0	0	5	5
18	56	Admin, Waste, & Remediation	8	64	0	96	168
19	61	Educational Services	2	2	0	186	190
20	62	Health Care, Social Assistance	2	1	0	90	93
21	71	Arts, Entertainment, Recreation	0	0	0	7	7
22	72	Accommod & Food Services	0	0	0	0	0
23	81	Other Services	0	1	0	88	89
24	92	Public Administration	0	1	0	213	214
25	??	NAICS code not provided					
Column totals =			112	94	102	5,182	5,490
Impact for Exclusion 3 (NAICS code industry-by-industry impact for Exclusion 3 not estimated) =							74
Combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =							**5,564**

Explanatory Notes:
* Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.

Exhibit 9C **Estimated Count of Affected Industries (5-digit NAICS codes)**							
			A	B	C	D	E (A+B+C+D)
Item	Industry 2-digit NAICS code		Exclusion 1A (Generator onsite)	Exclusion 1B (Same co. offsite) Incremental above Exclusion 1A	Exclusion 1C (offsite tolling)* Incremental above Exclusion 1A & 1B	Exclusion 2 (Transfer-based)** Incremental above Exclusion 1A, 1B & 1C	Combined Exclusions 1+2
1	11	Ag, Forestry, Fishing, Hunting	0	0	0	1	1
2	21	Mining	0	0	0	4	4
3	22	Utilities	0	1	0	5	6
4	23	Construction	1	0	0	4	5
5	31	Manufacturing	0	0	0	9	9
6	32	Manufacturing	21	1	1	44	67
7	33	Manufacturing	22	4	0	73	99
8	42	Wholesale Trade	1	0	0	13	14
9	44	Retail Trade	0	0	0	0	0
10	45	Retail Trade	0	0	0	1	1
11	48	Transportation	1	0	0	16	17
12	49	Postal, Messengers, Storage	0	1	0	3	4
13	51	Information	1	0	0	3	4
14	52	Finance & Insurance	0	0	0	0	0
15	53	Real Estate, Rental & Leasing	0	1	0	3	4
16	54	Prof, Scientific & Tech Services	1	1	0	4	6
17	55	Mgt of Companies/Enterprises	0	0	0	1	1
18	56	Admin, Waste, & Remediation	3	3	0	7	13
19	61	Educational Services	2	0	0	3	5
20	62	Health Care, Social Assistance	2	0	0	4	6
21	71	Arts, Entertainment, Recreation	0	0	0	1	1
22	72	Accommod & Food Services	0	0	0	0	0
23	81	Other Services	0	1	0	4	5
24	92	Public Administration	0	1	0	8	9
25	??	NAICS code not provided	0	0	0	0	0
		Column totals =	55	14	1	211	281
Impact for Exclusion 3 (NAICS code industry-by-industry impact for Exclusion 3 not estimated) =							Not Estimated
Combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =							**281**

Explanatory Notes:
* Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.

Exhibit 9D **Estimated Annual Tonnage of Affected Hazardous Wastes** **(Based on 2005 Hazardous Waste Generation & Management Tons Reported in the RCRA Biennial Report)**							
			A	B	C	D	E (A+B+C+D)
Item	Industry 2-digit NAICS code		Exclusion 1A (Generator onsite)	Exclusion 1B (Same co. offsite)	Exclusion 1C (offsite tolling)*	Exclusion 2 (Transfer-based)**	Combined Exclusions 1+2
1	11	Ag, Forestry, Fishing, Hunting	0	0	0	12	12
2	21	Mining	0	0	0	125	125
3	22	Utilities	0	<1	0	1,454	1,454
4	23	Construction	4	0	0	809	813
5	31	Manufacturing	0	0	0	307	307
6	32	Manufacturing	140,187	1,265	41,561	169,118	352,131
7	33	Manufacturing	282,279	4,103	0	685,123	971,505
8	42	Wholesale Trade	654	0	0	28,145	28,799
9	44	Retail Trade	0	0	0	235	235
10	45	Retail Trade	0	0	0	53	53
11	48	Transportation	19	0	0	1,599	1,618
12	49	Postal, Messengers, Storage	0	1	0	1,202	1,203
13	51	Information	11	0	0	256	266
14	52	Finance & Insurance	0	0	0	0	0
15	53	Real Estate, Rental & Leasing	0	3,413	0	85	3,498
16	54	Prof, Scientific & Tech Services	<1	13	0	1,037	1,050
17	55	Mgt of Companies/Enterprises	0	0	0	26	26
18	56	Admin, Waste, & Remediation	14,703	17,263	0	16,641	48,606
19	61	Educational Services	7	7	0	806	819
20	62	Health Care, Social Assistance	83	10	0	520	613
21	71	Arts, Entertainment, Recreation	0	0	0	12	12
22	72	Accommod & Food Services	0	0	0	0	0
23	81	Other Services	0	1	0	1,017	1,018
24	92	Public Administration	0	50	0	1,411	1,461
25	??	NAICS code not provided	0	0	0	0	0
Column totals =			437,948	26,126	41,561	909,990	1,415,625
Sub-total offsite tonnage excluded (Columns B+C+D) =							977,677 **(54,315 shipments)**
Impact for Exclusion 3 (NAICS code industry-by-industry impact for Exclusion 3 not estimated) =							121,484
Combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =							**1.537 million**

Explanatory Notes:
* Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.
Annual offsite shipments affected estimated by dividing the offsite tonnage by the average 18-ton per truckload assumption from Section D1 of **Appendix D** to this RIA.

Exhibit 9E
Estimated Net Annual Cost Savings to Industry (De-Regulatory Cost Savings to Baseline Recycling Plus Net Value of Commodities Recovered from Baseline Disposal Switchover to Recycling)*

			A	B	C	D	E (A+B+C+D)
Item	Industry 2-digit NAICS code		Exclusion 1A (Generator onsite)	Exclusion 1B (Same co. offsite)	Exclusion 1C (offsite tolling)**	Exclusion 2 (Transfer-based)***	Combined Exclusions 1+2
1	11	Ag, Forestry, Fishing, Hunting	$0	$0	$0	$7,512	$7,512
2	21	Mining	$0	$0	$0	$390,908	$390,908
3	22	Utilities	$0	$67,766	$0	$1,164,898	$1,231,663
4	23	Construction	$16,161	$0	$0	$227,356	$243,517
5	31	Manufacturing	$0	$0	$0	$563,771	$563,771
6	32	Manufacturing	$598,500	$74,453	$3,152,740	$22,232,035	$26,017,729
7	33	Manufacturing	$1,416,248	$262,935	$0	$43,731,442	$45,410,625
8	42	Wholesale Trade	$229	$0	$0	$1,685,941	$1,686,170
9	44	Retail Trade	$0	$0	$0	$180,466	$180,466
10	45	Retail Trade	$0	$0	$0	$89,026	$89,026
11	48	Transportation	($1,108)	$0	$0	$1,854,278	$1,853,170
12	49	Postal, Messengers, Storage	$0	$32,544	$0	$532,552	$565,097
13	51	Information	$16,060	$0	$0	$226,667	$242,737
14	52	Finance & Insurance	$0	$0	$0	$0	$0
15	53	Real Estate, Rental & Leasing	$0	$27,692	$0	$104,741	$132,433
16	54	Prof, Scientific & Tech Services	$16,229	$50,126	$0	$2,711,792	$2,778,146
17	55	Mgt of Companies/Enterprises	$0	$0	$0	$83,982	$83,982
18	56	Admin, Waste, & Remediation	$147,296	$683,958	$0	$1,672,231	$2,503,484
19	61	Educational Services	$30,679	$65,931	$0	$3,377,907	$3,474,516
20	62	Health Care, Social Assistance	$13,953	$63,371	$0	$1,357,893	$1,435,217
21	71	Arts, Entertainment, Recreation	$0	$0	$0	$63,965	$63,965
22	72	Accommod & Food Services	$0	$0	$0	$0	$0
23	81	Other Services	$0	$33,382	$0	$1,092,644	$1,126,027
24	92	Public Administration	$0	$33,167	$0	$3,930,941	$3,964,109
25	??	NAICS code not provided	$0	$0	$0	$0	$0
		Column totals =	$2,214,246	$1,394,325	$3,152,741	$87,282,962	$94,044,273
						Impact for Exclusion 3 (NAICS code industry-by-industry impact for Exclusion 3 not estimated) =	$1,279,795
						Combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =	**$95.3 million**

Explanatory Notes:
* Reductions in state fees may influence a generator's waste management decisions (e.g., disposal vs. recycling) and are included in the micro-economic breakeven test. Distributive effects on state governments are not treated as social costs in this RIA for estimating the net economic impact of the DSW final rule. Government fees often represent "transfer payments" not real resource costs. State fees are taken out from the net economic impact. As a result, cost savings may be negative in this table.
** Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
*** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.

Exhibit 9F Estimated Net Impacts Parsed According to Two Major Components: Impacts on Baseline Recycling and Impacts on Baseline Disposal										
			A	B	C	D	E	F	G	H
			Impact on Baseline Recycling				Impact on Baseline Disposal (Switchover to Recycling)			
Item		Industry 2-digit NAICS code	Waste streams	Facilities	Tons/year	Net savings	Waste streams	Facilities	Tons/year	Net savings
1	11	Ag, Forestry, Fishing, Hunting		2	9	$6,229		1	3	$1,283
2	21	Mining		17	66	$306,089		8	58	$84,819
3	22	Utilities		91	1,354	$1,090,061		21	100	$141,602
4	23	Construction		15	684	$201,383		11	129	$41,134
5	31	Manufacturing		25	257	$457,325		15	50	$106,447
6	32	Manufacturing		1,001	346,491	$20,617,400		729	5,640	$5,400,329
7	33	Manufacturing		1,861	956,805	$38,229,311		1,078	14,701	$7,181,314
8	42	Wholesale Trade		71	28,192	$1,379,861		55	607	$306,309
9	44	Retail Trade		33	235	$180,466		0	0	$0
10	45	Retail Trade		4	49	$78,914		1	4	$10,112
11	48	Transportation		88	1,315	$1,580,602		44	303	$272,568
12	49	Postal, Messengers, Storage		14	1,096	$369,577		18	107	$195,520
13	51	Information		12	245	$227,991		1	21	$14,745
14	52	Finance & Insurance		0	0	$0		0	0	$0
15	53	Real Estate, Rental & Leasing		12	3,489	$110,816		4	9	$21,617
16	54	Prof, Scientific & Tech Services		118	654	$2,256,243		95	396	$521,903
17	55	Mgt of Companies/Enterprises		4	17	$80,628		1	9	$3,354
18	56	Admin, Waste, & Remediation		148	48,406	$2,197,868		42	200	$305,615
19	61	Educational Services		134	546	$2,805,125		102	274	$669,391
20	62	Health Care, Social Assistance		68	419	$1,246,513		39	195	$188,703
21	71	Arts, Entertainment, Recreation		6	12	$57,474		1	0	$6,491
22	72	Accommod & Food Services		0	0	$0		0	0	$0
23	81	Other Services		78	959	$1,069,891		12	59	$56,135
24	92	Public Administration		124	910	$2,766,006		162	552	$1,198,103
25	??	NAICS code not provided		0	0	$0		0	0	$0
		Column totals =		3,926	1,392,210	$77,315,777		2,440	**23,413**	$16,728,493
				74	121,484	$1,279,795	= Impact for Exclusion 3 (NAICS not estimated)			
Baseline recycling + baseline disposal combined impact (Exclusion 1 + Exclusion 2 + Exclusion 3) =								**5,564**	**1,537,109**	**$95.3 million**

Explanatory Notes:
* Exclusion 1C tolling arrangement offsite recycling indirectly estimated using baseline offsite recycling for NAICS industry code 32519 Other Organic Chemical Mfg.
** Exclusion 2 offsite transfer recycling based on all other offsite recycling not covered under Exclusion 1 (i.e., mutually-exclusive non-duplicative impact), plus all baseline disposal estimated to potentially shift to offsite recycling.

Chapter 10
Distributional Effects

10A. Definition of Distributional Effects

This section presents an evaluation of potential distributional impacts of the DSW final rule on various industries which are inter-related (i.e., within the same 2-digit NAICS economic sector, or within the same 3-digit NAICS industry group, or in counterpart industries) to the industrial facilities subject to the terms and conditions of the DSW rule. As stated in the Federal Register announcement of the DSW final rule, the main purpose and object of the final rule is to provide additional RCRA regulatory exclusions for industrial recycling:

> "In today's rule, EPA is revising the definition of solid waste to exclude from regulation under Subtitle C of RCRA (42 USC 6921 through 6939(e)) certain hazardous secondary materials which are being reclaimed. We have defined hazardous secondary materials as those which would be classified as hazardous wastes if discarded. We are also promulgating regulatory factors for determining when recycling is legitimate" (underscoring added here for emphasis).

Thus, entities affected by the rule are those industrial facilities which engage or support recycling operations according to the terms and conditions of the DSW final rule. Under Exclusion 2, affected entities also include intermediate (middlemen) facilities. However, there are other industries which may be economically affected by the rule but which are not engaged in recycling nor otherwise subject to the terms and conditions of the rule but which may experience gain or loss in business activity because of this rule. The purpose of this chapter is to identify these two sets of industries, by categorizing them as "direct effects" and "indirect effects", respectively.

Public commentors on the 2003 RIA and 2007 RIA identified at least two such possible indirect effects. The Environmental Technology Council (ETC) commenting on the 2003 DSW proposed rule identified a potential adverse effect on the NAICS 562211 commercial hazardous waste management industry.21 In addition to the NAICS 562211 commercial hazardous waste management industry, the NAICS 327310 Portland cement manufacturing industry is another relatively large current receiver (i.e., consumer) of RCRA hazardous wastes for purpose of energy recovery. Wastes used as fuel (i.e., energy recovery) may be considered a type of beneficial form of waste disposal whereby the energy content (i.e., Btu value) embodied in wastes is beneficially extracted during the waste's destruction, by using the waste as fuel for an industrial process to augment other sources of fuel such as coal or natural gas.22 According to the Cement Kiln Recycling Coalition (CKRC; http://www.ckrc.org), 14 of the 100 to 105 Portland cement

21 See pages 55 to 56 of ETC's 25 Feb 2004 comments on OSW's 2003 DSW proposed rule at: http://www.etc.org/ETC_Detailed_Comments.pdf
22 Additional background information about the US cement manufacturing industry and its energy consumption is available at: http://www.energystar.gov/ia/business/industry/Cement_Energy_Guide.pdf, LBNL-54036, Ernest Orlando Lawrence Berkeley National Laboratory, Energy Efficiency Improvement Opportunities for Cement Making, An Energy Star Guide for Energy and Plant Managers, Ernst Worrell & Christina Galitsky, Environmental Energy Technologies Division, Sponsored by the USEPA, Jan 2004

manufacturing plants in the US receive RCRA hazardous wastes from fuel blenders who collect spent solvents from auto body shops, printing plants, and large paint makers, and use the spent solvents to augment coal as a fuel for operating the kilns which produce Portland cement.

From a national economic perspective, this RIA evaluates two simplified categories of potential distributional effects.23 These two categories are simplified in this RIA, in the sense that baseline hazardous waste generators, baseline hazardous waste recyclers, and baseline hazardous waste disposers identified in the RCRA Biennial Report as facilities possibly subject to the DSW final rule, may in fact generate/handle/manage multiple types of wastes (i.e., both hazardous and non-hazardous wastes) involving multiple types of industrial operations, and therefore be classifiable according to multiple NAICS codes. An example of the former is some NAICS 562211 hazardous waste TSDRFs may also be classifiable as NAICS 562212, 562213 or 562219 non-hazardous waste TSDRFs. An example of the later is NAICS 32 or NAICS 33 manufacturing industries may also be secondarily classifiable as NAICS 56 TSDRFs recyclers (e.g., NAICS 3314 secondary non-ferrous metal smelter manufacturers who receive metal-bearing secondary materials for metals recovery may also be secondarily classifiable as NAICS 56292 materials recovery facilities).

The two distributional effects categories evaluated in this RIA involve **23 industries**:

1. Direct effects: Net economic gain or loss to industrial facilities engaged or supporting recycling operations and subject to the recycling terms and conditions of the DSW final rule exclusions according to **8 industries** grouped into three groups:
    - A. Hazardous waste recycling industries (this RIA simplistically assumes that hazardous waste recyclers will continue to provide recycling services under the DSW exclusions at a price which passes-through their de-regulatory cost savings to hazardous waste generator customers; this RIA does not evaluate the extent to which baseline hazardous waste recycling and baseline disposal switchover to recycling, may switch to non-hazardous waste recyclers).
    - B. Intermediate (middlemen) service industries to hazardous waste and hazardous secondary materials recyclers
    - C. Transportation (hazardous waste transport and hazardous secondary materials transport)
2. Indirect effects: Net economic gain or loss to industrial facilities which are not engaged in recycling nor otherwise subject to the recycling exclusion terms and conditions of DSW final rule, but which are lateral or counterpart to the industries subject to the rule. This category includes **15 industries** in four groups:
    - D. Hazardous waste disposal industries (displaced by switchover to recycling)
    - E. Non-hazardous waste disposal industries (displaced by switchover to recycling)
    - F. Virgin materials production industries (resources conserved by recycling switchover)
    - G. Coal mining (replacement for wastes disposed as fuel/energy switching to recycling)

This chapter presents estimates for each category of potential distributional effects. It is important to note that indirect effects are not

23 Page 139 of USEPA's "Guidelines for Preparing Economic Analyses" (report no. EPA-240-R-00-003, Sept 2000;), provides a descriptive distinction and definitions of "distributional effects" and "real resource effects". (http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html/$file/Guidelines.pdf).

necessarily additive to direct effects in all cases because some indirect effects may represent financial "transfer effects" rather than "real resource effects".

10B. Potential Distributional Effects on Industries

Exhibit 10A below presents potential distributional effects indicated by possible shifts in annual tonnages of current hazardous wastes which may become de-regulated as hazardous secondary materials, for 24 economic sub-sectors (i.e., at the 2-digit NAICS code level). These tonnage shifts are estimated in relation to the affected tonnages displayed in Exhibit 9D. Based on the potential tonnage shifts displayed in Exhibit 10A, Exhibit 10B presents estimates of potential <u>direct</u> distributional effects, and Exhibit 10C presents estimates of potential <u>indirect</u> distributional effects in relation to annual business revenues. This RIA expresses these potential effects as a percentage of current annual business revenues per-facility in affected industries. There are six important limitations in the scope of the distributional effects estimated in this chapter:

1. Partial equilibrium effects: The effects represent "partial equilibrium" effects, not "general equilibrium" effects. In other words, this RIA estimates distributional effect based on static prices/costs, not based on dynamic prices/costs according to price elasticities (i.e., this RIA does not include potential changes in relative prices between (a) hazardous and non-hazardous waste disposal services, (b) industrial hazardous secondary materials recycling services, (c) waste truck transportation services, or (d) recycled materials markets, as a result of the DSW rule).
2. Lateral/counterpart industries: Exhibit 10B presents potential distributional effects for **23 industries**, not for all of the 100s of upstream and downstream industries inter-linked to affected facilities. The 23 industries represent two categories of industries:
    - 19 lateral industries: Consisting of industries involved in hazardous and non-hazardous waste management recycling, disposal, transport, intermediate support services.
    - 4 counterpart industries: Three commodity groups (i.e., metals, solvents, other materials) potentially affected by baseline disposal switchover to new recycling alternative supply of these materials, as well as energy production (coal mining) to offset the possible loss of energy recovery and fuel blending disposal tonnages that may switchover to recycling under the DSW rule.
3. Transportation modes: According to generalized data on hazardous waste transportation not specific to the hazardous wastes potentially affected by the DSW final rule, there are three modes of hazardous waste transport, of which trucking is the predominant mode (source: page 26 of OSW "Economics Background Document: Economic Analysis of the USEPA's Final Rule Revisions to the RCRA

Hazardous Waste Manifest Form", 24 Nov 2004, document ID nr. EPA-HQ-RCRA-2001-0032-0106 at http://www.regulations.gov):

- NAICS 482 Rail transportation 6% of shipments
- NAICS 483 Water transportation 3% of shipments
- NAICS 484 Truck transportation 91% of shipments

This RIA does not distinguish distributional effects according to these three modes because this RIA simply assumes that current hazardous waste transporters (NAICS 562112) will continue to transport the de-regulated hazardous secondary material under the DSW rule, but at cost savings from reduced partial load surcharge fees and from shorter average haul distances.

4. Multiple unit facilities: Because each sub-sector consists of many different industries (i.e., multiple 5- and 6-digit NAICS codes), some material shifts may also occur within the same industry group (i.e., 3-digit NAICS code level), which is not indicated in Exhibit 10A. For example, DSW-excluded secondary materials could shift from baseline hazardous waste recycling and baseline hazardous waste disposal (NAICS 562211), to non-hazardous waste recycling (NAICS 56292 materials recovery). The likelihood of this inter-industry shift within the NAICS 562 waste management industry sub-group is not estimated in this RIA, for the following reason. According to written comments submitted 25 June 2007 to the DSW rulemaking docket ID number EPA-HQ-RCRA-2002--0031 at http://www.regulations.gov from the Environmental Technology Council (ETC) which is a "*national trade association of commercial firms that provide technologies and services to customers for the treatment, recycling, and secure disposal of industrial and hazardous wastes*" (p.1), and which is "*the largest association of companies that operate RCRA-permitted facilities*" (p.20), RCRA Subtitle C hazardous waste management permits (i.e., "RCRA permits") do not cover an entire single industrial facility or an entire single industrial property, but usually only cover a distinct plant/equipment operational "unit" within a single facility or property (e.g., waste landfill, waste storage tank, waste incinerator, waste recycling process, waste treatment process). For example, ETC stated:

> "*In some cases, the RCRA permit may address an unrelated unit elsewhere on the property, and the reclamation [i.e., recycling] facility itself is not in any way covered by the permit.*" (p.20).

On a single facility basis, both RCRA-permitted and non-permitted industrial recycling operations may occur within a single facility/property (e.g., industrial secondary materials recovery facility), which makes it difficult to estimate in this RIA where (i.e., at RCRA-permitted facilities or at non-permitted facilities) future new induced industrial recycling may occur as a result of the DSW final rule.

5. Tertiary effects: Not included with the indirectly affected industries (Exhibit 10C) are potential tertiary indirect effects such as the possible reduction in sulfuric acid production associated with a reduction in

virgin metals production from mineral ores.24

6. Industrial capacity: Furthermore, this methodology implicitly assumes that adequate industrial capacity exists in other industries affected by potential distribution effects. As a test of this second assumption, based on the most recent (2006) industrial capacity utilization data for US manufacturing industries, industrial capacity ranged between 62% to 72% in 2006 across the following three NAICS codes applied in this RIA as proxies for industries which may receive baseline disposed hazardous wastes which become DSW-excluded "hazardous secondary materials" for new future recycling, suggesting a range of 28% to 38% available non-utilized industrial capacity (source: US Dept of Commerce, Bureau of Census, Economics & Statistics Administration, "Survey of Plant Capacity" data are only available for NAICS 31-33 manufacturing sectors at http://www.census.gov/cir/www/mqc1pag2.html):
    - Proxy for solvent recycling: NAICS 325199 all other basic organic chemical mfg = 72% capacity utilization
    - Proxy for metals recycling: NAICS 331492 other nonferrous metals secondary smelting = 65% capacity
    - Proxy for acids/other recycling: NAICS 325188 all other basic inorganic chemical mfg = 62% capacity

24 Sulfuric acid is a non-discretionary by-product of smelter SO2 recovery in metallic ore (sulfides) roasting in the production of copper, nickel, lead, zinc, molybdenum and gold. Approximately 10%of the US sulfuric acid market is supplied by smelter acid, the remainder coming from virgin acid production (via elemental sulfur burning, acid sludge burning and stack gas desulfurization). As of 1999, the following 14 metallic ore smelters had a sulfuric acid by-product production capacity of 4.765 million short-tons per year: 1. Asarco, East Helena MT, 2. Asarco, El Passo TX, 3. Asarco, Hayden AZ, 4. Big River Zinc, Sauget IL, 5. Chino Mines, Hurley NM, 6. Climax Molybdenum, Ft. Madison IA, 7. Doe Run, Herculaneum MO, 8. Kennecott Utah Copper, Magna UT, 9. Langeloth Metallurgical, 10. Langeloth PA, 11. Newmont Gold, Carlin NV, 12. Pasminco, Clarkesville TN, 13. Phelps Dodge Miami, Claypool AZ, 14. Zinc Corp, Monaca PA. Source: "Chemical Profiles," Chemical Market Reporter, publication of the Schnell Publishing Company at: http://www.the-innovation-group.com/ChemProfiles/Sulfuric%20Acid%20(smelter).htm

Exhibit 10A Comparison of Distribution of Affected Materials Quantities Before & After DSW Final Rule						
A	B		C	D	E	F
			Baseline (Pre-Rule)		Post-Rule	
Item	2-digit NAICS code Industry Location of Recycling & Disposing Activities Involving Hazardous Wastes Affected by the DSW Final Rule		Location of baseline recycling expected to become excluded under DSW rule (million tons/year)	Location of baseline disposal meeting breakeven test for switchover to recycling (million tons/year)	Location of expected recycling post-rule (de-regulated + switchover) (million tons/year)	% change*
1	11	Agriculture, Forestry, Fishing & Hunting	0	0	0	0%
2	21	Mining	39	16	39	-29%
3	22	Utilities	0	0.03	0	-100%
4	23	Construction	4	0	4	0%
5	31	Manufacturing	0	0	0	0%
6	32	Manufacturing	416,091	408	416,091	0%
7	33	Manufacturing	581,664	84	600,187	+3%
8	42	Wholesale Trade	15,661	401	15,661	-2%
9	44	Retail Trade	0	0	0	0%
10	45	Retail Trade	0	0	0	0%
11	48	Transportation	33	0.004	33	0%
12	49	Postal, Couriers, Warehousing	187	35	187	-16%
13	51	Information	2,829	3	2,829	0%
14	52	Finance & Insurance	0	0	0	0%
15	53	Real Estate, Rental & Leasing	15	1	15	-6%
16	54	Professional, Scientific & Tech Services	7	0.09	7	-1%
17	55	Mgt of Companies/Enterprises	0	0	0	0%
18	56	Admin Support, Waste Mgt	160,432	12,564	165,325	-4%
19	61	Educational Services	44	6	44	-12%
20	62	Health Care, Social Assistance	106	0	106	0%
21	71	Arts, Entertainment, Recreation	0	0	0	0%
22	72	Accommodation & Food Services	0	0	0	0%
23	81	Other Services	1	0	1	0%
24	92	Public Administration	76	13	76	-15%
25	??	NAICS code not provided	215,020	9,883	215,020	-4%
		Column totals =	1,392,210	23,417	1,415,625	0%
		Exclusion 3 affected materials not itemized according to NAICS codes =			121,484	
					1.537 million	
* % change = (E - (C+D)) / (C+D)						

Exhibit 10B Potential Direct Distributional Effects on 8 Industries Engaged in or Supporting Recycling and Subject to the Terms/Conditions of the DSW Final Rule (Potential Distributional Effects on Business Sales/Service Annual Revenues)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
A. Industries Engaged in Recycling Operations Subject to the Terms & Conditions of the DSW Final Rule:								
1	H010 haz waste metals recovery	331492 Secondary smelting, refining, alloying nonferrous metals	96 (a)	+18,522 from hazardous waste disposal industries	• +$6,390,100 ($345/ton x 18,522 tons) • -$28,634,800 (69% ton-weighted from Exhibit 4C) • -$41,499,600 decreased minimum charge revenues • +$352,100 (Part B permit renewal savings: 96 x $3,668/yr) Net = -$21,892,500	-$228,000	$11,433,500	-1.995%
2	H020 haz waste solvent recovery	562 PLC 38472 haz waste recyclable material recovery & preparation services	57 (a)	+3,755 tons from hazardous waste disposal industries (organic containing wastes)	• +$3,664,900 • ($976/ton x 3,755 tons) • -$6,224,900 (15% ton-weighted from Exhibit 4C) • -$41,499,600 decreased minimum charge revenues • +$206,700 (Part B permit renewal	-$41,300	$9,797,500	-0.422%

Exhibit 10B Potential Direct Distributional Effects on 8 Industries Engaged in or Supporting Recycling and Subject to the Terms/Conditions of the DSW Final Rule (Potential Distributional Effects on Business Sales/Service Annual Revenues)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
					savings: 57 x $3,627/yr) Net = -$2,353,300			
3	H039 haz waste other materials recovery (in this RIA H039 represents carbon recovery)	562 PLC 38472 haz waste recyclable material recovery & preparation services	36 (a)	+1,136 tons from hazardous waste disposal industries (carbon recovery)	• +$986,000 ($868/ton x 1,136 tons) • -$6,639,900 (16% ton-weighted from Exhibit 4C) • -$41,499,600 decreased minimum charge revenues • +$130,600 (Part B permit renewal savings: 36 x $3,627/yr) Net = -$6,508,400	-$180,800	$9,797,500	-1.845%
		A, subtotal =	159 (non-duplicative)	**+23,413**	-$30,754,200			
B. Intermediate (Middlemen) Service Industries Supporting Industrial Recyclers Subject to the DSW Final Rule								
4	Waste & Recycling Brokerage facilities	562 PLC 38510 haz waste brokers	Up to 119 (c)	NNC	NNC	NNC	$1,758,200	NNC
		562 PLC 38520 haz recyclable materials brokers	Up to 45 (c)	NNC	NNC	NNC	$15,751,100	NNC
5	Waste & materials transfer facilities (storage & consolidation)	562 PLC 38471 haz waste transfer facilities	Up to 225 (c)	NNC	NNC	NNC	$6,407,500	NNC
		562 PLC 38771 non-haz waste & recyclable	Up to 1,248 (c)	NNC	NNC	NNC	$5,443,500	NNC

Exhibit 10B Potential Direct Distributional Effects on 8 Industries Engaged in or Supporting Recycling and Subject to the Terms/Conditions of the DSW Final Rule (Potential Distributional Effects on Business Sales/Service Annual Revenues)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
		materials transfer facilities						
6	Waste & materials sorting facilities	562 PLC 38472 prepare haz waste recyclable materials for recovery	Up to 108 (c)	NNC	NNC	NNC	$9,797,500	NNC
		562 PLC 38772 prepare non-haz waste recyclable materials for recovery	Up to 1,125 (c)	NNC	NNC	NNC	$2,798,300	NNC
7	Industrial recyclable materials wholesale distribution facilities	42393 PLC 15330 wholesale distributors of industrial recyclable materials including chemicals products, industrial gases, petroleum	Up to 16 (c)	NNC	NNC	NNC	$4,429,400	NNC
		B. sub-total =	Up to 2,565 (c) (non-duplicative)	**0**	$0			
C. Truck Transportation Services Supporting Industrial Facilities Engaged in Recycling and Subject to the Terms of the DSW Final Rule								
8	Truck Transportation Note: Although tonnage loss is indicated in column E, this RIA assumes this effect involves reduction in fees charged rather than shift in tonnage to NAICS 4842 specialized freight truck transport	562 PLC 38430 hazardous waste transportation services	Up to 358	-977,677 (Columns B+C+D of Exhibit 9D)	-$46,511,314 (Row 14 Exhibit 6C)	-$129,920	$5,927,690	-2.192%
Explanatory Notes: • *PLC code = NAICS product line code.								

Exhibit 10B Potential Direct Distributional Effects on 8 Industries Engaged in or Supporting Recycling and Subject to the Terms/Conditions of the DSW Final Rule (Potential Distributional Effects on Business Sales/Service Annual Revenues)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues

- ** Hxxx = all other affected Hxxx disposal codes (i.e., not including codes H010, H020, H039, H050, H132, H134).
- NNC = "No net change" expected because this RIA assumes the potential distributional effect of the DSW final rule exclusions is a potential intra-industry shift rather than an inter-industry shift, because the particular affected industry has both hazardous and non-hazardous wastes or secondary materials product lines (i.e., as evidenced by NAICS product line code statistics).
- Column D data sources:
  - (a) Exhibit 4A off-site receivers of waste
  - (b) Exhibit 5A off-site receivers of waste
  - (c) Total establishment counts for NAICS industry code and/or specific NAICS PLC code from the US Dept of Commerce Bureau of Census "2002 Economic Census" at: http://www.census.gov/econ/census02/data/us/US000.HTM
- Column H: average facility revenues calculated for each NAICS & PLC code by [(total annual PLC receipts) / (total count establishments)] based on data from the US Dept of Commerce Bureau of Census 2002 Economic Census "Industry Series" data for respective NAICS industry and PLC codes at: http://www.census.gov/econ/census02/guide/INDSUMM.HTM

Exhibit 10C below presents four groups of possible indirect distributional effects for industrial facilities not engaged in recycling nor subject to the terms/conditions of the DSW final rule. As noted in the introduction to this chapter, this classification is a simplification because many facilities in these industries may have multiple NAICS codes reflecting diverse operations at any single facility within the groups displayed below in Exhibit 10C. The indirect distributional effects for non-hazardous commercial waste management industries are already included in the impact estimates of Chapter 9. The potential decrease in virgin materials production is estimated based on the tonnage of baseline disposal switchover to recycling estimated in Chapter 8 (Exhibit 8B) of this RIA. The potential increase in coal production represents a replacement energy source for the anticipated switchover of beneficial disposal to recycling as a result of the DSW final rule (i.e., switchover of baseline H050 energy recovery and baseline H061 fuel blending), which this RIA estimates in Chapter 9 (Exhibit 9F).

Exhibit 10C
Potential Indirect Distributional Effects
on 15 Industries Not Engaged in Recycling Nor Subject to the Terms/Conditions of the DSW Final Rule
Potential Distributional Effects on Business Sales/Service Annual Revenues
(Note: Column A row item numbers follow consecutively from Exhibit 10B)

A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
D. Hazardous Waste Disposal Industries Not Engaged in Recycling Nor Subject to the Terms & Conditions of the DSW Final Rule:								
9 10 11 12 13 14 15	H050 haz waste energy recovery beneficial disposal	• 21223 Copper, lead, nickel & zinc mining • 3241 Petroleum & coal products mfg • 325 Chemical mfg • 327 Nonmetallic mineral (cement mfg) • 493 Warehousing • 561 Admin. support • 562 Waste mgt	44 (b) By NAICS code: 2123 = 3.6% = 1 3241 = 4.2% = 2 325 = 6.3% = 3 327 = 46.8% = 20 493 = 1.6% = 1 561 = 1.2% = 1 562 = 36.0% = 15 Misc = 3.9% =1	• -3,755 tons (switch to haz. waste solvent recovery) • +1,239 tons (33% haz. waste solvent recovery tons are residuals & 100% require energy recovery; assume continue haz. energy recovery) • +0 tons (assume deregulated "listed" baseline	• -$568,600 ($226/ton H050 energy recovery fee x -2,516 net tons) • -$191,800 loss for increased coal purchase (e) Net = -$760,400	-$17,300	By NAICS: $48,041,200 $95,187,000 $34,166,300 $5,702,200 $1,305,900 $1,148,700 $2,749,400	By NAICS: -0.036% -0.018% -0.051% -0.303% -1.325% -1.506% -0.629%

Exhibit 10C Potential Indirect Distributional Effects on 15 Industries Not Engaged in Recycling Nor Subject to the Terms/Conditions of the DSW Final Rule Potential Distributional Effects on Business Sales/Service Annual Revenues (Note: Column A row item numbers follow consecutively from Exhibit 10B)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
				recycling residuals continue haz. energy recovery) Net =-2,516 tons				
16	H132 landfill or surface impoundment disposal	562 PLC 38441 haz waste landfill disposal	44 (b)	• -18,522 tons (switching to haz waste metals recovery) • +5,631 tons (32% of haz. waste metals recovery tons are residuals & 95% remains haz requiring landfill) • + 85 tons (10% of haz. waste other recovery tons are residuals & 75% remain haz requiring landfill) • -25,132 tons (deregulated “listed” baseline recycling residuals) Net = -37,938 tons	- $8,460,200 ($223/ton x 37,938 tons)	-$192,300	$5,784,400	-3.324%

Exhibit 10C Potential Indirect Distributional Effects on 15 Industries Not Engaged in Recycling Nor Subject to the Terms/Conditions of the DSW Final Rule Potential Distributional Effects on Business Sales/Service Annual Revenues (Note: Column A row item numbers follow consecutively from Exhibit 10B)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
17	H134 deepwell injection disposal	562 PLC 38442 haz waste deepwell & other disposal	0	0	$0	$0	$7,572,000	0%
18	Hxxx** other disposal methods (H040 incineration)	562 PLC 38450 haz waste disposal other than confinement	88 (b)	-1,136 tons (switch to haz. waste other recovery: carbon regeneration)	- $648,700 ($571/ton x 1,136 tons)	-$7,400	$7,678,600	-0.096%
		D. subtotal =	176	**-41,590**	-$9,869,300			
E. Non-Hazardous Waste Disposal Industries Not Engaged in Recycling Nor Subject to the Terms & Conditions of the DSW Final Rule:								
19	Non-hazardous waste landfills	562 PLC 38791 non-haz waste landfill disposal services	Up to 2,012 (c)	• +25,132 tons (deregulated "listed" baseline recycling residuals) • +296 tons (32% of switch to metals recovery tons are residuals &5% non- haz requires landfill) • +28 tons (10% of switch to other recovery are residuals & 25% is non- haz requiring landfill) Net = +25,456 tons	+$943,500 ($37/ton x 25,500 tons)	+$500	$3,513,700	+0.014%
		E. subtotal =	Up to 2,012	**+25,456**	+$943,500			
F. Virgin Industrial Materials Production Industries Not Engaged in Recycling Nor Subject to the Terms of the DSW Final Rule:								
20	Virgin metals	331419 Other nonferrous	Up to 172 (c)	-123	-$3,680,400	-$21,400	$13,752,400	-0.156%

Exhibit 10C Potential Indirect Distributional Effects on 15 Industries Not Engaged in Recycling Nor Subject to the Terms/Conditions of the DSW Final Rule Potential Distributional Effects on Business Sales/Service Annual Revenues (Note: Column A row item numbers follow consecutively from Exhibit 10B)								
A	B	C	D	E	F	G (F/D)	H	I (G/Hx100)
Item	Type of Industrial Material or Business Activity Potentially Affected	NAICS industry code & NAICS PLC* code (affiliated or proxy)	2005 count of potentially affected facilities	Potential annual quantity materials affected + = business gain - = business loss (tons/year)	Potential annual distributional effect + = business gain - = business loss	Average annual effect per affected facility	2002 average annual facility revenues for PLC	Distribution effect as % of average facility PLC revenues
	production	metal primary smelting			(from Exhibit 8B)			
21	Virgin solvent production	325199 All Other Basic Organic Chemical Mfg	Up to 685 (c)	-677	-$578,900 (from Exhibit 8B)	-$900	$70,496,800	-0.001%
22	Virgin other materials production	325182 Carbon black mfg	Up to 25 (c)	-102 (carbon)	-$438,500 (from Exhibit 8B)	-$17,500	$41,340,600	-0.0004%
		F. subtotal =	Up to 882	**-902**	**-$4.7 million**			
G. Ancillary Industries:								
23	Coal production	2121 Coal mining	Up to 1,190 (c)	**+2,413 (d)**	+$191,800 (e)	+$200	$17,303,700	+0.0012%
				Net materials resource conservation (14+15+16+17) =	**-$4.5 million**			

Explanatory Notes:

- *PLC code = NAICS product line code.
- Column D data sources:
  (c) Total establishment counts for NAICS industry code and/or specific NAICS PLC code from the US Dept of Commerce Bureau of Census "2002 Economic Census" at: http://www.census.gov/econ/census02/data/us/US000.HTM
- Column E data sources:
  (d) Step 1: Assume the estimated annual tonnage that may switchover from H050 energy recovery disposal to future solvent recycling, has 8.34 lbs/gallon specific gravity similar to water: (2,516 net H050 short tons/year switchover to recycling) x (2,000 lbs/short ton) x (1 gallon per 8.34 lbs) = 603,400 gallons/year spent solvent equivalent switchover from H050 to solvent recycling. Step 2: Assume ratio coal:to:H050 spent solvent is 800,000 tons coal for every 200 million gallons H050 spent solvent: (603,400 gallons/year H050 spent solvent switchover to recycling) x (800,000 tons/200,000,000 gals) = 2,413 tons/year coal equivalent (ratio source: page 5 at http://www.wbcsd.org/web/projects/cement/tf2/HWF-CKS.pdf).
  (e) Assume average delivered cost of coal = $53/ton (source: average of 07 March 2008 spot prices for coal for five US regional coal supply sources which ranged between $14/ton to $84/ton http://www.eia.doe.gov/cneaf/coal/page/coalnews/coalmar.html), and assume shipping & handling adds 50%: (2,413 tons/year coal equivalent) x ($53/ton x 1.50 S&H) = $191,800/year cost of equivalent coal to replace loss of H050 spent solvents.
- Column H: average facility revenues calculated for each NAICS & PLC code by [(total annual PLC receipts) / (total count establishments)] based on data from the US Dept of Commerce Bureau of Census 2002 Economic Census "Industry Series" data for respective NAICS industry and PLC codes at: http://www.census.gov/econ/census02/guide/INDSUMM.HTM

10C. Potential Distribution Effects on State Governments (Hazardous Waste Fee Revenues)

Certain state governments charge hazardous waste generation taxes and fees. Under the DSW final rule, some industrial secondary materials may no longer be regulated as RCRA hazardous waste, and thus the generators may no longer incur a state government hazardous waste generation tax or fee for affected baseline hazardous wastes. Depending upon the extent to which state governments adopt the DSW final rule as part of their RCRA-authorized programs, certain state government hazardous waste programs may experience reductions in annual revenues from these fees. Distributive effects on state governments are not treated as social costs in this RIA for estimating the net economic impact of the DSW final rule, because government taxes often represent "transfer payments" not real resource costs. However, reductions in taxes and fees may influence a generator's waste management decisions (e.g., disposal vs. recycling) and are included in the financial breakeven test in this RIA.

Exhibit 10D below presents the estimated potential future reduction in state government hazardous waste tax/fee annual revenues as a result of the 2008 DSW final rule. These estimates are based on the state government hazardous waste generation fees identified for 31 states in **Appendix E** to this RIA. The remaining 20 states (including the District of Columbia) either (a) could not be determined from the data source reviewed if hazardous wastes that are recycled are taxed similarly to wastes that are treated or disposed, and further clarification is needed to determine applicability (applicable to eight states), or (b) charge TSDFs for permits or other waste management fees but do not charge waste generators. Note that at least one state (SC) charges both hazardous waste and non-hazardous waste fees.

Exhibit 10D
Estimated Potential Reduction in State Government Hazardous Waste Tax/Fee Annual Revenues As a Result of the 2008 DSW Final Rule (2007$/year)*

	Generator Impact Category	Exclusion 1: Generator Controlled	Exclusion 2: Transfer-Based	Exclusion 3: Case-by-Case Variance	Combined (Exclusions 1+2+3)
1	Baseline RCRA-regulated hazardous waste recycling that may become excluded under the DSW final rule	$279,185	$4,698,582	$56,460	$5,034,227
2	Baseline RCRA-regulated hazardous waste disposal that may be induced to de-regulated recycling under the DSW final rule	$0	$46,444	$0	$46,444
	Totals =	$279,185	$4,465,841	$56,460	**$5.1 million**

Explanatory Notes:
* Annual revenue reduction estimates in this Exhibit are based on hazardous waste generator tax/fee data for 31 states displayed in **Appendix E** of this RIA. The impacts do not include eight states (DE, IL, NE, NV, NY, OH, TX, WV) for which further analysis needs to be conducted to determine tax rates.

Chapter 11
Countervailing Risks

Note: This chapter presents a qualitative screening analyses which corroborates OSW's 2003 and 2007 DSW proposed rule assertion: "*EPA expects that this proposal will encourage the safe, beneficial recycling of hazardous secondary materials… while at the same time maintaining protection of human health and the environment*" (Source: Federal Register, Vol.68, No.208, 28 Oct 2003, p.61560 and Vol.72, Nor.57, 26 March 2007, p.14174, respectively).

11A. Definition of Countervailing Risk

OMB Circular A-4 indicates that Federal agencies should look beyond the direct benefits and direct costs of rulemakings and consider any important countervailing risks. OMB defines a countervailing risk as:

> "*[A] countervailing risk is an adverse economic, health, safety, or environmental consequence that occurs due to a rule and is not already accounted for in the direct cost of the rule.*"25

The purpose of this chapter is to evaluate potential countervailing risks concerning unintentional future environmental, human health, and safety risks identified by 18 public commentors on OSWs 2003 and 2007 DSW rulemaking proposals, listed in Exhibit 11A:

Exhibit 11A
18 Public Commentors on Possible Countervailing Risks

Count	Type of Commentor	Commentor Identity
1	Federal government	US Congress
3	Commercial TSDFs	American Ecology Corp, Clean Harbors Environmental Services Inc, Safety-Kleen Systems Inc
3	Industry associations	Cement Kiln Recycling Coalition, Environmental Technology Council, IPC Association Connecting Electronics Industries
4	State governments	Connecticut, Kentucky, Maine, North Carolina
7	Environmental organizations	Earth Justice, Sierra Club, US Public Interest Research Group, Nat'l Environmental Trust, NW Environmental Defense Center, Pacific Environmental Advocacy Center, Safe Food & Fertilizer

25 Source: Office of Management & Budget (OMB) Circular A-4: Regulatory Analysis, 17 Sept 2003, p.26; http://www.whitehouse.gov/omb/circulars/a004/a-4.pdf.

11B. Potential Countervailing Risks Identified by Public Commentors

Exhibit 11B below identifies the 12 countervailing risks the 18 public commentors requested OSW analyze and quantify to the extent possible. Please note that the categories in the Exhibit are overlapping. They are not intended to be mutually exclusive but rather to represent the variety of potential negative outcomes noted by the public commentors.

Exhibit 11B
12 Overlapping Categories of Countervailing Risks Identified by Public Commentors

Item	Type of Countervailing Risk	Description of Countervailing Risk
1	Recycling environmental damages	Potential increase in future industrial recycling environmental damages & cleanup costs
2	Industrial secondary materials testing	Potential decrease in assurance that excluded industrial secondary materials will be adequately tested to determine if they are hazardous.
3	Community & groundwater impacts	Potential increase in environmental, health, and safety risks from wastes formerly sent to RCRA Subtitle C landfills may now be disposed at other facilities with less monitoring of community & groundwater impacts.
4	Employee training	Potential increase in environmental, health, and safety risks from reduction in training of industrial employees thereby increasing risk during handling and transport of excluded materials.
5	Human exposure to hazardous materials	Potential increase in human exposure risk to hazardous secondary materials.
6	Material shipments	Potential increase in environmental, health, and safety risks of misdirected, abandoned, and lost hazardous secondary materials shipments.
7	DSW rule compliance enforcement	Potential increase in costs for compliance assurance and enforcement with conditions of DSW exclusions.
8	Abandoned recycling sites	Potential increase in costs for investigating and stabilizing abandoned recycling sites.
9	Recycler site inspections	Potential reduction in inspections may lead to future increase in sites requiring remediation.
10	Worker fatalities/injuries from inter-industry distributional effects	Potential increase use of additional coal to offset the likely shift of hazardous wastes currently burned as fuel (i.e., energy recovery) to future recycling, may increase coal miner fatalities/injuries. • Note: Although not identified by public commentors, for purpose of formulating a balanced evaluation of this potential countervailing risk, this RIA also evaluates potential distributional effects on worker fatalities/injuries in virgin materials producing industries other than coal production.
11	Commercial recycler bankruptcy	Potential increase in risk that current commercial recyclers may fail in bankruptcy from increased competition by non-regulated recyclers
12	Other environmental & health programs	Potential adverse impacts on functioning of other public programs that protect the environment & public health.

11C. Countervailing Risk Evaluation Methodology

The countervailing risks addressed in this chapter represent screening analyses and with the exception of one risk element, represent qualitative analyses. USEPA's information and data quality guidelines[26], which are based on OMB's government-wide policy regarding information dissemination to the public, describe mechanisms USEPA will use to ensure to the objectivity, accuracy, reliability, and un-biasness of data and information of USEPA risk assessments. According to the flexibility of those guidelines, the risk analysis of this chapter does not meet the "*influential*" risk assessment criteria. Rather, this risk analysis represents a relatively low level-of-effort "*screening*" risk analysis approach, which under the guidelines may be appropriate for environmental, ecological, human health and safety risk assessments:

> "*EPA conducts many risk assessments every year. Some of these are screening level assessments based on scientific experts' judgments using conservative assumptions and available data and can involve human health, safety, or environmental risk assessments. Such screening assessments provide useful information that are sufficient for regulatory purposes in instances where more elaborate, quantitative assessments are unnecessary. For example, such assessments could indicate, even with conservative assumptions, the level of risk does not warrant further investigation." "Only if potential risks are identified in a screening level assessment is it necessary to pursue a more refined, data-intensive risk assessment..,, Nevertheless, such assessments may be useful in making regulatory decisions, as when the absence of concern from a screening level assessment is used (along with other information) to approve the new use of a pesticide or chemical or to decide whether to remediate very low levels of waste contamination.*" (Source: USEPA Information Quality Guidelines Section A.3.6).

11D. Evaluation of 12 Countervailing Risks

• 11D-1. Potential Increase in Future Industrial Recycling Environmental Damages & Cleanup Costs

This section presents a qualitative, screening analysis of the potential impact of the DSW final rule exclusions on environmental protection. This qualitative risk screening analysis begins by examining the causes for environmental damages in OSW's study27 of 208 historical industrial recycling damage cases. These 208 cases are a non-exhaustive set of damage cases which occurred between

26 USEPA Office of Environmental Information (OEI), "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by the Environmental Protection Agency", EPA/260R-02-008, Oct 2002, http://www.epa.gov/quality/informationguidelines/documents/EPA_InfoQualityGuidelines.pdf

27 Source: OSW, "An Assessment of Environmental Problems Associated with Recycling of Hazardous Secondary Materials", 11 Jan 2007, Docket document ID nr. EPA-HQ-RCRA-2002-0031-0355 available at http://www.regulations.gov and at http://www.epa.gov/epaoswer/hazwaste/dsw/abr.htm. OSW conducted the 2007 recycling damage study in response to public commentors on the 2003 DSW proposed rule. OSW summarized the recycling damage case study findings in the 2007 DSW supplemental proposal (Federal Register, Vol.72, No.57, 26 March 2007, pp.14180-14182), and provided the study report and its appendices as background documents to the March 2007 DSW supplemental proposal.

1982 and 2005. Exhibit 11C below presents a comparison of the major causes of environmental damages in the 2008 cases, to the environmental, health, and safety protection conditions/ requirements of the DSW final rule exclusions. OSW selected these conditions/ requirements to safeguard against the causes uncovered in the damage case study. The extent to which the conditions/ requirements address the major causes is a rough indicator that the DSW final rule may prevent an increase in industrial recycling damages in the future, relative to recent historical average annual industrial recycling damages involving hazardous secondary materials. The historical recycling damage causation identification method is explained in the 2007 damage case background document:

> "*Many of the cases that were investigated were well documented, and we were able to assemble virtually all of this information. This was the case, for example, for many of the Superfund NPL sites. However, in many other cases it was not possible given the limitations of the study to document all of these facts. Often, there was considerable technical information as to the nature and extent of the contamination at the site, but relatively little information regarding the activities and circumstances that originally caused it. For some of the sites, we were able to collect only very basic information.... While our analysis did not attempt to probe in great detail the exact actions or circumstances that led to contamination problems at these sites, in most cases we were able to identify in general terms the primary cause of the contamination.*" Source: pp. 5 & 8 at:http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/env-prob.pdf.

Exhibit 11C below presents the five primary categories of known causes --- which account for 96% of all causes in the historical damage cases reference study after subtracting the 4% "unknown causes" category, and compares these causes with the implementation conditions/ requirements of the DSW final rule exclusions (as listed in Exhibit 7A of this RIA, plus the legitimate recycling criteria described in Chapter 3). As displayed at the bottom of Exhibit 11C, this comparison (i.e., gap analysis) reveals that the DSW final rule conditions/requirements address the damage causes for all three exclusions, which suggests a high level of protection from future recycling operation-related damages to the environment and human health. Furthermore, most all exclusions have three or more protective conditions/ requirements which address each of the five known primary causes of historical recycling damages.

Exhibit 11C Comparison of the Condition /Requirements of the DSW Final Rule Exclusions to Historical Causes of Industrial Recycling Damages Involving Hazardous Secondary Materials				
A	B	C	D	E
Primary cause of historical recycling environmental damages	Historical occurrence in 208 recycling damage cases (1982-2005)	**Exclusion 1**: Generator-controlled recycling involving land- & non-land based recycling units	**Exclusion 2**: Transfer-based recycling	**Exclusion 3**: Case-by-case variance non-waste determination
1. Mis-management of recyclables	40% (81 cases)	• No speculative accumulation • Materials must be contained • Generator initially, annually & upon change notifies USEPA of offsite recycling shipments • Generator maintains offsite recycling shipment records (receipts) • Legitimacy Factor 3: manage DSW-excluded material as valuable commodity, or as analogous raw material, or contained (40 CFR 261.2(g)).	Same as Exclusion 1 plus: • Does recycler intend to legitimately recycle the material? (40 CFR 261.4(a)(24)(v)(B) reasonable efforts question #1 of 5) • Generator maintains offsite recycling shipment records • Credible evidence recycler will manage materials safely based on 3-year environmental violations history (40 CFR 261.4(a)(24)(v)(B) reasonable efforts question #3 of 5)	• Materials must be contained • 1st Criterion for continuous process: extent the secondary material is managed as part of the continuous process (40 CFR 260.34(b)). • 1st Criterion for indistinguishable product: likely markets and market value for secondary materials (40 CFR 260.34(c)) • Legitimacy Factor 3: manage DSW-excluded material as valuable commodity, or as analogous raw material, or contained (40 CFR 261.2(g))..
2. Mis-management of recycling residuals	34% (71 cases)	• Materials must be contained • Corollary to Legitimacy Factor 1 : in cases where a hazardous component of the secondary material is not being used in the recycling process, the recycler is responsible for management of any hazardous residuals of the recycling process (40 CFR 261.2(g)). • RCRA Subtitle C hazardous waste regulations still apply to residuals either exhibiting 40 CFR 261 subpart C hazardous characteristics or 40 CFR 261 subpart D hazardous waste listing descriptions	Same as Exclusion 1 plus: • Recycler has financial assurance for site closure. • Does recycler have permits to manage residuals, or credible evidence that recycler will manage residuals safely? (40 CFR 261.4(a)(24)(v)(B) reasonable efforts question #5 of 5)	Same as Exclusion 1 plus: • 3rd Criterion for continuous process: whether hazardous constituents in secondary materials are reclaimed rather than released to the air, land or water (40 CFR 260.34(b)). • 4th Criterion for indistinguishable product: whether hazardous constituents in the secondary materials are reclaimed rather than released to the air, land, water (40 CFR 260.34(c)).
3. Abandoned materials	14% (30 cases)	• Materials must be contained • No speculative accumulation • Generator initially, annually & upon change notifies USEPA of offsite	Same as Exclusion 1 plus: • Does recycler has financial assurance for site closure? (40 CFR 261.4(a)(24)(v)(B)	• Materials must be contained • 1st Criterion for indistinguishable product: likely markets and market value for secondary materials (40 CFR 260.34(c))

Exhibit 11C **Comparison of the Condition /Requirements of the DSW Final Rule Exclusions** **to Historical Causes of Industrial Recycling Damages Involving Hazardous Secondary Materials**				
A	B	C	D	E
Primary cause of historical recycling environmental damages	Historical occurrence in 208 recycling damage cases (1982-2005)	**Exclusion 1**: Generator-controlled recycling involving land- & non-land based recycling units	**Exclusion 2**: Transfer-based recycling	**Exclusion 3**: Case-by-case variance non-waste determination
		recycling shipments • Legitimacy Factor 3: manage DSW-excluded material as valuable commodity, or as analogous raw material, or contained (40 CFR 261.2(g))..	reasonable efforts question #2 of 5)	• 2nd Criterion for continuous process: capacity of production process to use the secondary material in a reasonable time (40 CFR 260.34(b)) • Legitimacy Factor 3: manage DSW-excluded material as valuable commodity, or as analogous raw material, or contained (40 CFR 261.2(g))..
4. Fire or accident	5% (11 cases)	• Materials must be contained • No speculative accumulation • Legitimacy Factor 4: product of recycling process does not contain hazardous constituent concentrations or exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, toxicity) (40 CFR 261.2(g)). [Note: Although not counted in this RIA exhibit as a condition/ requirement of this DSW exclusion, other regulatory fire and accident prevention requirements apply such as OSHA requirements apply such as OSHA workplace standards & local fire codes.]	Same as Exclusion 1 plus: • Does recycler have equipment & trained personnel for safe recycling? (40 CFR 261.4(a)(24)(v)(B) reasonable efforts question #4 of 5) • Recycler mush have liability insurance for accidents	• Legitimacy Factor 4: product of recycling process does not contain hazardous constituent concentrations or exhibit a hazardous characteristic (ignitability, corrosivity, reactivity, toxicity) (40 CFR 261.2(g)). [Note: Although not counted in this RIA exhibit as a condition/ requirement of this DSW exclusion, other regulatory fire and accident prevention requirements apply such as OSHA workplace standards & local fire codes.]
5. Sham recycling	3% (7 cases)	• Legitimacy Factor 1: DSW-excluded material must provide a useful contribution to the recycling process (40 CFR 261.2(g)). • Legitimacy Factor 2: recycling process must produce a valuable product (40 CFR 261.2(g)). • Legitimacy Factor 3: generator & recycler manages secondary materials as a valuable commodity	Same as Exclusion 1 plus: • Does the recycler intend to legitimately recycle the material? (40 CFR 261.4(a)(24)(v)(B) reasonable efforts question #1 of 5)	Same as Exclusion 1 plus: • 1st Criterion for continuous process: extent the secondary material is managed as part of the continuous process (40 CFR 260.34(b)). • 2nd Criterion for continuous process: capacity of production process to use the secondary material in a reasonable time (40 CFR 260.34(b)). • 3rd Criterion for continuous process:

Exhibit 11C **Comparison of the Condition /Requirements of the DSW Final Rule Exclusions** **to Historical Causes of Industrial Recycling Damages Involving Hazardous Secondary Materials**				
A	B	C	D	E
Primary cause of historical recycling environmental damages	Historical occurrence in 208 recycling damage cases (1982-2005)	**Exclusion 1**: Generator-controlled recycling involving land- & non-land based recycling units	**Exclusion 2**: Transfer-based recycling	**Exclusion 3**: Case-by-case variance non-waste determination
		(40 CFR 261.2(g)). • Legitimacy Factor 4: product of recycling process does not contain hazardous constituent concentrations or exhibit a hazardous characteristic (40 CFR 261.2(g)).		whether hazardous constituents in secondary materials are reclaimed rather than released to the air, land or water (40 CFR 260.34(b)). • 1st Criterion for indistinguishable product: likely markets and market value for secondary materials (40 CFR 260.34(c)) • 2nd Criterion for indistinguishable product: chemical/physical identity of secondary material comparable to products or intermediates (40 CFR 260.34(c)) • 3rd Criterion for indistinguishable product: capacity of market to use the secondary material in a reasonable time (40 CFR 260.34(c)). • 4th Criterion for indistinguishable product: whether hazardous constituents in the secondary materials are reclaimed rather than released to the air, land, water (40 CFR 260.34(c)). • 5th Criterion for indistinguishable product: any other relevant factors that demonstrate the material is not discarded (40 CFR 260.34(c)).
6. Unknown causes	4% (8 cases)	Not analyzed in this RIA	Not analyzed in this RIA	Not analyzed in this RIA
Duplicative count* of protective conditions =		**19**	**25**	**25** (actual count will vary on case-by-case basis)

Explanatory Notes:
* Total counts in this Exhibit are duplicative because they double-count exclusion conditions/requirements as relevant to more than one recycling damage cause. Furthermore, these duplicative counts are higher than the counts of conditions displayed in Exhibits 7A and 7C of this RIA, because this Exhibit distinguishes the following requirement sub-items: (a) four “legitimate recycling” factors (2 mandatory factors, plus 2 non-mandatory factors) which are common to all DSW recycling exclusions, (b) five sub-elements of due diligence for Exclusion 2, and (c) nine criteria for making a non-waste determination under Exclusion 3..

The 11 remaining categories of countervailing risks discussed in the following sections of this chapter do not coincide with the 4% of damages from unknown causes that is listed in Exhibit 11C (row item 6). Instead the categories of potential countervailing risks covered in the remainder of this chapter reflect descriptions provided by public commenters of potential negative consequences associated with the DSW rule.

• 11D-2. Potential Decrease in Assurance That Excluded Industrial Secondary Materials Will be Adequately Tested to Determine if They Are Hazardous

Adequate testing is assured by one of the legitimate recycling factors: whether the product or the recycling process contains hazardous constituents or exhibits a hazardous characteristic. This factor is assumed to be current (baseline) practice because USEPA already issued this factor in 1989 as policy guidance ("Lowrance Memo"; OSWER directive 9441.1989(19), 26 April 1989), which has been applied by state governments to determine "legitimate" from "sham" industrial recycling.

• 11D-3. Wastes Formerly Sent to RCRA Subtitle C Landfills May Now be Disposed at Other Facilities With Less Monitoring of Community & Groundwater Impacts

Wastes sent to Subtitle C landfills will not be excluded by the DSW rule unless they shift to legitimate recycling operations which conform to the exclusion requirements. In such cases, the affected materials formerly sent to Subtitle C landfills will be recycled and not disposed elsewhere. Furthermore, any residuals generated from recycling the formerly landfilled materials at an DSW-excluded recycling operation must be managed in an environmentally protective manner, and if any residuals exhibit a hazardous characteristic according to 40 CFR 261 Subpart C, or themselves are RCRA-listed hazardous wastes, they are hazardous wastes if discarded and must be managed according to the applicable RCRA Subtitle C hazardous waste regulatory requirements of 40 CFR 260 to 272.

• 11D-4. Potential Reduction in Training of Industrial Employees Thereby Increasing Risk During Handling & Transport of Excluded Materials

All employees of truckers, air shippers, and vessel shippers who directly affect the safe and legal packaging, shipping, or transportation of hazardous materials must be trained before performing hazmat duties (and retrained every three years and as rules change) according to US Department of Transportation (DOT) 49 CFR haz mat training regulations, plus IATA dangerous goods training for air employees, and IMO dangerous goods training for vessel employees. This training consists of hazardous materials classification, proper shipping name, packaging requirements, preparing DOT shipping papers, hazard communication container marking/labeling, placards, loading, moving, unloading, security, handling incidents, emergencies, and recordkeeping.

- **11D-5. Potential Increase in Human Exposure to Hazardous Materials**

Based on the historical recycling damage cases reviewed in Exhibit 11C above, the two causal factors "mis-management of recycling residuals" and the "fire or accident" (i.e., row items 1 and 4 in Exhibit 11C, respectively) which could cause immediate human exposure risks are addressed by the conditions/requirements of each exclusion. Furthermore, the other causal factors which could result in either direct or indirect human exposure risks are also addressed by two or more conditions/requirements for each exclusion. Therefore, this RIA does not anticipate potential increase in human exposure.

- **11D-6. Potential Increase in Misdirected, Abandoned, and Lost Shipments**

One of the 208 historical recycling damage cases in OSW's non-exhaustive study (FLD982085003; 1994) compiled in the "Appendix 2: Profiles of Damage Cases from Hazardous Materials Recycling Operations" involved a roadway truck abandoned shipment over the 24-year historical period (source: http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/app-2.pdf). Based on the historical recycling damage case causation evaluation presented in Exhibit 11C above, the "abandoned materials" causal factor (i.e., row item 3 in Exhibit 11C) is addressed by all three DSW final rule exclusions, which suggests no expected change (increase) in this countervailing risk.

- **11D-7. Potential Increase in Costs for Compliance Assurance & Enforcement with Conditions of DSW Exclusions**

The DSW final rule is voluntary, not mandatory, for RCRA-authorized state governments to adopt. State governments may potentially weigh any possible increase in compliance assurance and enforcement costs, with the anticipated economic benefits the DSW final rule exclusions may have in their respective states, such that the incremental costs to the state governments are benefit-cost justified at a societal level. The expected net change in RCRA administrative paperwork burden costs (such as labor FTE costs for increased compliance and enforcement burden) to RCRA-authorized state governments is estimated in the Information Collection Request (ICR) Supporting Statement for the DSW final rule.

To the extent that the DSW final rule exclusions may affect shifts in RCRA regulatory status from LQG to SQG status (which would result in a decrease of four RCRA Subtitle C regulatory requirements from 11 for LQGs to 7 for SQGs as shown in the bottom row of Exhibit 6A of this RIA), and from SQG to CESQG status (which would result in a decrease of one Subtitle C requirements from 7 for SQGs to 6 for CESQGs as shown in the bottom row of Exhibit 6A), such shifts may be expected to reduce future RCRA Subtitle C compliance assurance and enforcement for affected facilities (as estimated in Exhibit 6D), which will offset any increase in compliance assurance and enforcement for the DSW final rule exclusion.

• 11D-8. Potential Increase in Costs for Investigating and Stabilizing Abandoned Recycling Sites

OSW's January 2007 recycling damage case database does not identify abandoned sites per se as causation of historical damages. However, the database does indicate 33% (i.e., 69) of the 208 cases involved abandoned materials as one of the five known causation categories (source: Exhibit 2 at http://www.epa.gov/epaoswer/hazwaste/dsw/abr-rule/env-prob.pdf), which represents an average annual occurrence of 2.9 abandoned materials cases per year (i.e., (69 abandonment cases)/ (24 years)). Materials abandonment constitutes the primary cause of damages for a smaller 14% (i.e., 30) of the 208 recycling damage cases (source: Exhibit 3, ibid). Based on the historical recycling damage case causation evaluation presented in Exhibit 11C above, the "abandoned materials" causal factor (i.e., row item 3 in Exhibit 11C) is addressed by all three DSW final rule exclusions, which suggests no expected change (increase) in this countervailing risk.

• 11D-9. Potential Reduction in Site Inspections May Lead to Future Increase in Sites Requiring Remediation

Although OSW has not verified this potential effect, it seems reasonable to assume that some hazardous wastes which become excluded under the DSW rule may be expected to shift to less-regulated (e.g., non RCRA-permitted) industrial recycling facilities, and thus possibly be subject to relatively less frequent annual environmental protection and regulatory enforcement site inspections. However, OSW designed the conditions/ requirements of the DSW final rule exclusions to minimize any adverse environmental outcome from this type of possible change (i.e., reduction in relative number of annual site inspections) in regulatory oversight. These requirements include (a) legitimate recycling, (b) containerized materials, (c) no speculative accumulation, (d) management of residuals in environmentally protective manner, (e) site closure financial assurance, (f) generator due diligence oversight of offsite recyclers, (g) initial, annual, and upon change notifications of offsite shipments, and (h) offsite shipment recordkeeping.

• 11D-10. Potential Worker Fatality/Injury Risks from Inter-Industry Distributional Effects

In its 25 June 2007 written comments (ID nr. 2002-0031-0548) to OSW on the March 2007 DSW supplemental proposal, the Cement Kiln Recycling Coalition (CKRC) wrote that:

> "*[T]he Regulatory Impact Analysis for this rule has not appropriately considered the potential for and magnitude of the negative impact this rule will have on the beneficial recycling practice of recovering energy from secondary hazardous materials in cement kilns… EPA has ignored or underestimated the extent to which the proposed rule*

would encourage energy-bearing hazardous secondary materials to move away from energy recovery in cement kilns and towards other less-regulated forms of recycling… EPA's DSW RIA correctly assumes that if cement plants are forced to reduce energy recovery they will meet their resulting increased energy needs with coal. However, the RIA does not address the additional adverse health and safety impacts that will result from the increased production, transportation and use of this additional coal... In [CKRC's 1996 comments on another EPA rule], CKRC found that reducing the use of hazardous waste derived fuels and substituting coal would increase fatalities and injuries due to more coal mining accidents, lung cancer among miners, black lung diseases among miners, coal train accidents, and coal truck accidents"

Although this comment only identifies a potential worker fatality/injury countervailing risk involving a possible indirect distributional effect of the DSW final rule on the coal production industry (i.e., NAICS code 2121), there are other industries which may be directly and indirectly affected by the DSW rule (as identified in Chapter 10 of this RIA) due to:

- Direct distributional effects: May arise from future shifts in secondary materials management between:
    1. Decrease in business activity at commercial hazardous waste management industries (i.e., NAICS code 562)
    2. Increase in business activity at secondary materials recovery/recycling industries (e.g., NAICS 331492 secondary smelting of nonferrous metals).
- Indirect distributional effects: May occur from compensating changes in production of virgin industrial materials such as:
    1. Decrease in virgin metals production (NAICS 331419 other nonferrous metal ore primary smelting & refining)
    2. Decrease in virgin solvent production (NAICS 325199 all other basic organic chemical mfg)
    3. Decrease in other virgin materials production (e.g., NAICS 325182 carbon black mfg)
    4. Increase in coal production (NAICS 2121) to replace baseline hazardous wastes used as fuel for energy recovery which may switchover to materials recovery (e.g., solvent recovery) under the DSW final rule exclusions

One study28 of the historical trend in annual worker injuries and fatalities in the US coal mining industry indicates that worker injury and fatality rates have fluctuated annually in that industry, as measured and normalized in relation to annual <u>work-hours</u>. Exhibit 11D below displays counts of worker fatalities, injuries and illnesses for the coal mining industry and the other major industries potentially affected directly and indirectly by the DSW rule, compared to the magnitude of the potential annual distributional effect estimated in Chapter 10 of this RIA (Exhibits 10B & 10C, respectively). This indicator reveals that the relative size of the potential distributional effect of the DSW rule is very small compared to the magnitude of work-related injuries, illnesses and fatalities in each industry (2006). Furthermore, from a national perspective, potential small marginal business gains (i.e., potential increases in annual work hours) in industrial secondary materials recovery and coal mining industries, are expected to be offset to a large degree by potential small marginal business loses (i.e., potential reductions in annual work hours) for virgin materials production industries.

28 Source: Figure 4-1: Injury and Fatality Rates in US Coal Mines, 1931-1996 (p. 23) in "Productivity Change in US Coal Mining", Joel Darmstadter, Resources for the Future, Discussion Paper 97-40, July 1997: http://www.rff.org/Documents/RFF-DP-97-40.pdf.

Exhibit 11D Comparison of Potential Annual Distributional Effects to Annual Work-Related Worker Injuries, Illnesses & Fatalities in 23 Industries Potentially Directly & Indirectly Affected by the DSW Final Rule						
A	B	C	D	E	F	G
			Worker IIF Statistics (2006)			
Item	NAICS industry codes	Industry Identity	Fatalities	Non-fatal illnesses	Non-fatal injuries	Annual distributional effect
		A. Hazardous waste recovery/recycling:				
1	331492	H010 metals recovery (secondary smelting nonferrous metals)	Not avlble	<100	500	-1.995%
2	562211	H020 solvent recovery	5	100	1,400\	-0.422%
3	562211	H039 other materials recovery (carbon in this RIA)	5	100	1,400	-1.845%
		B. Intermediate (middlemen) waste/materials distribution:				
4	562998	Waste & recycling brokerage	Not avlble	<100	2,100	0%
5	562998	Waste & materials transfer (storage & consolidation)	Not avlble	<100	2,100	0%
6	562998	Waste & materials sorting	Not avlble	<100	2,100	0%
7	42393	Industrial recyclable materials wholesale distribution	15	200	9,400	0%
8	562112	C. Hazardous waste transportation services (trucking)	Not avlble	Not avlble	Not avlbe	-2.192%
		D1. Hazardous waste beneficial disposal (H050 & H061 energy recovery):				
9	21223	Copper, lead, nickel & zinc mining	5	<100	400	-0.036%
10	3241	Petroleum & coal products mfg	9	200	3,100	-0.018%
11	325	Chemical mfg	32	3,100	22,600	-0.051%
12	327	Nonmetallic mineral product mfg (i.e., cement mfg kilns)	59	2,100	35,400	-0.303%
13	493	Warehousing & storage	17	1,400	44,600	-1.325%
14	561	Administrative support services	294	9,000	126,300	-1.506%
15	562	Waste management & remediation	77	500	22,600	-0.629%
		E2. Hazardous waste non-beneficial disposal:				
16	562211	H132 landfill or surface impoundment disposal	5	100	1,400	-3.324%
17	562211	H134 deepwell injection disposal	5	100	1,400	0%
18	562211	H040, H071 to H131, H135 other non-beneficial disposal	5	100	1,400	-0.096%
19	562212	E. Non-hazardous waste disposal (displaced by switchover to recycling)	8	100	3,900	+0.014%
		F. Virgin materials production (resources conserved by recycling switchover):				
20	331492	Virgin metals production (primary smelting nonferrous metals)	Not avlble	<100	500	-0.156%
21	325199	Virgin solvent production (all other basic organic chemical mfg)	3	100	600	-0.001%
22	325188	Virgin other materials production (carbon black mfg)	3	100	900	-0.0004%
23	2121	G. Coal mining (to replace recycling switchover loss of H050 & H061)	47	100	4,400	+0.0012%

Explanatory Notes:

- Columns D, E & F data source: US Dept of Labor, Bureau of Labor Statistics "Injuries, Illnesses & Fatalities" (IIF) database at http://www.bls.gov/iif
- Column G data source: Estimated potential percentage change in annual business revenues from Exhibits 10B & 10C of this RIA. Positive numbers (+) indicate potential business gain and negative numbers (-) indicate potential business loss. This percentage revenue change represents for purpose of this Exhibit an indicator of potential future change in annual work hours in each industry, compared to baseline annual work hours and IIF counts..

• 11D-11. Potential Increase in Risk That Current Commercial Recyclers May Fail in Bankruptcy From Increased Competition by Non-Regulated Recyclers

Although OSW has not verified this potential effect, it is reasonable to assume that some hazardous wastes which become excluded under the DSW final rule may be expected to shift to less-regulated (e.g., non RCRA-permitted) industrial recycling facilities, and thus possibly induce some business closures (e.g., bankruptcies) among commercial recyclers. This RIA estimates no potential future increase in business closures because the fraction of affected business activity as measured by average annual company revenues potentially lost (i.e., transferred to other industries) as a result of the DSW final rule, is relatively small in all affected industries, as estimated in Chapter 10 "Distributional Effects" of this RIA. For example, some current Subtitle C permitted hazardous waste recyclers may continue to manage the DSW-excluded secondary materials in other units of their same facilities after this rule is implemented, which would mitigate any potential future business loss for the commercial hazardous waste treatment industry.

• 11D-12. Potential Adverse Impacts on Functioning of Other Public Programs that Protect the Environment & Health

The Federal Register announcements for both the 2007 DSW supplemental proposal (Vol.72, No.57, 26 March 2007, Section XIII., pp.14205-14207), and for the DSW final rule, provide a description of the expected effects of this final rule on nine other governmental environmental and health programs:

1. RCRA solid waste exclusions found in 40 CFR 261.4(a): OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule because hazardous secondary materials that are currently excluded from the RCRA definition of solid waste in 40 CFR 261.4(a) with specific requirements or conditions, will be required to continue to meet those prior requirements. In addition, recycling of such hazardous secondary materials at new facilities, or at existing facilities that are not currently operating under the terms of an existing RCRA definition of solid waste exclusion, would also be subject to the existing applicable regulatory exclusion, rather than to the DSW final rule exclusions.

2. Spent lead-acid battery recycling: OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule because spent lead-acid batteries must continue to be managed according to (a) the requirements of the recycling exclusion found in 40 CFR 266 subpart G, or (b) the universal waste standards of 40 CFR part 273, or (c) full Subtitle C hazardous waste requirements (if disposed).

3. Other RCRA recycling exclusions: For other hazardous secondary materials currently eligible for management under other exclusions or alternative regulatory structures that do not include an exclusion from the RCRA definition of solid waste (such as the universal waste regulations in 40 CFR part 273), the facility would have the choice of either continuing to manage his

hazardous secondary material as a hazardous waste under the existing RCRA regulations or under today's exclusions from the definition of solid waste. Because the DSW final rule exclusions contain environmentally-protective conditions/requirements which may equal or exceed the conditions of existing RCRA Subtitle C exemptions, OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule. Furthermore, for those facilities that are currently excluded from boiler and industrial furnace (BIF) regulations under 40 CFR 266.100 subpart H for "smelting, melting, and refining furnaces" and precious metals recovery furnaces, hazardous secondary materials burned for metals recovery would still be required to meet the minimum metals and maximum toxic organic metals content specified in 40 CFR 266 subpart H, because these conditions define when an operation involving combustion is a legitimate materials recovery operation, rather than burning for energy recovery or burning for destruction, which are not eligible for the DSW final rule exclusions.

4. RCRA-permitted TSDFs: Permitted facilities that continue to manage hazardous wastes in addition to managing hazardous secondary materials excluded under the DSW final rule must continue to maintain their RCRA permits. In addition, permit requirements applicable to newly excluded units will remain in effect until they are removed from the permit by submitting a permit modification request. On the other hand, a permitted facility that manages only hazardous secondary materials excluded under the DSW final rule and is, therefore, no longer a hazardous waste management facility, will no longer be required to maintain a RCRA hazardous waste operating permit, and will no longer be required to comply with the existing RCRA hazardous waste regulations governing permitted facilities. However, permits issued to these facilities remain in effect until they are terminated. To support a request for permit termination by modifying the permit term, the owner or operator must demonstrate that the operations meet the conditions of the exclusion, and that the facility does not manage non-excluded hazardous wastes. In addition, as was explained in the October 2003 proposal and in the March 2007 proposal, the obligation of 40 CFR 264.101 to address facility-wide corrective action at permitted facilities, which attaches at permit issuance, is not affected by this final rule and remains in effect until corrective action at the facility is completed. Therefore, an owner or operator of a facility that manages only hazardous secondary materials excluded under the DSW final rule seeking to terminate the facility's permit by modifying the permit term must demonstrate as part of the permit modification request that corrective action obligations at the facility have been addressed. If facility-wide corrective action has not been addressed, the permit generally should not be terminated but, rather, modified to include only corrective action requirements. For these reasons, OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule.

5. RCRA interim status TSDFs: A facility that is operating under interim status will be affected by the DSW final rule in much the same way as a RCRA-permitted facility, and the issue of corrective action will be addressed in a similar manner. Thus, OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule.

6. Corrective action for releases from formerly RCRA-regulated units: To maintain a DSW final rule exclusion, owners and operators of facilities with excluded units must comply with the conditions/restrictions of the exclusion, including the conditions of (a) containment of the hazardous secondary material in the unit and (b) the prohibition against speculative accumulation. In some cases, units that release materials may no longer meet the condition of containment and, if such releases are not promptly addressed and containment at the unit is not promptly restored, the unit will no longer qualify for the

exclusion provided under the DSW final rule. If a unit loses its exclusion, the unit itself, as well as materials in the unit, once again will become subject to all RCRA regulatory requirements that were applicable prior to the DSW final rule. In addition, releases from the unit that were not promptly addressed become discarded solid and hazardous wastes and are not excluded secondary materials under the DSW final rule. In other cases, a unit that currently meets the conditions and thereby qualifies for the exclusion provided in the DSW final rule, including the containment condition, may have unaddressed releases from earlier waste management activities at the now-excluded unit. This release material is discarded solid and hazardous waste and is not excluded material under the DS final rule. Thus, in both cases described above, the owner/operator retains the obligation to address releases from the unit through corrective action. For these reasons, OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule.

7. Financial assurance obtained for closure at non-excluded RCRA-regulated units: Owners and operators of units eligible for the DSW final rule “Exclusion 2” and “Exclusion 3” would be required to remove and decontaminate all contaminated structures, equipment, and soils. The financial assurance provided under subpart H of 40 CFR parts 264 and 265 was designed to assure that funds would be available for these activities. In the case of “Exclusion 1” where financial assurance is no longer required, previous releases from the unit, which would have been addressed during closure and for which financial assurance was obtained, will as a result of the DSW final rule, now be addressed through corrective action authority. For these reasons, OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule.

8. CERCLA & SREA: At least one commentor (2002-0031-0193) on the 2003 DSW RIA requested OSW to address the potential for the DSW rule to affect “arranger liability” under CERCLA section 107. OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule because in 1999, Congress enacted the Superfund Recycling Equity Act (SREA) which explicitly defined those hazardous substance recycling activities that potentially may be exempted from liability under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). These exempted activities are listed in CERCLA section 127. The DSW final rule does not change the universe of recycling activities that could be exempted from CERCLA liability pursuant to CERCLA section 127. The DSW final rule only changes the RCRA definition of solid waste for purposes of RCRA Subtitle C requirements. The final rule also does not limit or otherwise affect USEPA’s ability to pursue potentially responsible persons under section 107 of CERCLA for releases or threatened releases of hazardous substances.

9. Hazardous secondary materials imports and exports: OSW does not expect an increase in this type of countervailing risk resulting from the DSW final rule for two reasons:
   a. The DSW final rule exclusion for hazardous secondary materials reclaimed under the control of the generating facility (“Exclusion 1” in this RIA) is limited to recycling performed in the United States or its territories, and
   b. Although the transfer-based recycling exclusion (“Exclusion 2”) and the non-waste determination (“Exclusion 3”) included in the DSW final rule do not place any geographic restrictions on movements of hazardous secondary materials, provided they meet the environmentally-protective conditions/requirements (i.e., description) of these two exclusions. It is therefore possible that in some cases excluded hazardous secondary materials could be generated in

the United States or its territories and subsequently exported for reclamation to a facility in a foreign country or hazardous secondary materials could be generated in a foreign country and imported for reclamation in the United States. Under the DSW final rule, the exclusion would only be effective while the hazardous secondary material is within the United States or its territories; excluded hazardous secondary materials may be subject to regulation as hazardous wastes in the receiving or (for imports) in the originating country, even if they are excluded from the definition of solid waste in the U.S. under RCRA. If this is the case, the U.S. facility who exports or imports hazardous secondary material will need to comply with any applicable requirements of the subsequent foreign country.

Chapter 12
Sensitivity Analysis Factors

This chapter presents the derivation of nine different sensitivity analysis factors which are applied in Chapter 1 (Exhibit 1D) of this RIA to the bottom-line economic impact estimate of this RIA (from Chapter 9). The purpose of these factors is to illustrate in Exhibit 1D, the extent to which the annual industry net costs savings estimated in this RIA based on 2005 data year, may fluctuate year-to-year in the future after the DSW final rule is promulgated. These factors are not meant to be additive and some are sub-components in part or in whole of other factors (e.g., factors #3, #4 and #5 are sub-components of factor #2). To avoid duplication of information in this RIA, refer to Exhibit 1D for the results of how these sensitivity factors affect the industry cost savings estimate for the DSW final rule.

- **Sensitivity Analysis #1: State Government Adoption Uncertainty**

The bottom two rows of Exhibit 12A present two alternative average annual impacts according to two scenarios:

- All states adopt the respective voluntary exclusions (i.e., 100% state adoption);
- Only some states adopt the exclusions; for this scenario potential non-adopting states are indicated in Exhibit 12A with shaded cells, based on OSW's analysis of 26 state government comments submitted to the USEPA Docket in response to OSW's 28 October 2003 proposed rule (note: state government and other public comments are available in Docket ID No. RCRA-2002-0031 at: http://www.regulation.gov). For Exclusion 1, four states indicated possible non-adoption, for exclusion 2, 12 states indicated possible non-adoption.

Exhibit 12A
Sensitivity Analysis #1:
State-by-State Net Cost Savings Impact and Possible Non-Adoption of DSW Final Rule

Item	State	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Recycling	Combined Net Impact (Exclusions 1+2+3)
1	Alabama	$1,004,543	$1,537,776	Not estimated on state-by-state basis	$2542319
2	Alaska	$0	$421,673	Not Est.	$421,673
3	Arizona	$34,713	$1,384,478	Not Est.	$1,418,191
4	Arkansas	$48,262	$565,259	Not Est.	$613,521
5	California	$522,971	$12,381,199	Not Est.	$12,904,170

Exhibit 12A Sensitivity Analysis #1: State-by-State Net Cost Savings Impact and Possible Non-Adoption of DSW Final Rule					
Item	State	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Recycling	Combined Net Impact (Exclusions 1+2+3)
6	Colorado	$68,730	$786,136	Not Est.	$854,866
7	Connecticut	$16,352	$2,205,657	Not Est.	$2,222,009
8	Delaware	$32,448	$373,179	Not Est.	$405,627
9	Dist. of Columbia	$0	$58,045	Not Est.	$58,045
10	Florida	$201,310	$1,561,563	Not Est.	$1,762,873
11	Georgia	$218,686	$1,501,058	Not Est.	$1,719,744
12	Guam	$0	$26,783	Not Est.	$26,783
13	Hawaii	$0	$41,233	Not Est.	$41,233
14	Idaho	-$199	$264,881	Not Est.	$264,682
15	Illinois	$114,561	$2,915,222	Not Est.	$3,029,783
16	Indiana	$161,220	$2,746,457	Not Est.	$2,907,678
17	Iowa	$30,898	$1,182,695	Not Est.	$1,213,593
18	Kansas	$65,807	$1,147,841	Not Est.	$1,213,648
19	Kentucky	$165,735	$1,433,990	Not Est.	$1,599,725
20	Louisiana	$448,575	$1,387,431	Not Est.	$1,836,006
21	Maine	$32,407	$270,165	Not Est.	$302,572
22	Maryland	$7,932	$1,056,642	Not Est.	$1,064,574
23	Massachusetts	$69,911	$3,165,705	Not Est.	$3,235,616
24	Michigan	$124,142	$4,097,662	Not Est.	$4,221,804
25	Minnesota	$82,802	$2,396,032	Not Est.	$2,478,833
26	Mississippi	$71,345	$783,331	Not Est.	$854,677
27	Missouri	$103,661	$1,403,563	Not Est.	$1,507,223
28	Montana	$0	$149,534	Not Est.	$149,534
29	Navajo Nation	$0	$0	Not Est.	$0
30	Nebraska	$1,253	$601,498	Not Est.	$602,752
31	Nevada	$0	$283,817	Not Est.	$283,817
32	New Hampshire*	$0	$0	Not Est.	$0
33	New Jersey	$342,740	$3,091,261	Not Est.	$3,434,002

Exhibit 12A Sensitivity Analysis #1: State-by-State Net Cost Savings Impact and Possible Non-Adoption of DSW Final Rule					
Item	State	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Recycling	Combined Net Impact (Exclusions 1+2+3)
34	New Mexico	-$165	$284,489	Not Est.	$284,323
35	New York	$262,252	$4,012,324	Not Est.	$4,274,576
36	North Carolina	$164,477	$1,942,456	Not Est.	$2,106,933
37	North Dakota	$0	$129,194	Not Est.	$129,194
38	Ohio	$266,756	$5,379,702	Not Est.	$5,646,457
39	Oklahoma	$31,560	$1,115,910	Not Est.	$1,147,470
40	Oregon	$1,946	$1,445,313	Not Est.	$1,447,259
41	Pennsylvania	$455,698	$3,599,587	Not Est.	$4,055,285
42	Puerto Rico	$2,818	$838,106	Not Est.	$840,925
43	Rhode Island	$0	$912,193	Not Est.	$912,193
44	South Carolina*	$212	$564,002	Not Est.	$564,213
45	South Dakota	$15,778	$101,842	Not Est.	$117,620
46	Tennessee	$250,202	$1,391,441	Not Est.	$1,641,643
47	Texas	$807,676	$3,115,011	Not Est.	$3,922,687
48	Trust Territories	$0	$0	Not Est.	$0
49	Utah	$35,934	$535,389	Not Est.	$571,323
50	Vermont	$16,001	$385,040	Not Est.	$401,041
51	Virgin Islands	$0	$1,676	Not Est.	$1,676
52	Virginia	$146,285	$2,231,942	Not Est.	$2,378,227
53	Washington	$98,421	$2,047,162	Not Est.	$2,145,583
54	West Virginia	$55,517	$658,106	Not Est.	$714,623
55	Wisconsin	$215,956	$3,645,023	Not Est.	$3,860,978
56	Wyoming	$0	$53,539	Not Est.	$53,539
Column Totals					
	If include all states =	$6.8 million	$87.3 million	$1.3 million	**$95.3 million**
	Count of shaded cells (possible non-adoption) =	4 states	12 states	Not estimated	12 states (non-duplicative count)
	If exclude shaded cells =	$5.4 million	$66.9 million	$1.3 million	**$73.6 million**

Exhibit 12A Sensitivity Analysis #1: State-by-State Net Cost Savings Impact and Possible Non-Adoption of DSW Final Rule					
Item	State	Exclusion 1: Generator Controlled Recycling	Exclusion 2: Offsite Transfer Recycling	Exclusion 3: Case-by-Case Recycling	Combined Net Impact (Exclusions 1+2+3)
	% reduction in all states impact =	-19.8%	-23.3%	Not Est. (0%)	**-23.0%**

- **Sensitivity Analysis #2: Future Annual Fluctuation in Affected Materials Quantities**

Because this RIA is based on 2005 RCRA Biennial Report data, it is important to recognize the year-to-year variability (fluctuations) in hazardous waste generation and management tonnage as reported to the Biennial Report in prior data years (i.e., 1991, 1993, 1995, 1997, 1999, 2001, 2003; prior years are at: http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm), as an indicator of the extent to which future year tonnages may also fluctuate. In particular, year-to-year fluctuations in the tonnages of hazardous waste recycling and hazardous waste disposal affected by the DSW final rule exclusions --- which would otherwise be RCRA-regulated in absence of this final rule --- implies that the actual impacts of the DSW final rule will fluctuate in future years, compared to the estimates presented in this RIA based on the 2005 single-year data snapshot.

For purpose of illustrating the potential magnitude of future annual fluctuations in recycling and disposal tonnages, Exhibits 12B and 12C present 1997-2005 historical time-trend data for annual facility counts and annual hazardous waste quantities (tons/year) recycled (Exhibit 12B) and disposed (Exhibit 12C). This retrospective is truncated at 1997 rather than extending to 1991 because the RCRA Biennial Report methodology discontinued collection of industrial wastewater data after 1995, so that data years 1995 and before which include both wastewater and non-wastewater data (i.e., sludge, solids, gases), are inconsistent with the 1997 to 2005 data years which exclude wastewater data. The data in the Exhibits below are from OSW's RCRA Hazardous Waste Biennial Report "National Analysis" reports.[29] Exhibits 12B and 12C provide annual percentage deviations for two time-trend metrics (i.e., annual facility counts and annual tonnages), relative to the annual average values for the 1997-2005 historical period. The 1997-2005 hazardous waste data trends show that:

- Baseline hazardous waste recycling has varied (from Exhibit 12B):
  - -57% to +45% by annual recycler facility count
  - -41% to +39% by annual tonnage recycled
- Baseline hazardous waste disposal has varied (from Exhibit 12C):
  - -24% to +28% by annual disposal facility count
  - -19% to +19% by annual tonnage disposed.

[29] http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm

Based on the minimum and maximum annual deviation percentages over these four deviation ranges, the national impacts of the DSW rule could range from **-57% to +45%** on any given future year, compared to the average annualized impact estimates presented in this RIA. This range is not a statistical confidence interval; it represents the overall minimum and maximum range in percentage variation between 1997-2005 annual counts of industrial facilities which reported recycling RCRA hazardous wastes to the RCRA Biennial Report, compared to the average count over that 9-year period. The purpose of this time-trend deviation computation is to provide an aggregate indicator of how national waste quantities fluctuate year-to-year.

There are at least four reasons for annual fluctuations in the quantity of hazardous wastes reported as disposed and recycled. One reason is within-year discrepancies between generation tonnage and management tonnage, which is addressed as Sensitivity Analysis #3 in this RIA. A second reason is the economic level of industrial activity in any given year which is addressed by Sensitivity Analysis #4 of this RIA. A third reason is data over-reporting to the Biennial Report by LQGs and TSDRFs involving reporting of non-required data for state-regulated hazardous wastes, which is addressed by Sensitivity Analysis #5 of this RIA. A fourth reason -- although not in itself quantified as a separate factor in this chapter -- is that OSW may add or subtract industrial secondary materials to the RCRA hazardous waste regulatory program, such that in any given year, the number and types of wastes covered by the RCRA program may vary from OSW or RCRA-authorized state government environmental agencies:

- Adding new waste streams to the program using the 40 CFR 261.11 "listing" procedure.
- Removing waste streams from RCRA regulation using the 40 CFR 260.22 "delisting" procedure.

Such changes may influence the types of industries, industrial facilities, and hazardous wastes that may be affected in any future year by the DSW rulemaking. USEPA publishes in the Federal Register its Regulatory Agenda twice per year. USEPA's Fall 2007 Regulatory Agenda published on 10 Dec 2007, lists 31 planned actions for OSWER --- consisting of 9 planned proposed rules, 8 planned final rules, 11 planned long-term actions, plus 3 recently completed actions --- of which 15 may affect (i.e., increase or decrease) future annual waste quantities managed under the RCRA hazardous waste program for certain industries and certain types of wastes.[30]

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30 Source: USEPA Fall 2007 Regulatory Plan and Semiannual Regulatory Agenda: Part Two - Regulatory Agenda; the 31 OSWER actions are listed on pages 14 & 15; http://www.epa.gov/lawsregs/documents/regagendabook-fall07-pt2.pdf. The 15 RCRA-related actions in the Fall 2007 regulatory agenda consist of:

1. Revisions to LDR standards for K171/K172 wastes; changes to encourage recycling of K171/K172
2. Revisions to RCRA financial test criteria
3. Revisions to export requirements for hazardous wastes destined for recovery in OECD countries and for spent lead-acid batteries
4. Addition of hazardous pharmaceutical wastes to the universal waste program
5. RCRA incentives for Performance Track members
6. Standards for Subtitle D management of utility coal combustion wastes
7. RCRA smarter waste reporting (formerly Reduction of RCRA reporting and recordkeeping burden, Phase II)
8. Exclusion for residues from petroleum refineries recycled in gasification units
9. Regulation of solvent-contaminated rags and wipers
10. Management of cement kiln dust
11. Revisions to F019 listing to exclude wastewater treatment sludges from the chemical conversion coating of aluminum automobile bodies
12. Revisions to the definition of solid waste

Exhibit 12B Sensitivity Analysis #2: 9-Year Time-Trend (1997-2005) Data for RCRA Hazardous Waste Recycling (Onsite + Offsite)									
		A	B	C	D	E	F	G (A+C+E)	H (B+D+F)
		Metals Recovery* (M011 to M019, or H010)		Solvent Recovery* (M021 to M029, or H020)		Other Recovery** (M031 to M039, or H039)		Row Total Recovery** (%s represent deviations from average)	
Data Item	Year	Facilities	Million tons	Facilities	Million tons	Facilities	Million tons	Facilities***	Million tons
1	1997	96	1.078	154	0.617	52	0.443	302 (-47%)	2.138 (+2%)
2	1999	88	0.720	111	0.368	46	0.152	245 (-57%)	1.240 (-41%)
3	2001	191	1.462	534	0.425	97	1.026	822 (+45%)	2.913 (+39%)
4	2003	159	1.152	523	0.263	85	0.729	767 (+35%)	2.144 (+2%)
5	2005	137	1.420	493	0.297	74	0.328	704 (+24%)	2.045 (-2%)
							9-year average =	568	2.096
							Deviation range =	**-57% to +45%**	**-41% to +39%**

Explanatory Notes:
(1) Data source: USEPA RCRA Hazardous Waste "National Analysis" Biennial Reports: http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm
(2) * USEPA RCRA Biennial Report waste management "method codes" changed in 2001 from M-codes to H-codes.
(3) ** "Other Recovery" in this exhibit excludes (1) energy recovery and (2) fuel blending because they are not eligible for the DSW final rule exclusions.
(4) *** Facility row total counts overstate actual counts because row totals are duplicative of facilities operating two or more recycling methods.

Exhibit 12C Sensitivity Analysis #2 (cont'd): 9-Year Time-Trend (1997-2005) Data for RCRA Hazardous Waste Disposal (Onsite + Offsite)									
		A	B	C	D	E	F	G (A+C+E)	H (B+D+F)
		Landfill or Surface Impoundment Disposal (M132 & M133, or H132)*		Incineration Disposal (M041 to M049, or H040)		Other Disposal** (M131, or H131)		Row Total Disposal (%s represent deviations from avg)	
Data Item	Year	Facilities	Million tons	Facilities	Million tons	Facilities****	Million tons	Facilities***	Million tons
1	1997	72	2.539	166	1.656	104	26.452	342 (-14%)	30.647 (+19%)
2	1999	62	2.115	149	1.454	92	17.473	303 (-24%)	21.042 (-19%)
3	2001	69	2.090	174	1.646	268	24.177	511 (+28%)	27.913 (+8%)
4	2003	72	1.676	162	1.273	184	17.856	418 (+5%)	20.805 (-19%)
5	2005	68	2.038	164	1.438	184	25.284	416 (+5%)	28.760 (+11%)
							9-year average =	398	25.833
							Deviation range =	**-24% to +28%**	**-19% to +19%**

Explanatory Notes:

13. Expanding the RCRA comparable fuels exclusion
14. Standards and procedures for electronic hazardous waste manifests
15. Streamlining hazardous waste management in academic laboratories

(1) Data source: USEPA RCRA Hazardous Waste "National Analysis" Biennial Reports: http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm
(2) * USEPA RCRA Biennial Report waste management "method codes" changed in 2001 from M-codes to H-codes.
(3) ** "Other Disposal" includes (1) other disposal, (2) deepwell injection, (3) land application.
(4) *** Facility counts for "Other Disposal" overstate actual counts because totals are duplicative of facilities operating two or more disposal methods.

- **Sensitivity Analysis #3: Within-Year Discrepancy Between Generation & Management Tons**

This factor may be a sub-component, in part or in whole, of Sensitivity Analysis #2. For any single data year, the total tons of hazardous wastes reported as "generated" in the RCRA Biennial Report by LQGs does not match the total tons of hazardous wastes reported as "managed" by TSDRFs. This discrepancy may to a large degree result from the fact that typically 17% to 24% of hazardous wastes generated in recent years (1997-2005) are reported as transported (i.e., shipped) either (1) to another industrial unit with a separate USEPA ID number within the same LQG facility or (2) offsite for management at a TSDRF, rather than managed onsite by the LQG. Because the economic impacts estimated in this RIA are proportional to the annual tonnage of affected materials, this within-year discrepancy suggests that the estimated net cost savings in this RIA based on 2005 BR data, could be between **-34% to +39%** for any future year. This range is not a statistical confidence interval; it represents the overall minimum and maximum range in percentage variation between 1997-2005 generation quantities of RCRA hazardous wastes compared to the within-year management quantities reported to the Biennial Report over that 9-year period as displayed in Exhibit 12D below.

Exhibit 12D
Sensitivity Analysis #3
9-Year Time Trend (1997-2005) in Hazardous Waste Generation & Management Tonnages

Indicator	1997	1999	2001	2003	2005
1. Million tons generated	40.7	40.0	40.8	30.2	38.3
2. Million tons managed	37.7	26.3	45.4	42.1	43.9
Percent discrepancy indicated by ratio of tons managed:to:generated ((2-1) / 1)	-7.4%	**-34.3%**	+11.3%	**+39.4%**	+14.6%

Explanatory Notes:
Data source: RCRA Hazardous Waste Biennial Reports: http://www.epa.gov/epaoswer/hazwaste/data/biennialreport/index.htm.

- **Sensitivity Analysis #4: Fluctuation in Future Annual US Industrial Economic Conditions**

This factor may be a sub-component, in part or in whole, of Sensitivity Analysis #2. This RIA is built upon a single year 2005 snap shot of potentially affected industries, facilities, and hazardous waste tonnage; it does not include a future projection. Future year impacts are likely to fluctuate because future year counts of industries, facilities and materials quantities fluctuate with changing macro-economic conditions. For example, one of the top-10 potentially impacted industries --- NAICS 32411 petroleum refining --- is expected to grow **+5.6% annually** in the US through year 2010 (source: The Freedonia Group, Cleveland OH, "Refinery Chemicals: Industry Study with Forecasts to 2005 & 2010", Study #2065, June 2006, 214 pages, at: http://www.freedoniagroup.com/pdf/2065smwe.pdf). Future annual industry cost savings from the DSW rule will reflect changes in the size of affected industries.

- ## Sensitivity Analysis #5: Data Quality Assurance

This factor may be a sub-component, in part or in whole, of Sensitivity Analysis #2. For any given data reporting year, some LQG and TSDRF data records in the RCRA Biennial Report (BR) may be inaccurately or incorrectly (i.e., unnecessarily) included in the Biennial Report database for at least three reasons:

1. Misreporting of data
2. State regulatory reporting requirements for hazardous waste data are in excess of Federal RCRA requirements in some states:
    a. Some states require SQGs and CESQGs to report hazardous waste generation data
    b. Some states require LQGs to report state-regulated waste data, in addition to Federal-regulated waste data
3. As listed earlier in this RIA, there are 16 existing exclusions from the RCRA Definition of Solid Waste, but it appears that the Biennial Report may incorrectly contain data from some facilities for wastes that are already excluded.

Including any such misreported and state waste data in the baseline dataset used for this RIA could result in errors in impact estimation. However, two factors mitigate these potential sources of inaccuracy: (a) state governments are required to subject Biennial Report data to quality assurance prior to submitting it to the USEPA for aggregation into the Biennial Report database, and (b) the Biennial Report database has a data element which is intended to distinguish between "Federal regulated hazardous wastes" and "state government regulated hazardous wastes". Furthermore, with respect to state-regulated data included in the Biennial Report, this RIA only included Federal data from the Biennial Report for impact estimation.

Otherwise, the purpose of this sensitivity analysis is to provide a quality assurance factor in this RIA, by illustrating the degree to which data quality questions may affect the impact estimates. Exhibit 12E below identifies 6 of the 16 existing DSW exclusions for which data may have been incorrectly (i.e., unnecessarily) reported by LQGs or TSDFs to the 2005 Biennial Report (BR). OSW's 2003 RIA (p.3-12) identified three of these six categories (i.e., oil, recovery, by-products, sludges), and the 2007 RIA (Exhibit 1A) identified four of these categories, based on QA/QC random visual inspection of waste descriptions supplied by the LQGs (Form GM, Section 1A) and TSDRFs (Form WR, Section A) reporting to the Biennial Report database applied in the prior RIAs. Two additional categories were identified from QA/QC random visual inspection of th 2005 dataset applied in this RIA. The percentage displayed at the bottom of Column D of Exhibit 12E may be interpreted as a rough approximation of the possible over-estimation of economic impacts in this RIA, as a result of this data quality assurance sensitivity factor.

Exhibit 12E Sensitivity Analysis #5: Six Industrial Secondary Materials Already-Excluded from the DSW Which May be Incorrectly in RIA Baseline Recycling Data			
A	B	C	D
Type of Excluded Material	Description	Biennial Report Data Code to Identify the Excluded Material	2005 Generation (million tons)
1. Oil Recovery	Reported waste quantities in the BR dataset may already be excluded under the existing DSW exclusion for oil recovery in the petroleum refining industry under 40 CFR 261.4(a)(12)(ii). This exclusion requires materials be "*inserted into the petroleum refining process*"; this RIA assumes facilities reporting this to the BR do not meet this condition and are included in the dataset for this RIA.	• SIC code 2911 (petroleum refinery; same as NAICS code 32411) and • W206 waste oil	0
2. Recycled By-products Exhibiting Characteristic of Hazardous Waste	Reported waste quantities in the BR dataset may already be excluded under the existing DSW exclusion for "*by-products*" exhibiting a characteristic of hazardous waste that are not solid wastes when reclaimed under 40 CFR 261.2(c)(3).	• D001 (ignitability characteristic) or • D002 (corrosivity characteristic) or • D003 (reactivity characteristic) or • D004 to D043 (toxicity characteristic), and • G07 source code "Product & by-product processing"	221,242*
3. Recycled Sludge Exhibiting Characteristic of Hazardous Waste	Reported wastes quantities in the BR dataset may already be excluded under the existing DSW exclusion for "*sludges*" exhibiting a characteristic of hazardous waste that are not solid wastes when reclaimed under 40 CFR 261.2(c)(3).	• D001 (ignitability characteristic) or • D002 (corrosivity characteristic) or • D003 (reactivity characteristic) or • D004 to D043 (toxicity characteristic), and • W5xx or W6xx sludges physical form code	5,906
4. Recycled Commercial Chemical Products	Reported waste quantities in the BR dataset may already be excluded under the existing DSW exclusion for "*commercial chemical products*" when reclaimed under 40 CFR 261.2(c)(3).	• G11 source code "Discarding off-spec or out-of-date chemicals or products: unused chemicals or products – corresponds to P and U hazardous waste codes")	55,665
5. Oil refining spent acids	Reported waste quantities in the BR dataset may be already excluded from the DSW if reclaimed under either 40 CFR 261.4(a)(7) or 40 CFR 261.4(a)(12).	• D002 (corrosivity characteristic) and • SIC code 2911 petroleum refinery (same as NAICS code 32411).	2,915
6. Oil bearing petrochemical wastes	Reported waste quantities in the BR dataset may be already excluded from the DSW if reclaimed under 40 CFR 261.4(a)(18) if "inserted into the petroleum refining process (SIC coded 2911) along with normal petroleum refinery process streams"	• D001 (ignitable characteristic) or • D018 (benzene toxicity characteristic) and • SIC 2865 "Cyclic Organic Crudes, Intermediates & Organic Dyes/Pigments, or SIC 2869 Industrial Organic Chemicals (both SIC codes are same as NAICS 32511 petrochemical mfg)	58
		Column total =	285,797
		Percentage of 2005 National Biennial Report total hazardous waste generation =	**-0.7%**
* One waste stream accounts for 171,748 tons with the waste description "spent lead/acid batteries and lead bearing scrap dismembered for metals recovery and recycling."			

• Sensitivity Analysis #6: Indirect Inclusion of RCRA SQGs in this RIA

SQG facility counts are not included in the RCRA Biennial Report database --- the underlying data used in this RIA --- because SQGs are not required to submit a Biennial Report. In addition, while SQG annual waste tonnages are not directly collected by the BRS, some, but not all, of their tonnage is reflected in the TSDF quantities since SQGs frequently send their waste offsite to TSDFs. Consequently, the estimates of cost savings in this RIA are likely under-estimated. Given that CESQGs are currently exempt from RCRA regulations but SQGs are not exempt, the omission of SQGs in this RIA may represent a 2% to 3% under-estimation of potential annual industry cost savings, given that historically between 1993 to 2005, a low estimate of 84,000 SQGs (1993) to a high estimate of 236,000 SQGs (1998) generated a range of 0.60 million to 0.93 million tons/year of RCRA hazardous waste (Source: page 4 of "Work Assignment 7 Task 5 Quick Response Task 1 Memorandum: Study of Impact of Imposing Part 262 Manifest Requirements on Generators of HWIR-Exited Waste", prepared 01 Feb 1999 by Dynamac Corp for OSW). This SQG tonnage range represents an additional +**1.6% to +2.4%** annual tonnage compared to the 38.347 million tons generated by 16,191 LQGs in the 2005 Biennial Report. Therefore, this RIA may under-estimate impacts by this percentage.

• Sensitivity Analysis #7: Physical/Chemical Quality of Secondary Materials for Viable Recovery/Recycling

The methodology applied in Chapter 5 of this RIA for identifying baseline disposal wastes for potential switchover to recycling under the DSW final rule, may have been overly broad (i.e., overly inclusive) in the physical/chemical types and industrial sources identified. Exhibit 12F below identifies nine categories of baseline disposed wastes that may not be suitable for recycling, and their corresponding tonnages in the 2005 Biennial Report, as an indicator of potential industry cost savings over-estimation in this RIA from possible over-estimation of the baseline disposal tonnage with may switchover to recycling under the DSW final rule.

Exhibit 12F
Sensitivity Analysis #7
Criteria to Identify Baseline Disposal Hazardous Wastes
Unlikely Suitable for Potential Future Switchover to Recovery/Recycling Under the 2008 DSW Final Rule

Types of Disposed Haz Wastes Unlikely Suitable for Recycling	Criterion A Physical/ Chemical Form Codes	Criterion B Industrial Source Codes	Criterion C RCRA Hazardous Waste Codes	2005 Generation (tons)
1. Probably better suited for energy recovery or use as fuel (e.g., oily wastes, tarry wastes, PAHs, heavy ends, petroleum refining	For wastes not reporting source code G61 include: • W205 oil-water emulsion • W206 waste oil		For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61, or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • F024heavy end, tars reactor clean-out process wastes	1,024,341

Exhibit 12F Sensitivity Analysis #7 Criteria to Identify Baseline Disposal Hazardous Wastes Unlikely Suitable for Potential Future Switchover to Recovery/Recycling Under the 2008 DSW Final Rule				
Types of Disposed Haz Wastes Unlikely Suitable for Recycling	Criterion A Physical/ Chemical Form Codes	Criterion B Industrial Source Codes	Criterion C RCRA Hazardous Waste Codes	2005 Generation (tons)
wastes)	• W403 solid resins, plastics or polymerized organics • W409 other organic solids • W603 oily sludge • W604 paint or ink sludges, still bottoms in sludge form • W606 other organic sludge		• F032, F034 chlorophenolic & creosote wood preservative wastewaters • F037, F038 petroleum refinery oil/water separation sludge • K001 wood preserving bottom sediment sludges • K018, K030, K035, K042, K048, K049, K050, K051, K052, K087, K096, K101, K107, K108, K115 heavy ends, overheads • K141, K142, K143, K144, K147, K148 coking operation tars • K169, K170 oil tank sediment	
2. Likely contains acutely toxic (dioxans/furans) or mutiple mixed hazardous constituents		For wastes with no reported form codes include source code: • G26 leachate collection	For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • F020, F021, F022, F023 listed for dioxins/furans • F026, F027, F028, F032 listed for dioxins/furans • F039 land disposal leachate • K032, K033, K034 listed for carcinogen hexachlorocyclopentadiene • K174 listed for dioxins/furans • P001 to P205 (i.e., all Pxxx) acutely hazardous discarded or off-spec commercial chemical products, container residues	19,508
3. Explosive or reactive material	For wastes not reporting source code G61 include: • W210 reactive or polymerizable organic liquids and adhesives • W405 explosives or reactive organic solids		For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • K044, K045, K046, K047 explosives mfg wastewaters, sludge, spent carbon	98,300
4. Already subject to recovery/ — 4a. Distillation residuals (may be better suited for	For wastes not reporting source code G61 include: • W200 still bottoms in liquid form	For wastes with no reported form codes include source code: • G24 solvent or product distillation	For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • K009, K010, K015, K016, K019, K020, K022, K023,	95,140

Exhibit 12F Sensitivity Analysis #7 Criteria to Identify Baseline Disposal Hazardous Wastes Unlikely Suitable for Potential Future Switchover to Recovery/Recycling Under the 2008 DSW Final Rule					
Types of Disposed Haz Wastes Unlikely Suitable for Recycling		Criterion A Physical/ Chemical Form Codes	Criterion B Industrial Source Codes	Criterion C RCRA Hazardous Waste Codes	2005 Generation (tons)
recycling	energy recovery)		or recovery	K024, K025, K026, K027, K036, K083, K085, K093, K094, K095, K116, K136, K149 chemical mfg product distillation bottoms or solvent recovery residues	
	4b. Acid recovery residuals			For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • K150 hydrochloric acid recovery residuals	0
5. Material unlikely to contain recoverable constituents of recycling value		For wastes not reporting source code G61 include: • W301 contaminated soil • W512 sediment or lagoon dragout, drilling or other muds		For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • F028residues from incineration of contaminated soil • K060 ammonia still lime sludge • K102 residue from use of activated carbon for decolorization	437,048
6. Materials not eligible for DSW final rule exclusions*		For wastes not reporting source code G61 include: • W309 (lead-acid batteries) • W320 electrical devices (lamps, thermostats, CRTs)			257,948
7. Materials not currently widely recovered/ recycled**		• W401 used or discarded pesticide solids • W503 gypsum sludges		For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 or RCRA waste codes listed in Exhibit 5F or item 8 below include RCRA waste codes: • D004 arsenic	8,552
8. Materials unlikely to be economically recovered off site***		For wastes not reporting source code G61 include: • W103 spent concentrated acid >5% • W110 caustic aqueous waste without cysnides	For wastes with no form code include source codes: • G02 stripping & acid or caustic cleaning • G05 metal forming	For wastes with no form codes and not reporting source codes G01 through G06, G24, G26, or G61 include RCRA waste codes: • K031, K043, K097, K099, K123, K124, K125, K126, K131, K132 pesticide mfg wastewaters, sludges, absorbents, solids • K062 iron & steel spent pickle liquor	6,068,617
9. Mixture of RCRA Waste Codes				Wastes that have multiple RCRA waste codes reported and the fall under more than one of the first seven categories.	143
				Column total =	8,009,597

Exhibit 12F Sensitivity Analysis #7 Criteria to Identify Baseline Disposal Hazardous Wastes Unlikely Suitable for Potential Future Switchover to Recovery/Recycling Under the 2008 DSW Final Rule				
Types of Disposed Haz Wastes Unlikely Suitable for Recycling	Criterion A	Criterion B	Criterion C	2005 Generation (tons)
	Physical/ Chemical Form Codes	Industrial Source Codes	RCRA Hazardous Waste Codes	
Percentage of 2005 National Biennial Report total hazardous waste generation (38.347 million tons, Exhibit 4A) =				**-21%**

Explanatory Notes:
Some materials identified in this exhibit may contain potential beneficial re-use market value (e.g., construction fill, soil amendments, cement additives) which is not covered under the DSW final rule exclusions, and therefore not included in this RIA for evaluation of potential switchover from baseline disposal to future recycling.
* Or which may be managed as excluded materials under other RCRA exemptions (e.g., as "universal wastes").
** As determined by comparison with the physical/chemical types or constituent s of RCRA hazardous wastes currently being recovered/ recycled according to H010, H020, or H039 management method codes in the 2005 Biennial Report.
*** Note that these data were initially pulled from the 2005 BR under Commodity Group #3 in Exhibit 5F. Upon review of W103 spent concentrated acids > 5%, G02 stripping and acid or caustic cleaning, and G05 metal forming and treatment waste streams nearly all the waste is not suitable for switchover to off-site other recovery. Much of the waste are dilute acid wastes that are disposed in on-site wastewater treatment systems followed by POTW/sewer or NPDES discharge or disposed by Class I UIC permitted deep-well injection. These disposal methods are cheap compared to offsite recovery. It will not be more economical to ship these wastes offsite for other recovery. It is beyond the time and resource constraints of this RIA to individually carry these records through the analysis. A small quantity (< 4,000 tons) of spent pickle liquor (K062) was identified. The quantity is too small to carry forward through the analysis.

- **Sensitivity Analysis #8: Expected Accuracy of Impact Estimates**

This RIA is based on a semi-detailed cost data designed to provide semi-detailed estimates rather than exact engineering cost and benefit estimates for each of the almost 300 different industries (Exhibit 9C) consisting of about 5,600 of facilities (Exhibit 9B) which are generating and managing 10,000s of individual waste streams (Exhibit 9A) which may be affected by the DSW rule. For purpose of classifying relative degrees of estimation accuracy, the Association for the Advancement of Cost Engineering (AACE) defines five generic classes of cost estimation accuracy for application in engineering, procurement, and industry.31 AACE defined these classes in relation to ANSI standards Z94.0 and Z94.2.32 In the context of this RIA, the purpose of estimation accuracy classification is to

31 Source: AACE International Recommended Practice No. 17R-97 "Cost Estimate Classification System" , 12 Aug 1997, and Recommended Practice No. 18R-97 "Cost Estimate Classification System – As Applied in Engineering, Procurement, and Construction for the Process Industries", 15 June 1998; http://www.aacei.org/technical/rp.shtml.

32 ANSI = American National Standards Institute. ANSI standard Z94.0 was originally published in 1972, then revised as Z94-1983 in 1983, revised as Z94.0-1989 in 1990, and revised again as Z94.2 in 1998. The ANSI Z94.2 standard is one element of the set of 17 standards (i.e., Z94.1 to Z94.17) are for the field of industrial engineering, which is concerned with the design, improvement, and installation of integrated systems of people, materials, information, equipment, and energy. Industrial engineering draws upon specialized knowledge and skill in the mathematical, physical, and social sciences, together with the principles and methods of engineering analysis and design, to specify, predict and evaluate the results obtained from such systems. Additional background information about

indicate the relative degree to which the "ex-post" (i.e., post-rule) actual economic impacts for the DSW rule may vary from the "ex-ante" (i.e., pre-rule) impacts estimated in this RIA. The AACE classification scheme expresses five levels of estimation accuracy according to a +/- percentage range around the point estimate. The five accuracy classes are formulated to reflect varying, relative degrees of:

- Project definition, design, and planning maturity level (e.g, <2% vs >50% complete),
- End usage purpose of cost estimates (e.g., initial concept screening vs contract bid),
- Type of estimation methodology (e.g., judgment vs detailed unit costs), and
- Estimate preparation level-of-effort (e.g., <200 hours vs >1,000 hours to prepare).

The five accuracy classifications range from -50% :to:+100% for Class 5 "order-of-magnitude" type estimates, to -10% to +15% Class 1 "definitive estimates". Basically, as the level-of-detail and level-of-effort given to a cost (or cost savings) estimate increases, the expected accuracy of the estimate tends to improve, as indicated by a tighter +/- accuracy range assigned to it according to the accuracy classification scheme. The impact estimates of this RIA may be classified as a "Class 3" semi-detailed type of estimate with expected accuracy range of **-20% to +30%**, because this RIA includes semi-detailed unit costs, but which are less than the thousands of highly detailed unit costs and other details that typify a "Class 2" type estimate with -15% to +20% expected accuracy range.

- **Sensitivity Analysis #9: Future Change in Market Price of Recovered Commodities**

The Chapter 8 micro-economic (i.e., facility-by-facility level) breakeven test of this RIA which estimates potential switchover of baseline hazardous waste disposal to recycling, utilizes the market price of recoverable commodities in the breakeven calculation. The purpose of this sensitivity factor is to illustrate how the overall industry cost savings estimate of this RIA (i.e., average annual industry cost savings), may fluctuate in any given future year according to fluctuations in the price of the recoverable commodities. Exhibit 12G below displays the 28 market price data points utilized in the breakeven test (from **Appendix A** of this RIA), and alternative prices representing a +/-50% fluctuation range. A relatively large +/-50% illustrative range is applied rather than a relatively smaller deviation (e.g., +/-10%) particularly to acknowledge relatively large fluctuations in commodity metals prices in recent years.33

ANSI Z94 standards is available from the Institute for Industrial Engineers at: http://www.iienet2.org/Details.aspx?id=2644.
33 Since 2003, the US dollar price of copper has increased fivefold, for zinc fourfold, and for lead sevenfold. Source: "Growth in Base Metal Prices Set to Continue", Gill Montia, Metal Markets, Brite Media, 23 July 2007; http://www.metalmarkets.org.uk/2007/07/23/growth-in-base-metal-prices-set-to-continue/

Exhibit 12G Sensitivity Analysis #9: Change in Future Market Price of Commodities Recovered from Baseline Disposal Switchover to Recycling				
A	B	C	D (C x 50%)	E (C x 150%)
Item	Commodity Type	Baseline price @90% market price ($/ton)	-50% future change (@90% price)	+50% future change (@90% price)
Commodity Group #1: Metals				
	1A. Metal Containing Liquids			
1	Copper	$5,778	$2,889	$8,667
2	Lead	$2,124	$1,062	$3,186
3	Zinc	$1,908	$954	$2,862
4	Metal Cont. Liqs Weighted Average	**$2,063**	**$1,032**	**$3,094**
	1B. Metal Containing Solids			
5	Copper	$5,778	$2,889	$8,667
6	Lead	$2,124	$1,062	$3,186
7	Zinc	$1,908	$954	$2,862
8	Metal Cont. Solids Weighted Average	**$2,072**	**$1,036**	**$3,108**
	1C. Metal Containing Sludges			
9	Chromium	$2,412	$1,206	$3,618
10	Copper	$5,778	$2,889	$8,667
11	Nickel	$22,644	$11,322	$33,966
12	Zinc	$1,908	$954	$2,862
13	Metal Cont. Sludges Weighted Average	**$9,413**	**$4,706**	**$14,120**
	1D. Emission Control Dust (K061)			
14	Zinc	**$1,908**	**$954**	**$2,862**
	1E. Molybdenum Disulfide Catalyst			
15	Molybdenum disulfide	**$39,051**	**$19,526**	**$58,576**
Commodity Group #2: Solvents				
	2A. Solvent Bearing Liquids (1)			
16	Alkyl Benzenes	$911	$456	$1,366
17	C9-C10 Alkyl Benzenes	$911	$456	$1,366
18	Toluene	$900	$450	$1,350
19	Xylene	$923	$462	$1,384
20	Methanol	$442	$221	$663
21	Solvent Bearing Liqs. Weighted Average	**$845**	**$422**	**$1,268**
	2B. Other Organic Liquids			
22	Acetone	$756	$378	$1,134
23	MEK	$1,152	$576	$1,728
24	Toluene	$900	$450	$1,350
25	Xylene	$923	$462	$1,384

Exhibit 12G Sensitivity Analysis #9: Change in Future Market Price of Commodities Recovered from Baseline Disposal Switchover to Recycling				
A	B	C	D (C x 50%)	E (C x 150%)
Item	Commodity Type	Baseline price @90% market price ($/ton)	-50% future change (@90% price)	+50% future change (@90% price)
26	Other Organic Liqs. Weighted Average	**$909**	**$454**	**$1,364**
Commodity Group #3: Other				
27	Carbon	$4,289	$2,144	$6,434
28	Acids	$46	$23	$69

Explanatory Notes:

- Source for Columns B & C: **Appendix** A of this RIA.
- This RIA assumes that recoverable materials from baseline disposed hazardous wastes may on average capture 90% of market price because of perceived or real lower quality relative to virgin materials.

Appendices

Appendix A
Data Sources for Concentrations, Yield, & Market Values for Recoverable Commodities

This Appendix presents the data and references applied in this RIA for purpose of estimating the potential market value (aka "salvage value") of chemical commodities contained in RCRA industrial hazardous wastes currently disposed, for potential switchover to recovery/recycling. These data are applied as inputs to the micro-economic breakeven test in this RIA (describe in Chapter 8). Rather than using engineering judgment and miscellaneous secondary sources, this RIA attempted to derive these chemical commodity concentration data from OSW's 1996 "National Hazardous Waste Constituent Survey" (NHWCS) database. The NHWCS was benchmarked to the 1993 RCRA Biennial Report hazardous waste streams, and is the only nationally comprehensive and representative database of its kind.34 OSW queried the NHWCS database for chemical constituent identities and corresponding concentrations for disposed wastes (i.e., excluding M011 to M019 metals recovery, M021 to M029 solvents recovery, and M031 to M039 other materials recovery).

To build the NHWCS database, in 1996 OSW mailed survey questionnaires to 221 of the largest managers (i.e., TSDRFs) of <u>industrial process</u> RCRA hazardous wastes in the US. This facility sample also included some of the largest LQGs who manage their own hazardous wastes onsite. The survey data responses received from 156 facilities of this targeted survey sample group accounted for 1,020 industrial process waste streams, representing 42% (i.e., 115 million annual tons) of the 235 million annual hazardous waste management tonnage universe as reported in the 1993 RCRA Biennial Report by the 2,584 TSDRF universe.35 Data reported in the survey included over 12,000 parts-per-million (ppm) concentration datapoints corresponding to 2.0 million tons of 724 different chemical constituents in the wastes. The NHWCS data reported by the TSDRFs represented hazardous wastes generated by and received from a broad spectrum of hundreds of 4-digit SIC code industries within the following 12 2-digit SIC code industry sectors:

1. SIC 28 Chemicals & allied products mfg
2. SIC 29 Petroleum products mfg
3. SIC 32 Stone, clay & glass products mfg
4. SIC 33 Primary metal mfg
5. SIC 34 Fabricated metal products mfg
6. SIC 36 Electronic & other electrical equipment mfg
7. SIC 38 Instruments & related products mfg
8. SIC 42 Trucking & warehousing
9. SIC 49 Electric, gas & sanitary services
10. SIC 50 Wholesale trade
11. SIC 73 Business services not elsewhere classified (nec)
12. SIC 95 Environmental quality & housing

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34 An October 1998 report "National Hazardous Waste Constituent Survey: Summary Report" which summarizes the survey methodology and data findings for OSW's 1996 National Hazardous Waste Constituent Survey (NWHCS) is available at: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/pdf/summary.pdf.
35 Additional summary information and data for the 1993 RCRA Biennial Report are available at: http://www.epa.gov/epaoswer/hazwaste/data/br93.htm

Furthermore, the chemical constituent data represented hazardous wastes managed using a broad spectrum of methods including:

1. Metals recovery
2. Solvents recovery
3. Energy recovery,
4. Fuel blending
5. Stabilization
6. Sludge treatment
7. Landfills
8. Surface impoundments
9. Incineration
10. Aqueous inorganic treatment
11. Aqueous organic treatment
12. Deepwell injection
13. Land application

Exhibit A1 below presents the NHWCS data for each commodity group evaluated by the micro-economic breakeven test in this RIA. Exhibit A1 also presents the baseline market prices associated with these recoverable commodities, as applied in the Chapter 8 micro-economic breakeven test of this RIA. Before presenting Exhibit A1 containing the NHWCS data results for identifying commodity values in baseline disposed wasets, there are two prior "lessons learned" derived from a 1998 summary study report of the NHWCS database which are worth noting their possible implications on the use of the NHWCS data in this RIA:

- Waste constituents: Recycling RCRA hazardous wastes is made technically difficult in some cases (i.e., for some industrial operations and for some sources/types of RCRA hazardous wastes), because of numerous chemical co-contaminates in the wastes. Based on Chapter 3 of the 1998 NHWCS database summary report cited above, 90% of facilities reported that between 10 and 60 hazardous chemical constituents are present in individual waste streams which they receive for management (i.e., for disposal, for materials recovery/recycling, or for energy/fuel recovery). Over 33% of facilities reported between 10 and 20 constituents in individual waste streams. The highest number of constituents reported for a single waste stream is 287. Waste streams reported in the survey carry a total of 724 different chemical constituents. This NHWCS suggests that most LQGs and TSDRFs must address a relatively high number of hazardous chemical constituents in evaluating the technical feasibility of their waste management options such as recycling. The constituent complexity factor is not explicitly addressed in this RIA and represents a source of potential over-estimation of baseline disposal switchover to recycling in this RIA.

- Waste assay value: Some RCRA hazardous wastes have relatively low (e.g., less than 1%) concentrations for constituents of commodity market value. Based on the 1998 NHWCS database summary report referenced above, analysis of concentrations of highly prevalent constituents concluded that concentrations of prevalent non-metal chemicals are significantly higher than those reported for prevalent metals:
  - Non-metals: The median concentration of five prevalent non-metals — toluene, xylene, acetone, methyl ethyl ketone, and methylene chloride — is between 10,000 and 100,000 parts per million (ppm), which represents a non-metals concentration

range of 1% to 10% waste volume. Benzene is the only non-metal with a median concentration below 100 ppm (i.e., below 0.01%).

- Metals: In comparison, median concentrations of three of four prevalent metals — lead, chromium, cadmium, and barium — are over an order of magnitude lower, ranging between 1 and 200 ppm (i.e., 0.0001% to 0.02% assay value). Of the 10 most prevalent metal constituents, only lead and barium have median concentrations higher than 100 ppm (i.e., higher than 0.01% assay value). Cadmium, silver, mercury, and nickel all have median concentrations less than 10 ppm (i.e., less than 0.001% assay value); mercury has the lowest median concentration at 0.3 ppm (0.00003% assay value).

The implication of this data finding is that the a priori expected outcome of the breakeven test (described in Chapter 8 of this RIA) is that it may yield a relatively higher tonnage of wastes containing non-metal commodity values compared to waste tonnages containing metal commodity values.

Exhibit A1
Data for Estimating Recoverable Materials Quantities, Potential Recovery Yield, & Market Value

A		B	C	D	E	F	G
				Commodity Concentration in Disposed Wastes			
Item	Commodity Type	Tonnage of waste streams with commodity present (>0ppm)	Count & percent of waste streams >0ppm	Minimum ppm	Maximum ppm	Tonnage-weighted mean ppm	90% of market price ($/ton)
Commodity Group #1: Metals							
	1A. Metal Containing Liquids						
1	Copper	113,393	1 (100%)	10.5	10.5	10.5 (0.001%)	$5,778 (a)
2	Lead	610,434	5 (100%)	0.85	250	165.89 (0.017%)	$2,124 (a)
3	Zinc	113,383	1 (100%)	443.8	443.8	443.8 (0.044%)	$1,908 (a)
4	Metal Cont. Liqs Weighted Average	**610,434**	**5 (100%)**			**250.27 (0.025%)**	**$2,063**
	1B. Metal Containing Solids						
5	Copper	24,369	8 (90%)	199	5,040	50,207 (5.021%)	$5,778 (a)
6	Lead	87,727	24 (36%)	0.16	48,000	1,840 (0.184%)	$2,124 (a)
7	Zinc	46,130	10 (51%)	660	140,000	14,607 (1.461%)	$1,908 (a)
8	Metal Cont. Solids Weighted Average	**87,727**	**24 (36%)**			**41,519 (4.152%)**	**$2,072**
	1C. Metal Containing Sludges						
9	Chromium	25,834	9 (6%)	0.058	5,000	1,197 (0.120%)	$2,412 (b)
10	Copper	2,773	2 (37%)	162	406	271 (0.027%)	$5,778 (a)
11	Nickel	24,184	9 (8%)	0.03	51,000	9,939 (0.994%)	$22,644 (a)
12	Zinc	2,773	2 (4%)	6,730	23,600	16,043 (1.604%)	$1,908 (a)
13	Metal Cont. Sludges Weighted Average	**31,531**	**11 (7%)**			**10,040 (1.004%)**	**$9,413**
	1D. Emission Control Dust (K061)						

Exhibit A1 Data for Estimating Recoverable Materials Quantities, Potential Recovery Yield, & Market Value							
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Item	Commodity Type	Tonnage of waste streams with commodity present (>0ppm)	Count & percent of waste streams >0ppm	Minimum ppm	Maximum ppm	Tonnage-weighted mean ppm	90% of market price ($/ton)
14	Zinc	**160,640**	**4 (62%)**	36,111	140,000	**24,507 (2.451%)**	**$1,908 (a)**
	1E. Molybdenum Disulfide Catalyst						
15	Molybdenum disulfide	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS (5%)**	$39,051
Commodity Group #2: Solvents							
	2A. Solvent Bearing Liquids (1)						
16	Alkyl Benzenes**	66,406	20 (100%)	380,900	380,900	380,900 (38.09%)	$911 (c)
17	C9-C10 Alkyl Benzenes	80,309	14 (100%)	98,700	98,700	98,700 (9.87%)	$911 (c)
18	Toluene	504,254	163 (52%)	0.171	935,000	140,198 (14.02%)	$900 (c)
19	Xylene	426,152	145 (39%)	0.077	852,800	156,983 (15.70%)	$923 (c)
20	Methanol	274,651	103 (31%)	2.58	990,000	129,504 (12.95%)	$442 (c)
21	Solvent Bearing Liqs. Wtd Average	**545,253**	**183 (56%)**			**378,509 (37.85%)**	**$845**
	2B. Other Organic Liquids						
22	Acetone	124,556	23 (56%)	25	400,000	54,640 (5.46%)	$756 (c)
23	MEK	117,662	21 (35%)	50	100,000	44,977 (4.50%)	$1,152 (c)
24	Toluene	138,808	33 (51%)	15	222,000	111,239 (11.12%)	$900 (c)
25	Xylene	128,218	27 (56%)	27	448,000	88,185 (8.82%)	$923 (c)
26	Other Organic Liqs. Weighted Average	**142,035**	**35 (37%)**			**273,101 (27.31%)**	**$909**
Commodity Group #3: Other							
27	Carbon	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS (90%)**	$4,289**
28	Acids	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS	No data in NHWCS (74%)**	$46 (a)

Explanatory Notes:

- Column A: Chemicals for each commodity group identified based on chemicals with >0pm concentrations in a substantial annual tonnage (i.e., greater than 10,000 tons/year) of 1993 disposed hazardous wastes reported in OSW's 1996 "National Hazardous Waste Constituent Survey" (NHWCS) database, which is available as webpage item 4 at: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm. OSW identified the chemicals for each commodity group/sub-group by using the NHWCS data codes displayed in Exhibit A2 below.
- * The NHWCS database listed several constituents that were grouped together for pricing purposes for solvent bearing liquids subgroup as alkyl benzenes. alkyl benzenes includes those constituents listed as alkyl benzene, C9 – C10 alkyl benzene, xylene, and toluene.
- Column B: Annual tonnage of the entire waste matrix (i.e., not just the single chemical constituent mass) reported in the NHWCS database for the associated one or more disposed waste streams containing the commodity chemical.
- Column C: Count of individual waste streams reporting the presence (i.e., >0ppm) and the % of tonnage containing the chemical constituent in the NHWCS database.
- Columns D, E, F: Based on the disposed waste streams reporting the presence (i.e., >0ppm) of the chemical constituent in the NHWCS database.
- Column G: To account for possible perceived or real lower quality compared to virgin-produced materials, recovered commodities are assumed to obtain 90% of

Exhibit A1 Data for Estimating Recoverable Materials Quantities, Potential Recovery Yield, & Market Value							
A		B	C	D	E	F	G
				Commodity Concentration in Disposed Wastes			
Item	Commodity Type	Tonnage of waste streams with commodity present (>0ppm)	Count & percent of waste streams >0ppm	Minimum ppm	Maximum ppm	Tonnage-weighted mean ppm	90% of market price ($/ton)

market price from the following price sources:

(a) London Metal Exchange, Average January 2008 price: http://www.lme.com

(b) http://www.MetalPrices.com average weekly price from March 2, 2007 through August 24, 2007 (2007 price applied to avoid Jan/Feb 2008 spike price).

(c) ICIS Pricing, February 22, 2008: http://www.icis.com. The price for the alkyl benzenes is based on a weighted average price for 47% toluene & 53% xylene.

- ** Other data sources for commodities in disposed wastes for which there is no NHWCS data:
  - Row 15: Received verbal price quote from Atlantic Equipment Engineers listed on http://www.micronmetals.com for Molybdenum Disulfide in quantities of 100lbs or greater and averaged with price of technical grade in 50 lb. lot from: http://rosemillcom.host-manager.com/product.asp?productid=258465. An assay value of 16.7% is assumed for the recovered value of the catalysts based on a calibration of the baseline cost estimates comparing offsite disposal to onsite recycling under pre-rule conditions (i.e., assumed percent of tonnage containing recoverable catalyst). The percentage recovered product from spent catalyst (waste codes K171 and K172) was estimated using engineering judgment as to the concentration of the recoverable product from the waste stream, likelihood of destruction during the recovery process and potential of the recovered product to retain useable characteristics. The percentage recovered product for spent catalyst is 5% (i.e., 5% of catalyst is reusable).
  - Row 26: From RACER 2005 cost estimating software was used for the unit price. The percentage recovered product from spent granular activated carbon was estimated using engineering judgment as to the concentration of the recoverable product from the waste stream, likelihood of destruction during the recovery process and potential of the recovered product to retain useable characteristics. An assay value of 10% was assumed for the price of recovered activated carbon based on a calibration of the baseline cost estimates comparing offsite disposal to onsite recycling under pre-rule conditions (i.e., percent of tonnage containing recoverable carbon). The percentage recovered product for spent granular activated carbon is 90% (i.e., 90% of carbon is reusable).
  - Row 28:The percentage recovered product for acids recovered from acid waste streams was estimated. Waste streams at selected recovery facilities were reviewed by comments, disposal system type, and origin to determine the likely waste streams generated from the recovery operations. Assuming there are minimal lost products by spillage or evaporation, the mass of the original waste stream (recovery waste stream) minus the reported residuals waste stream (i.e., sludge, and wastewater) is the mass of the recovered product. The waste residual fraction is described in the respective recovery technology section. Based on the estimated waste residual mass fraction, the recoverable product mass fraction is estimated at 74% for acid product recovery.

OSW's query for this RIA, of the 1996 NHWCS database for disposed hazardous waste constituents, yielded 32,575 rows of data, each row representing a single chemical/material constituent for a single waste stream at a single facility. However, 21,807 (67%) of the 32,575 data rows contained zero ppm (i.e., 0 ppm) datapoints which were excluded from calculation of the tonnage-weighted means displayed in Exhibit A1 above. Zero ppm datapoints were excluded because they signify either missing ppm data or non-numerical data such as "None/Not Applicable (NA)", "Not Tested (NT)", "Present at Unknown Concentration (PR)", "Not Detected" or "Less Than Detection Limit (ND)", "Trace (TR)", or "Don't Know (DK)." (Source: page 21 of the NHWCS database user manual "Draft Documentation for the Data Files for the National Hazardous Waste Constituent Survey", prepared by Westat, Inc., 30 March 1998 at http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/pdf/datadoc5.pdf).

Exhibit A2 below presents the data code crosswalk OSW used to analyze the disposed hazardous waste data extracted from the 1996 NHWCS database, to identify commodity constituents relevant for assigning to each of the three commodity groups/sub-groups displayed in Exhibit A1. This crosswalk was necessary because the 1996 NWHCS database is based on the pre-2001 RCRA Biennial Reports coding system (USEPA revised the RCRA Biennial Reporting codes beginning with data year 2001). See pages 77 to 81 of the 2001 Hazardous Waste Biennial Report "Instructions and Forms" (http://www.epa.gov/epaoswer/hazwaste/data/brs01/ins-frms.pdf) for a comparison of the pre-2001 RCRA codes with the current RCRA codes involving hazardous waste (a) industrial source codes (i.e., Gxx compared to Axx on page 77), (b) physical/chemical form codes (i.e., Wxxx compared to Bxxx on pages 79-80), and (c) management method codes (i.e., Hxxx compared to Mxxx on page 81).

Exhibit A2
Definition of Commodity Sub-Groups
for Assignment of Recoverable Constituents and Average Concentrations from the NHWCS Database*
for Evaluating Potential Switchover of Baseline Disposal to Future Recovery/Recycling

Commodity Sub-Group	Physical Form Codes**	RCRA Regulatory Codes
	NHWCS form codes = Bxxx	NHWCS regulatory codes = same as Biennial Report
Commodity Group #1: For Possible Metal Recovery:		
1A. Metal-bearing liquids	• B106 + B107 = W107 wastes containing cyanides	• D005 barium • D006 cadmium • D007 chromium • D008 lead • D009 mercury • D010 selenium • D011 silver • F006, F007, F008, F009 metal electroplating • F010, F011, F012 metal heat treating • F019 sludge from conversion coating of aluminum • F035 inorganic wood preservative waste (arsenic or chromium) • K002, K003, K004, K005, K006, K007, K008 inorganic pigment mfg sludge & residues (listed for chromium)
1B. Mercury-bearing wastes	• B117 = W117 waste liquid mercury	
1C. Metal-bearing solids	• B303 = W303 ash • B304 = W304 slags, drosses, other solid thermal residues • B307 = W307 metal scale, filings & scrap (metal drums) • B312 = W312 cyanide or metal cyanide solids, chemicals • B316 = W316 metal salts or chemicals w/out cyanides • B319 = W319 other inorganic solids	
1D. Metal-bearing sludges	• B305 + B306 = W501 lime and/or metal hydroxide sludge/solids • B505 = W505 metal bearing sludge w/out cyanide • B506 = W506 cyanide-bearing sludge (non contaminated soils)	

<table>
<tr><th colspan="3">Exhibit A2
Definition of Commodity Sub-Groups
for Assignment of Recoverable Constituents and Average Concentrations from the NHWCS Database*
for Evaluating Potential Switchover of Baseline Disposal to Future Recovery/Recycling</th></tr>
<tr><td rowspan="2">Commodity Sub-Group</td><td>Physical Form Codes**</td><td>RCRA Regulatory Codes</td></tr>
<tr><td>NHWCS form codes = Bxxx</td><td>NHWCS regulatory codes = same as Biennial Report</td></tr>
<tr><td></td><td>• B519 = W519 other inorganic sludge</td><td>• K064, K065, K066, K069, K086, K100 lead- or chromium-bearing
• K061 iron & steel mfg emission dust
• K071, K073, K106, K176, K177, K178 inorganic chemical mfg
• K171, K172 petroleum refining spent catalysts</td></tr>
<tr><td colspan="3">Commodity Group #2: For Possible Solvent Recovery:</td></tr>
<tr><td>2A. Solvent-bearing liquids</td><td>• B202 = W202 concentrated halogenated organic liquids
• B203 = W203 concentrated non-halogenated organic liquids
• B201 + B204 = W204 concentrated halo/non-halogenated solvents</td><td rowspan="2">• F001, F002, F003, F004, F005 spent solvents
• F024, F025 chlorinated aliphatic mfg
• K086 solvent washes of ink equipment</td></tr>
<tr><td>2B. Other organic-bearing liquids</td><td>• B209 = W209 paint, ink, lacquer or varnish
• B211 = W211 paint thinner or petroleum distillates
• B219 = W219 other organic liquid</td></tr>
<tr><td colspan="3">Commodity Group #3: For Possible Other Recovery (e.g. Acids and Carbon Regeneration)</td></tr>
<tr><td>3A. Acids</td><td>• B103 + B104 = W103 spent concentrated acid >5%
• B105 = W105 acidic aqueous wastes <5% acid</td><td rowspan="4">• K031, K043; K097, K098, K099, K123, K124, K125, K126, K131, K132 pesticide mfg wastewaters, sludges, absorbents, solids
• K062 iron & steel mfg spent pickle liquor
• K088 aluminum production spent potliners (sodium fluoride)</td></tr>
<tr><td>3B. Caustics</td><td>• B108 + B109 + B110 = W110 caustic aqueous waste without cyanides</td></tr>
<tr><td>3C. Spent carbon</td><td>• B310 + B403 + B404 = W310 filters, adsorbents, resins & spent carbon</td></tr>
<tr><td>3D. Sodium fluoride</td><td>Any</td></tr>
<tr><td colspan="3">Explanatory Notes:
* NHWCS = 1993 OSW National Hazardous Waste Constituent Survey, available as item 4 at: http://www.epa.gov/epaoswer/hazwaste/id/hwirwste/economic.htm.
** There are a total 47 Wxxx codes, 47 Gxxx codes, 40 Dxxx codes, 28 Fxxx codes, 120 Kxxx, codes, 205 Pxxx codes, and , 612 Uxxxx codes defined for data reporting to the RCRA Biennial Report (BR): .for complete lists see pp. 49 to 54 of the 2005 BR instructions book at: http://www.epa.gov/epaoswer/hazwaste/data/br05/05report.pdf</td></tr>
</table>

Exhibit A3 below displays a consolidated list of **815 chemical and material constituents** reported with concentrations > 0 ppm (parts-per-million) in disposed hazardous waste data from the 1996 NHWCS database. This list is consolidated from the 32,575 constituent datapoint rows produced by query of the 1996 NHWCS database for disposed wastes (i.e., RCRA Biennial Report system codes = M041 to M137). Many of these constituents are either (a) associated with only one waste stream, or (b) associated with more than one waste stream which aggregate to a relatively small quantity, so they were excluded from the baseline disposal switchover to recycling breakeven test of this RIA. This exclusion of other constituents from the breakeven test is a source of resource recovery benefit under-estimation in this RIA.

Exhibit A3
List of 815 Constituents with Concentrations > 0ppm in Disposed Hazardous Wastes in the 1996 NHWCS Database

1. 1-Chloro-1,3-butadiene
2. 1-Hexanol
3. 1-Hexene
4. 1-Methylnaphthalene
5. 1-Methylpiperidine [N-Methylpiperidine
6. 1-Pentene
7. 1-Pentyne
8. 12-Hydroxyoctadecanoic acid
9. 1,1'-Methylenebis(isocyanato)benzene
10. 1,1-Dichloroethane [Ethylidene dichloride]
11. 1,1-Dichloroethylene [Vinylidene chloride]
12. 1,1,1-Trichloroethane [Methyl chloroform]
13. 1,1,1,2-Tetrachloroethane
14. 1,1,2-Trichloro-1,2,2-trifluoroethane [Freon 113]
15. 1,1,2-Trichloroethane [Vinyl trichloride]
16. 1,1,2,2-Tetrachloroethane
17. 1,2-Dichlorobenzene [o-Dichlorobenzene]
18. 1,2-Dichloroethane [Ethylene dichloride]
19. 1,2-Dichloroethylene, mixed isomers
20. 1,2-Dichloropropane [Propylene dichloride]
21. 1,2,3-Trichloropropane
22. 1,2,3,4-Tetrahydronaphthalene [Tetralin]
23. 1,2,4-Trichlorobenzene
24. 1,2,4-Trimethylbenzene [Pseudocumene]
25. 1,2,4,5-Tetrachlorobenzene
26. 1,3-Butadiene
27. 1,3-Butylene glycol
28. 1,3-Dichloro-2-butene
29. 1,3-Dichlorobenzene [m-Dichlorobenzene]
30. 1,3-Dichloropropene [1,3-Dichloro-1-propene][mixed isomers]
31. 1,3-Dimethyl-2-imidazolidinone [N,N'-Dimethylethylene urea]
32. 1,3-Pentadiene
33. 1,3,3-Trichloropropene
34. 1,3,5-Trimethyl-2,4,6-tris-(3,5-di-tert-butyl-4hydroxybenzyl) benzene
35. 1,4-Butanediol
36. 1,4-Cyclohexanedimethanol
37. 1,4-Dichloro-2-butene, mixed isomers
38. 1,4-Dichlorobenzene [p-Dichlorobenzene]
39. 1,4-Dioxane [1,4-Diethyleneoxide]
40. 1,4-hexadiene, (Z)-
41. 1,4-Pentadiene
42. 1,5-Cyclooctadiene
43. 1,5-Pentanediol
44. 1,6-Hexamethylene diisocyanate
45. 1,6-Hexanediol [Hexamethylene glycol]
46. 2'-Hydroxy acteophenone
47. 2- Chloroethanol [Ethylene chlorohydrin]
48. 2-Acetylaminofluorene [2-AAF]
49. 2-Benzotriazol
50. 2-Butanol [sec-Butanol]
51. 2-Butoxyethanol [Butyl cellosolve][Ethylene gycol monobutyl ether]
52. 2-Butyne-1,4-diol
53. 2-Butyne [Crotnylene]
54. 2-Chloronaphthalene [beta-Chloronaphthalene]
55. 2-Chlorophenol [o-Chlorophenol]
56. 2-Ethoxyethanol acetate [2-EEA][Cellosolveacetate]
57. 2-Ethoxyethanol [Ethylene glycol monoethyl ether][Cellosolve]
58. 2-Ethyl-1-hexanol
59. 2-Ethyl-1,3-butylene glycol
60. 2-Ethyl-1,3-propanediol
61. 2-Ethylhexanal
62. 2-Hexanone
63. 2-Hydroxyethyl methacrylate [Glycol methacrylate]
64. 2-Mercaptoethanol
65. 2-Methoxy-1-propyl acetate

66. 2-Methoxyethanol [Ethylene glycol monomethyl ether]
67. 2-Methyl-1-butene
68. 2-Methyl-2-butene [Amylene]
69. 2-Methyl-2-propanethiol [tert-Butyl mercaptan]
70. 2-Methyl-2,4-pentanediol [Hexylene glycol]
71. 2-Methyl pentane
72. 2-Methylhexane
73. 2-Methylnaphthalene
74. 2-Nitroaniline [o-Nitroaniline]
75. 2-Nitrobenzoic Acid
76. 2-Nitrophenol [o-Nitrophenol]
77. 2-Nitropropane
78. 2-Pentanol
79. 2-Pentene [Beta-N-amylene]
80. 2-Picoline [alpha-Picoline][2-Methylpyridine]
81. 2-Propanol [Isopropyl alcohol][Isopropanol]
82. 2-(3-Isobutyl phenyl) proprionic acid
83. 2-(4-Isobutyl phenyl) proprionic acid [Ibuprofen]
84. 2 B-3 Alcohol
85. 2,2'-Methylene bis(6-tert-butyl phenol)
86. 2,2-Dimethylbutane
87. 2,2,4-Trimethylpentane [Iso-octane]
88. 2,3-Diamino toluene [2,3-Toluenediamine]
89. 2,3-Dichloro-1-propene
90. 2,3-Dichlorobutane
91. 2,3-Dimethyl butane
92. 2,3,4,6-Tetrachlorophenol
93. 2,4- and 2,6-Toluene diisocyanate mixture
94. 2,4-D [2,4-Dichlorophenoxyacetic acid]
95. 2,4-di-tert-Butylphenol
96. 2,4-Dichlorophenol
97. 2,4-Dimethyl-4-Vinyl Cyclohexene
98. 2,4-Dimethylphenol
99. 2,4-Dinitrophenol
100. 2,4-Dinitrotoluene
101. 2,4-Toluene diisocyanate
102. 2,4-Toluenediamine [2,4-Diaminotoluene]
103. 2,4,5-Trichlorophenol
104. 2,4,6-Di-tert-butylphenol
105. 2,4,6-Trichlorophenol
106. 2,5-Di-tert-amylhydroquinone [2,5-Di-tert-pentylhydroquinone]
107. 2,6-Di-tert-butyl-p-cresol
108. 2,6-Dichlorophenol
109. 2,6-Dinitrotoluene
110. 2,6-Toluene diisocyanate
111. 2,6-Toluenediamine [2,6-Diaminotoluene]
112. 3-Methyl-1,4-pentadiene
113. 3-Methyl-2-butanone [Methyl isopropyl ketone]
114. 3-Methyl pentane
115. 3-Methyl pyridine [beta-Picoline]
116. 3-Nitro-o-xylene
117. 3-Nitroaniline [m-Nitroaniline]
118. 3-Pentanol
119. 3-Pentanone [Diethyl ketone]
120. 3-(4-Isobutyl phenyl) proprionic acid
121. 3-(Dimethylamino)propylamine
122. 3-(Triethoxysilyl)-1-propanamine [3-Aminopropyl) triethoxysilane]
123. 3,3'-Dichlorobenzidine
124. 3,3-Dichloropropene
125. 3,3,3-Trichloro-2-Metyl-1-Propene
126. 3,4-Dichlorobutene-1
127. 3,4-Toluenediamine [3,4-Diaminotoluene]
128. 4'-Isobutyl acetophenone
129. 4-Acetoxy acteophenone
130. 4-alpha-Cumylphenol
131. 4-Bromophenyl phenyl ether [p-Bromo diphenyl ether]
132. 4-Chlorophenyl phenyl ether
133. 4-Hydroxy acetophenone
134. 4-Isobutyl ethyl benzene
135. 4-Isobutyl phenyl ethenol
136. 4-Isobutyl styrene
137. 4-Methyl morpholine
138. 4-Nitro-o-xylene
139. 4-Nitroaniline [p-Nitroaniline][4-Nitrobenzenamine]
140. 4-Nitrophenol [p-Nitrophenol]
141. 4-Vinylcyclohexene
142. 4-(Diglycidamino) phenyl glycidyl ether
143. 4,4'-Methylene-bis-(2,6-diethylaniline)
144. 4,4'-Methylene bis(2-chloroaniline)
145. 4,4'-Methylene diphenyl diisocyanate [MDI][Methylenebis(phenylisocyante)]
146. 4,4'-Methylenedianiline [p,p'-Diaminodiphenylmethane][MDA]
147. 4,4'-Thiobis(6-tert-butyl)phenol
148. 4,6-Dinitro-o-cresol [4,6-Dinitro-2-methyl phenol]
149. 7,12-Dimethylbenz[a]anthracene
150. Acenaphthene
151. Acenaphthylene
152. Acetaldehyde [Ethanal]
153. Acetamide
154. Acetates
155. Acetic acid
156. Acetic anhydride
157. Acetone [2-Propanone]
158. Acetonitrile [Methyl cyanide]
159. Acetophenone
160. Acetyl chloride
161. Acetylene
162. Acridine
163. Acrolein [2-Propenal]
164. Acronitrile-Butadiene-Styrene Polymer
165. Acronitrile-Butadiene Polymer
166. Acrylamide
167. Acrylic acid
168. Acrylic Copolymer
169. Acrylonitrile [2-Propenenitrile]
170. Acryloyl chloride
171. Adiponitrile [Hexanedinitrile]
172. Al Compounds
173. Alcohol Sd No.3a Absolute
174. Aldrin
175. Alkyl benzenes
176. Alkyl naphthalenes

177. Alkylalkanolamines
178. Allyl alcohol
179. Allyl chloride [3-Chloropropylene][3-Chloropropene]
180. Allyl methacrylate
181. alpha-Hexachlorocyclohexane [alpha-BHC]
182. alpha-Methylstyrene
183. alpha-Pinene Polymers
184. Aluminum
185. Aluminum chloride hexahydrate
186. Aluminum silicate
187. Aluminum silicate, hydrated
188. Ammonia, gas
189. Ammonium acetate
190. Ammonium Acetone Disulfonate
191. Ammonium bicarbonate
192. Ammonium chloride
193. Ammonium hydroxide [Ammonia solution]
194. Ammonium oxides
195. Ammonium phosphate
196. Ammonium sulfate
197. Ammoniun phosphate, dibasic
198. Amyl acetate
199. Aniline
200. Anthracene
201. Antimony
202. Antimony trioxide
203. Aroclor 1242 [PCB 1242]
204. Aromatic 200
205. Arsenic
206. Ash
207. Atrazine
208. Azeo Oil
209. Barium
210. Barium metaborate
211. Barium Oxide
212. Barium sulfate
213. Bentone 38 organophillic clay
214. Benzal chloride [Dichloromethyl benzene]
215. Benzene
216. Benzoic acid
217. Benzophenone
218. Benzoyl peroxide
219. Benzo(a)pyrene
220. Benzo(b)fluoranthene
221. Benzo(k)fluoranthene
222. Benzo[g,h,i]perylene
223. Benzyl alcohol
224. Benzyl chloride
225. Benz[a]anthracene
226. Beryllium
227. Beta-cis-amylene [2-Pentene-cis]
228. beta-Hexachlorocyclohexane [beta-BHC]
229. beta-Myrcene
230. beta-Pinene, alpha-Pinene
231. beta-Pinine Polymer
232. Bis-(2-chloroethoxy)methane [Dichloromethoxy ethane]
233. Bismuth
234. Bisphenol A-Epichlorohydrin copolymer
235. Bisphenol A diglycidyl ether [Epoxide A]
236. Bisphenol A [2,2-bis(4-hydroxyphenyl)propane)]
237. Bis(2-chloroethyl) ether [Dichloroethyl ether]
238. Bis(2-chloroisopropyl) ether [2,2'-Oxybis(2-chloropropane)]
239. Bis(2-ethylhexyl) phthalate [Di-2-ethylhexyl phthalate]
240. Brass Foundry/Silica
241. Bromine
242. Bromodichloromethane [Dichlorobromomethane]
243. Bromoform [Tribromomethane]
244. Bromomethane [Methyl bromide]
245. Brown/Red Clay
246. BTEX
247. Butyl benzyl phthalate
248. Butyl glycolate
249. Butyl methacrylate [2-Methyl butyl acrylate]
250. Butyric acid [Butanoic acid]
251. C12-C20 Parrafins
252. C4-6 Dicarbonic acid, mixture
253. C6-C12 Aliphatics
254. C6 Alkenes/Alkenes
255. C9-C10 Alkyl Benzenes
256. Cadmium
257. Cadmium hydroxide
258. Cadmium sulfide
259. Calcium
260. Calcium carbonate
261. Calcium chloride
262. Calcium hydroxide
263. Calcium nitrate
264. Calcium oxide
265. Calcium resinate
266. Calcium sulfate
267. Calcium zinc resinate
268. Caprolactam
269. Caprylene [1-Octene]
270. Carbazole
271. Carbon
272. Carbon black
273. Carbon dioxide
274. Carbon disulfide
275. Carbon monoxide
276. Carbon tetrachloride
277. Carboxy Methyl Cellulose
278. Catalyst Tlf 2370c
279. Catechol
280. CD-dimers
281. Cellite
282. Cellulose
283. Cement
284. Chlordane
285. Chlorine
286. Chloroacetone
287. Chlorobenzene
288. Chlorobutanes
289. Chloroethane [Ethyl chloride]
290. Chloroform
291. Chloromethane [Methyl chloride]
292. Chloroprene-Sulfur polymer
293. Chloroprene [2-Chloro-1,3-butadiene]
294. Chlorothalonil
295. Chlorotoluene, mixed isomers
296. Chromium
297. Chromium oxide

298. Chromium trioxide
299. Chrysene
300. CI Pigment Blue 15 [Copper Phthalocyanine]
301. CI Pigment Green 36
302. CI Pigment Green 7
303. CI Pigment Yellow 14 [Benzidine yellow OT]
304. cis-1,2-Dichloroethylene
305. cis-1,3-Dichloropropylene [cis-1,3-Dichloropropene]
306. cis-4-Methyl-2-pentene
307. cis-Polybutadiene
308. Clay
309. Coal tar creosote
310. Cobalt
311. Concrete
312. Copper
313. Copper acetylide
314. Creosote
315. Cresols, mixed isomers
316. Crotonaldehyde
317. Crotonaldehyde, trans- stereoisomer
318. Crude Oil Soilds (Parrefins)
319. Crushed Drums
320. Cryolite [Sodium aluminofluoride]
321. Cumene [Isopropyl benzene]
322. Cyanides
323. Cyanides (Amenable)
324. Cyanides (Cyanohydrins)
325. Cyanogen bromide [Bromine cyanide]
326. Cyclohexane
327. Cyclohexanol
328. Cyclohexanone
329. Cyclohexylamine
330. Cyclopentadiene
331. Cyclopentane
332. D-Limonene
333. Dacthal [2,3,5,6-Tetrachloroterephthalic acid][DCPA]
334. Decalin
335. delta-Hexachlorocyclohexane [delta-BHC]
336. Deuterated Toluene
337. Di-n-butyl phthalate
338. Di-n-butylether [n-Butyl ether]
339. Di-n-octyl phthalate
340. Diacetone alcohol
341. Dibenzofuran
342. Dibenz(a,h)anthracene
343. Dibromochloromethane [Chlorodibromomethane]
344. Dichlorobenzene, mixed isomers
345. Dichlorodifluoromethane [CFC-12]
346. Dichloropropane, mixed isomers
347. Dicyanodiamide
348. Dicyclopentadiene
349. Dieldrin
350. Diethyl phthalate
351. Diethylene glycol-trimethylpropane-adipate polymer
352. Diethylene glycol dimethyl ether [Diglyme]
353. Diethylene glycol monobutyl ether [Butyl carbitol]
354. Diethylene glycol monomethyl ether [Methyl Carbitol]
355. Diethylenetriamine
356. Diisobutyl ketone [Isobutyl ketone]
357. Diisopropylfluorophosphate [DFP]
358. Dimethyl adipate
359. Dimethyl disulfide
360. Dimethyl gluterate [Pentanedioic acid, dimethyl ester]
361. Dimethyl hydrogen phosphite [Phosphonic acid, dimethyl ester]
362. Dimethyl methyl phosphonate
363. Dimethyl naphthalene
364. Dimethyl phthalate
365. Dimethyl succinate [Butanedioic acid, dimethyl ester]
366. Dimethyl sulfate
367. Dimethyl sulfide [Methyl sulfide][Thiobismethane]
368. Dimethyl sulfoxide
369. Dinitro-o-xylenes (3,4 & 3,5)
370. Dinitrotoluene, mixed isomers
371. Dinitroxylenols
372. Dinoseb [2-sec-Butyl-4,6-dinitrophenol]
373. Diphenyl ether [diphenyl oxide]
374. Diphenylamine
375. DIPRENE
376. Dipropylene glycol methyl ether
377. Dirt/Sand/Soil/Rocks/Gravel/Debris
378. Distillates, petroleum, solvent-refined light paraffinic
379. Disulfoton
380. Ditrimethylol propane
381. Dust/Lime/Metal
382. Echinocandin B
383. Endosulfan
384. Endosulfan I [alpha-Endosulfan]
385. Endosulfan II [beta-Endosulfan]
386. Endosulfan sulfate
387. Endrin
388. Endrin aldehyde
389. Epoxy resin [Epikote 862]
390. Epoxynovalac
391. Ethanol [Ethyl alcohol]
392. Ethyl acrylate
393. Ethyl butyl ketone [3-Heptanone]
394. Ethyl cyanide [Propionitrile][Propanenitrile]
395. Ethyl ether [Ethane 1,1'-oxybis]
396. Ethyl formate
397. Ethyl methacrylate
398. Ethylbenzene
399. Ethylene
400. Ethylene dibromide [1,2-Dibromoethane]
401. Ethylene glycol
402. Ethylene glycol butyl ether acetate [Butyl cellosolve acetate]
403. Ethylene glycol dimethyl ether [1,2-Dimethoxyethane]
404. Ethylene oxide
405. Ethylenediamine
406. Extracts (petroleum), heavy naphtha solvent
407. Ferric chloride
408. Ferric Salt Of 3-Nitro
409. Filter Aid-Carbon
410. Fluoranthene
411. Fluorene

412. Fluoride
413. Fluoroalkyl carboxylate
414. Fluorochemical adduct
415. Formaldehyde
416. Formamide
417. Formic Acid
418. Fuel oil #2
419. Fuel oil #6
420. Fumaronitrile
421. Fumaronitrile [Fumaric acid dinitrile]
422. Furan
423. gamma-Picoline [4-Methyl pyridine]
424. Glutaraldehyde
425. Glycol ethers
426. Gylcerin [Glycerol][Propanetriol]
427. HEAVY ENDS
428. Heptachlor
429. Heptachlor epoxide
430. Hexachloro-1,3-butadiene [Hexachlorobutadiene]
431. Hexachlorobenzene
432. Hexachlorocyclopentadiene
433. Hexachloroethane
434. Hexadiene Oligomers
435. Hexamethyldisilazane
436. High boiling aliphatic hydrocarbons
437. HOC
438. HXCDFS
439. Hydrazine
440. Hydrocarbon polymer resin
441. Hydrogen chloride [Hydrochloric acid]
442. Hydrogen fluoride [Hydrofluoric acid]
443. Hydrogen peroxide
444. Hydroiodic acid
445. Hydroquinone
446. Hydrotreated heavy naphtha
447. Hyrdrocarbon sludge
448. Hyrdrocarbons
449. Hyrdrocarbons (Low Boiling)
450. Imidazole
451. Indeno(1,2,3-cd) pyrene
452. Indole
453. Ink
454. Inorganics
455. Iodine
456. Iodomethane [Methyl iodide]
457. Irganox
458. Iron
459. Iron oxide
460. Isoamyl acetate
461. Isobutyl acetate
462. Isobutyl Acrylate
463. Isobutyl alcohol
464. Isobutyl isobutyrate
465. Isobutyraldehyde
466. Isom Reactor
467. Isooctyl acrylate
468. Isoparaffinnic hydrocarbons
469. Isopentane
470. Isophorone
471. Isoprene [2-Methyl-1,3-butadiene]
472. Isopropyl acetate
473. Isopropyl ether
474. K-10 Bentonite clay
475. Kerosene
476. L-Aspartic acid
477. L-Limonene
478. Lanolin
479. Lauryl methacrylate
480. Lead
481. Lead chromate VI oxide
482. Lead II sulfate
483. Limonene, racemic mixture [Dipentene]
484. Lindane [gamma-Hexachlorocyclohexane][gamma-BHC]
485. Lithium fluoride
486. Loracarbef monohydrate
487. m-Cresol [3-Methyl phenol]
488. Magnesium
489. Magnesium hydrate
490. Magnesium oxide
491. Magnesium resinate
492. Maleic acid
493. Maleic anhydride
494. Malic Anhydride
495. Malononitrile
496. Manganese
497. Meat & Meat By-Products
498. Mercury
499. Mesityl oxide
500. Metal Oxides (Zinc, Brass, Aluminum)
501. Methacrylic acid
502. Methacrylonitrile
503. Methacryloyl chloride
504. Methanol [Methyl alcohol]
505. Methoxychlor
506. Methyl acetate
507. Methyl amyl ketone [2-Heptanone]
508. Methyl ethyl ketone peroxide
509. Methyl ethyl ketone [2-Butanone][MEK]
510. Methyl ethyl ketoxime [2-Butanone oxime]
511. Methyl formate
512. Methyl isoamyl ketone [5-Methyl-2-hexanone]
513. Methyl isobutyl ketone [Hexone][4-Methyl-2-pentanone]
514. Methyl isobutyrate [2-Methylpropanoic acid methyl ester]
515. Methyl methacrylate
516. Methyl naphthalenes
517. Methyl parathion
518. Methyl tert-butyl ether
519. Methylchrysene (Total)
520. Methylcyclohexane
521. Methylene chloride [Dichloromethane]
522. Mica
523. Mineral oil, light and heavy
524. Mineral spirits
525. Mirror Backing
526. Misc. Chlorinated Organics
527. Mixed Alcohols
528. Mixed Esters & Diols
529. Molybdenum
530. Morpholine
531. Mycelia Solids
532. n-Amyl alcohol [1-Pentanol]
533. n-Butyl-n-butyrate
534. n-Butyl acetate

535. n-Butyl alcohol [n-Butanol]
536. n-Butyl bromide
537. n-Butyl formate
538. n-Butyraldehyde [Butanal]
539. N-Ethyl morpholine
540. n-Heptane
541. n-Hexane
542. N-Methyldiethanolamine
543. N-Methylpyrrolidone [1-Methyl-2-pyrrolidinone]
544. N-Nitrosodi-n-propylamine [Di-n-propylnitrosamine]
545. N-Nitrosodiphenylamine [Diphenylnitrosamine]
546. n-Octyl mercaptan [1-Octanethiol]
547. n-Propyl acetate
548. n-Propyl alcohol [n-Propanol]
549. n-Propylamine [1-Propanamine]
550. n-tert-Butylphenol-formaldehyde polymer
551. n-Vinyl-Caprolactam
552. N-(1-Ethylpropyl)-3,4-dimethyl benzamine
553. Naphtha [Petroleum benzin]
554. Naphthalene
555. Naphtha, light steam-cracked aromatic, piperylene conc. polymd.
556. Natural rubber [Polyisoprene]
557. Neopentyl glycol
558. Neopentyl glycol gylcidyl ether
559. Nickel
560. Nickel hydroxide
561. Nicotinonitrile [3-Pyridinecarbonitrile]
562. Nitrates
563. Nitrobenzene
564. Nitrogen
565. Nitromethane
566. Nitrotoluene
567. Nonyl phenol
568. N,N'-Dimethyl acetamide
569. N,N-Diethyl aniline
570. N,N-Dimethyl-N-octylamine
571. N,N-Dimethyl formamide
572. o-Cresol [2-Methyl phenol]
573. o-Toluidine [2-Methylaniline]
574. o-Xylene [1,2-Dimethylbenzene]
575. Octadecyl acrylate
576. Octadecyl isocyanate
577. Octadecyl methacrylate
578. Octane
579. Octane sulfonic acid sodium salt monohydrate
580. Oily sludge
581. Oil/Oils
582. Organic Esters
583. Organic Nitrogen
584. Organic Residues
585. Organic Tar & Salts
586. Organophillic clay
587. Other Misc Organics
588. Other Organics
589. Other Polymers
590. Oxazole
591. Oxygen
592. o,p'-DDD
593. o,p'-DDE [o,p'-TDE]
594. o,p'-DDT
595. p-Chloro-m-cresol
596. p-Chloroaniline [4-Chloroaniline]
597. p-Chlorophenol
598. p-Cresol [4-Methyl phenol]
599. p-Nitrobenzoic acid
600. p-Toluidine [4-Methylaniline]
601. Paint
602. para-Nitrobenzyl bromide
603. para-Nitrobenzyl ester of PVSO
604. para-Toluene sulfonic acid
605. Paraffinic Olefinic Hydrocarbons
606. PCB's
607. Peatanane Tech Normal
608. PECDFS
609. Pendimethalin
610. Pentachlorobenzene
611. Pentachlorobutadiene
612. Pentachloroethane
613. Pentachlorophenol [PCP]
614. Pentaerythritol tetraacrylate
615. Pentane
616. Petroleum distillate
617. Petroleum Hydrocarbons
618. Petroleum resins
619. Petroleum Sludges
620. Petroluem naphtha [Ligroin]
621. Phenacetin
622. Phenanthrene
623. Phenol
624. Phenol-formaldehyde polymer
625. Phenoldisulfonic acid
626. Phenolic Resin
627. Phenothiazine
628. Phenyl acetate
629. Phenylacetic acid
630. Phenylenediamine, mixed isomers
631. Phenylenedicarbonyl
632. Phorate
633. Phosgene [Carbonic dichloride]
634. Phosphoric acid
635. Phosphorus
636. Phthalazine
637. Phthalic
638. Phthalic anhydride
639. Pigment Blue
640. Pivalic acid [Trimethyl acetic acid]
641. PNA'S
642. Polyacrylic acid [2-Propenoic acid homopolymer]
643. Polyamide Resin
644. Polybutylene
645. Polychloroprene
646. Polymer
647. Polymethylene [Isocyanic acid, polymethylenepolyphenylene ester]
648. Polypropylene glycid glycerol triether
649. Polypropylene glycol
650. Polystryene
651. Polytetrahydrofuran
652. Polyurethane
653. Polyurethane resin
654. Poly(alpha-methylstyrene)
655. Poly(ethylene terephthalate)
656. Poly(isoprene) [Rubber]
657. Potassium acetate
658. Potassium chloride
659. Potassium hydroxide
660. Potassium sulfate

661. Potassium tetrafluoroborate
662. Potassium tetrathionate
663. Production Intermediates
664. Propyl cellosolve
665. Propylene glycol methyl ether
666. Propylene glycol methyl ether acetate
667. Propylene glycol monopropyl ether
668. Propylene glycol [1,2-Propane diol]
669. PYRANS
670. Pyrene
671. Pyridine
672. Pyridoxal-5'-phosphate
673. p,p'-DDD
674. p,p'-DDE [p,p'-TDE]
675. p,p'-DDT
676. Quartz
677. Quinoline
678. Quinone [p-Benzoquinone]
679. R-11
680. Rags/Filters
681. Refractory Brick
682. Resin acids and Rosin acids, hydrogenated, esters with glycerol
683. Rosin
684. Salicyclic acid
685. Sand/Silica/Glass
686. sec-Butylamine
687. Selenium
688. Silane [Silicon hydride]
689. Silica gel
690. Silica [Silicon oxide]
691. Silica, amorphous [Silica, vitreous]
692. Silicon
693. Silicon carbide
694. Silicon tetrachloride
695. Silicone oil
696. Silicones, all
697. Siloxanes & silicones
698. Silver
699. Silvex [2,4,5-Trichlorophenoxypropionic acid][2,4,5-TP]
700. Sodium
701. Sodium azide
702. Sodium bicarbonate
703. Sodium bromide
704. Sodium carbonate
705. Sodium chloride
706. Sodium cyanide
707. Sodium hydroxide
708. Sodium hypochlorite
709. Sodium iodide
710. Sodium lactate
711. Sodium lauryl sulfate
712. Sodium methylate [Sodium methoxide]
713. Sodium nitrate
714. Sodium phosphate dibasic
715. Sodium phosphate dibasic, 7-hydrate
716. Sodium phosphate monobasic
717. Sodium Salts Of Organic Acids
718. Sodium sulfate
719. Sodium trifluoroacetate
720. Solvent naphtha (petroleum), heavy aromatic
721. Solvent naphtha (petroleum), light aliphatic
722. Solvent naphtha (petroleum), light aromatics
723. Solvent naphtha (petroleum), medium aliphatic
724. Solvents
725. Soybean oil
726. Sterigmatocystin
727. Stoddard solvent
728. Streptomycin sulfate
729. Stryene-isoprene copolymer
730. Styrene-butadiene polymer
731. Styrene [Vinyl benzene][Phenylethylene]
732. Succinonitrile [Butanedinitrile]
733. Sulfate
734. Sulfide
735. Sulfur
736. Sulfur dioxide
737. Sulfuric acid
738. Talc
739. Tar
740. TCDFS
741. Terbufos
742. Terephthalic acid [1,4-Benzenedicarboxyllic acid][p-Phthalic acid]
743. Terpene hydrocarbons
744. Terphenyl, hydrogenated
745. tert-Amyl alcohol [2-Methyl -2-butanol][tert-Pentanol]
746. tert-Butanol [2-Methyl-2-propanol]
747. tert-Butyl phenol
748. Tetrabutyl ammonium hydroxide
749. Tetrachloroethylene [Perchloroethylene]
750. Tetraethylamine
751. Tetraethylene glycol Diacrylate
752. Tetraethylene pentamine
753. Tetrahydrofuran
754. Texanol [Propanoic acid, 2-methyl, monoester with 2,2,4-trimethyl-1,3-pentanediol]
755. Thallium
756. Thioacetamide
757. Thiomethanol [Methyl mercaptan][Methanethiol]
758. Thiram [Thiuram][Tetramethylthiuram disulfide]
759. Tin
760. Tin Hydroxide
761. Titanium
762. Titanium dioxide
763. Titanium dioxide, anatase form
764. Toluene [Methylbenzene]
765. Toluenediamine [Diaminotoluene]
766. Total Kjeldahl Nitrogen
767. Toxaphene [Chlorinated camphene]
768. trans-1,2-Dichloroethylene
769. trans-1,3-Dichloropropylene [trans-1,3-Dichloropropene]
770. trans-1,4-Dichloro-2-butene
771. Tributylamine
772. Trichloroethylene
773. Trichlorofluoromethane [Trichloromonofluoromethane][CFC-11]
774. Trichloromethane-deuterated [Chloroform-D]

775. Triethylamine
776. Triethylamine Acetate
777. Triethylenetetramine [Trientine]
778. Trifluoroacetic acid
779. Trifluralin
780. Trimethyl phosphate
781. Trimethylated silica
782. Trimethylol propane acetate
783. Trimethylol propane diallyl ether
784. Trimethylol propane [2-Ethyl-2-(hydroxymethyl)-1,3-propanediol]
785. Triphenyl phosphite
786. Tris Buffer
787. Tris Buffer W/EDTA 7-Molar Urea
788. Turpene resin
789. Turpentine
790. Ultimate residue
791. Undecane
792. Unknown Heavy Ends
793. Unleaded Gasoline, Rust, Scale, Water
794. Unspecified Hydrocarbons
795. Unspecified Organics
796. Urea
797. Urethane Polymer
798. V-PNB Furan
799. Vanadium
800. Vanadium Pentoxide
801. Vermiculite
802. Vinyl acetate
803. Vinyl chloride [Chloroethylene][Ethylene Chloride]
804. Vinyltrimethoxysilanes
805. Waste Oil
806. Water
807. White mineral oil [Paraffin oil]
808. Xylenes, mixed isomers [Xyenes, total]
809. Zinc
810. Zinc oxide
811. Zinc resinate
812. Zinc stearate
813. (1,1-Dimethylethyl)-1,2-benzenediol
814. (Z)(Z)-2,4-Hexadiene
815. >C6 Alkenes/Alkenes

Appendix B
Unit Costs for Estimating Baseline RCRA Regulatory Burden (Pre-Rule)

B0. Regulatory Burden Labor Wage Rates

Many of the baseline RCRA regulatory administrative burden elements consist of labor burden cost. Thus, a beginning point for estimating regulatory burden unit costs, is to obtain data on labor unit costs (i.e., hourly wage rates) to be applied in this RIA (see Exhibit B1 below). It should be noted that this RIA applies in **Appendix C**, these same labor unit costs for the purpose of estimating the administrative-type conditions/ requirements of the DSW final rule.

Exhibit B1
Labor Wage Rates (2007 $/hour)
Note: These same labor wage rates are also applied in Appendix C to this RIA

A	B	C	D	E	F (D x E)
Item	Labor Category	National Compensation Survey Category*	Labor Loading Multipliers (Benefits* + Overhead**)	Unloaded Labor Rate ($/hour)***	Loaded Labor Rate (2007 $/hour)
1	Office Manager	Managers & Administrators, not elsewhere classified (nec)	43.4% + 43.6% = 87.0%	$44.00	$90.61
2	Field/ Process Technician	Furnace, kiln, & oven operators, except food	46.7% + 43.6% = 90.3%	$14.91	$31.41
3	Project Manager	Supervisors, production	43.4% + 43.6% = 87.0%	$22.92	$47.20
4	Drafting	Drafter	39.8% + 43.6% = 83.1%	$22.20	$44.57
5	Staff Engineer	Chemical Engineer	39.8% + 43.6% = 83.1%	$38.87	$78.03
6	Legal	Lawyer	39.8% + 43.6% = 83.1%	$58.07	$116.58
7	Clerical	Administrative support including clerical	42.6% + 43.6% = 86.2%	$15.08	$30.88

Explanatory Notes:
* Source for benefits loading factor: US Department of Labor, Bureau of Labor Statistics, USDL 05-432, March 16, 2005.
** Source for overhead loading factor: Overhead consists of 12% G&A overhead + 16.6% fixed overhead + 5% insurance + 10% profit estimated using Remedial Action Cost Engineering and Requirements (RACER) cost estimating software 2005 defaults. General & administrative (G&A) cost overhead can include expenses such as human resources, payroll, accounting, sales personnel, executive salaries, legal fees, office supplies, equipment, communications, administrative buildings, office space, travel, subscriptions, and other overhead items related to administrative activities that support operating (production) labor. Fixed overhead can include a proportion of the cost of building services (e.g., medical, safety, recreation, general engineering, general plant maintenance, janitorial, and cafeteria), electricity, heating, interplant transportation, warehouses, shipping and receiving facilities, insurance, and other resources shared throughout the organization in support of operating labor..
*** Unloaded labor wage rate: US Department of Labor Bureau of Labor Statistics "National Compensation Survey: Occupational Wages in the United States", http://www.bls.gov/ncs/home.htm

B1. EPA ID Number

This RCRA regulatory baseline cost was not estimated in this RIA, because this RIA assumes that obtaining a USEPA ID number is an historical one-time sunk cost for all affected RCRA-regulated facilities included in the datasets used for this RIA. This RIA does not attempt to simulate the future annual numbers of new facilities which may begin generating or recycling or disposing RCRA-regulated hazardous wastes, or which may begin generating or recycling DSW-excluded hazardous secondary materials.

B2. 40 CFR 262.34(g) (LQGs) & 262.34(d) (SQGs) & 264.16 (TSDFs) Personnel Training

Training includes costs for manifesting and hazardous materials handling training. These costs are assumed to be incurred for all LQGs and SQGs. Facilities classified as CESQGs were not assumed to have training costs for manifesting as these facilities are not required to manifest wastes generated or the resulting manifest reporting/storage requirements. CESQGs were excluded from hazardous materials handling training as described in 40 CFR 262.16 Subpart B. The hazardous materials handling training requirements for LQGs and SQGs include on-the-job training for emergency response and inspection of emergency response equipment.

- Manifest training is estimated to cost $335 per year (2007$). Training costs include an estimated 4.0 hours every 3-years for a process technician and a manager (assuming a 3-year capital recovery factor (CRF) at 7% is 0.38105). A turn over of the process technician is assumed to occur once every 4-years (assumed a 4-year CRF at 7% is 0.29523); seven years for the manager (assumed a 7 year CRF at 7% is 0.18555). Each year 0.6 hours are included for administrative requirements associated with the training (i.e., updating records, refresher/new class scheduling, etc.). The class training cost per trainee is estimated as $100 based on current pricing for the training services from on-line providers. This unit cost is based on USEPA Supporting Statement for Information Collection Request Number 820.10 Hazardous Waste Generator Status, January, 2008.
- Hazardous materials handling training is estimated to cost $847 per year for SQGs (2007$) and $2,726 per year for LQGs (2007$). Training costs for SQGs include an estimated eight hours per year each for a process technician and a manager. Training costs for LQGs include an estimated eight hours per year each for four process technicians, a manager, and a branch manager. Each year 0.6 hours are included for administrative requirements associated with the training (i.e., updating records, refresher/new class scheduling, etc.). The class training cost per trainee is estimated as $100 based on current pricing for the training services from on-line providers. This unit cost is based on USEPA Supporting Statement for Information Collection Request Number 820.10 Hazardous Waste Generator Status, January, 2008.

B3. 40 CFR 262.40 (Generators), 263.22 (Transporters), & 264.74 (TSDFs) RCRA Recordkeeping

These costs are assumed to be direct labor costs for a staff engineer to conduct annual record keeping and tracking of waste and recycling management. Labor hours are estimated based on professional judgment. For a CESQG facility general administrative duties labor is estimated at three hours at a cost of $234 per year, a SQG facility is estimated at six hours at a cost of $468 per year, and a LQG is estimated at nine hours at a cost of $702 per year (2007$).

B4. Manifest Exception Reports

This RCRA regulatory baseline cost was not estimated in this RIA because it is an unpredictable, infrequent occurrence.

B5. 40 CFR 262.41 (LQGs) & 40 CFR 264.75 (TSDFs) RCRA Biennial Reporting

Biennial reporting as well as other generator recordkeeping and reporting is required for all LQGs and TSDFs. There are no reporting Biennial reporting requirements for SQG or CESQG facilities. Annual costs for biennial reporting is estimated to cost $364 for a LQG facility (2007$). The average facility is estimated to fill out 11 GM forms for the reporting cycle. The reporting labor is estimated at 1.37 hours of a project manger level, 3.57 hours of a staff engineer level, and 0.61 hours of clerical labor. This activity along with manifest and annual reporting of recycling activity requirements covers the costs for documenting two other conditions - “no land placement” and “track offsite shipments”. This unit cost is based on Supporting Statement for USEPA Information Collection Request Nr. 976.13 “The 2007 Hazardous Waste Report,” September 18, 2007

B6. 40 CFR 264 Subparts I to DD (TSDF) Storage Requirements for Accumulated Hazardous Waste

This RIA assumes that plant and equipment investments for both hazardous waste and “hazardous secondary materials” storage are sunk costs, so no incremental effect (i.e., cost savings) is estimated in this RIA for the DSW final rule exclusions.

B7. 40 CFR 270 RCRA “Part B” TSDRF Permit Renewal Costs

Savings to onsite and offsite recyclers may result from no longer needing to renew their 40 CFR 270 RCRA hazardous waste TSDF permits. The maximum duration that a RCRA permit is valid is 10 years; therefore, a TSDRF facility is required to renew the 40 CFR 270 “Part B” portion of the RCRA permit application a minimum of once every 10 years. Recyclers (TSDRFs) who become excluded from RCRA regulation under the DSW final rule have two options concerning not renewing their RCRA 40 CFR 270 TSDRF permits:

Option 1: the TSDRF may do nothing and just let their permit expire according to its current 10-year expiration date

Option 2: the TSDRF may file a termination request to the RCRA-authorized state agency.

This RIA does not assign a cost under option 2, so this RIA assumes option 1.

The Part B application is composed of a general facility section and the technology specific section for storage and/or disposal of the hazardous waste. Facilities reclaiming metals, solvents, or acids onsite may not require a TSDRF permit for their facility or for one or more particular recycling units at their facility affected by the DSW rule, as these wastes will no longer be considered solid wastes. Therefore, the facility would not be a RCRA TSDRF. The facilities potentially affected by the DSW rule would not need to resubmit the Part B application to renew the TSDRF RCRA permit.

Costs for preparing and renewing the RCRA Part B application are from *Estimating Costs for the Economic Benefits of RCRA Noncompliance*, USEPA Office of Regulatory Enforcement, Sept 1997, http://www.epa.gov/epaoswer/hazwaste/gener/f006/s0004.pdf. The general facility portion of the Part B application estimated cost was $43,693 ($56,559 inflated to 2007$; inflated from 1994$ to 2002$ using a 1.127 multiplier and inflated from 2002$ to 2007$ using a 1.148646184 multiplier from: Table 1.1.9 Implicit Price Deflators for Gross Domestic Product, Bureau of Economics Analysis last revised January 30, 2008. The technology specific section of the permit has estimated costs of $9,371 ($12,130 inflated to 2007$) for container systems and $8,780 ($11,365 inflated to 2007$) for tank systems.

The update of the Part B application is estimated to cost 25% to 50% the original preparation cost. All TSDRF facilities would be required to submit the general facility portion of the Part B application. In general, it is assumed that TSDRF facilities reclaiming metals would require the container systems technical requirements of the Part B application and the solvent and acid reclamation facilities would require the tank system technical requirements of the Part B application. Exhibit B3 below provides an estimate of the number of baseline (pre-rule) RCRA hazardous waste recycling facilities (TSDRFs) by material type which incur RCRA Subtitle C Part B permit renewal costs, and which may realize associated Part B cost savings under the DSW rule.

Exhibit B3
2003 Estimate of the Baseline (Pre-Rule) Count of Offsite Recycling Facilities
Which May Realize RCRA Subtitle C Part B Permit Paperwork Cost Savings as a Result of the DSW Rule

Row	Paperwork Burden Impact Metric	A. Metals Recovery	B. Solvent Recovery	C. Other Recovery
1	Number of Unique USEPA ID Numbers That Received Shipments of Hazardous Waste from Generators for Recycling (2003 Biennial Report)	403	296	155
2	Number of USEPA ID numbers with No Reported Address in RCRAInfo or 2003/1999 Biennial Report Databases	44	16	17
3	Companies and number of USEPA ID numbers that are most likely transfer facilities (based on DPRA Inc professional judgment of data from Row 1 & Row 2 above):	52	130	25
4	Estimate #1 (maximum estimate): Total Number of Recycling Facilities Based on Reported Shipments (i.e., Row 1 – Row 2 – Row 3)	307	150	113
5	Estimate #2 (minimum estimate): Total Number of Recycling Facilities Based on Reported Waste Receipts from Offsite (source: USEPA 2003 RCRA Biennial Report, Exhibit 3.9)	106	47	40
6	Average annualized potential RCRA Part B permit renewal cost savings per-recycling facility (see text above this Exhibit for data source; the range	$2,445 to $4,890/year per-	$2,418 to $4,836/year per-	$2,418 to $4,836/year per-

Exhibit B3 2003 Estimate of the Baseline (Pre-Rule) Count of Offsite Recycling Facilities Which May Realize RCRA Subtitle C Part B Permit Paperwork Cost Savings as a Result of the DSW Rule				
Row	Paperwork Burden Impact Metric	A. Metals Recovery	B. Solvent Recovery	C. Other Recovery
	reflects the 25% to 50% data source reference range); range midpoint applied in this RIA	facility [mp= $3,668]	facility [mp= $3,627]	facility [$= 3,627]
7	Potential RCRA Subtitle C Part B Permit Renewal Annual Cost Savings: Min estimate ((Row 5)x(minimum of Row 6 in same column)) Max estimate ((Row 4)x(maximum of Row 6 in same column)) Range midpoint applied in this RIA	$0.26 to $1.50 million/year [mp= $0.88 mill/yr]	$0.11 to $0.73 million/year [mp= $0.42 mill/yr]	$0.10 to $0.55 million/year [mp= $0.32 mill/yr]

B8. 40 CFR 262 Subpart B (Generators), 263 Subpart B (Transporters) & 264 Subpart E (TSDFs) RCRA Hazardous Waste Shipment Manifests (EPA Form 8700-22)

In general, under the current hazardous waste regulations, wastes are tracked through the use of a hazardous waste manifest which accompanies each waste shipment. Manifesting costs were estimated using the Supporting Statement for Information Collection Request (ICR) Number 801.15 "Requirements for Generators, Transporters, and Waste Management Facilities Under the RCRA Hazardous Waste Manifest System.", December 30, 2004. Costs were estimated using the labor rates in Exhibit B1 of this RIA Appendix, and miscellaneous costs were inflated to 2007$. The manifesting cost incurred by the generator per manifest was determined to be $47.63 for SQGs and $48.30 for LQGs (2007$). The cost for non-hazardous shipping papers under a reclamation agreement were estimated to be comparable to a SQG's shipping RCRA manifests. All pre rule shipments were assumed to require hazardous waste manifests (including same-NAICS recycling transportation shipments). Post-rule shipments are all assumed to require non-hazardous shipping papers, except for the portion of the residuals assumed to be characteristically hazardous (95% of metals recovery residuals, 85% of solvent recovery residuals, and 75% of acid regeneration residuals).

B9. Preparedness & Prevention

Preparedness and prevention costs are included in personnel training (Appendix B, section B2), contingency plan (Appendix B, section B10), and emergency plan (Appendix B, section B11).

B10. 40 CFR 262.34(g) (LQGs) & 264 Subpart D (TSDFs) Contingency Plan

Contingency planning costs are estimated to cover the requirements as stated in 40 CFR 264 Subpart D relating to the development of

TSDF contingency plans. LQGs are required by 40 CFR 262.34(g)(4)(C)(2)(v) to prepare and maintain the same contingency plan as TSDFs. The cost includes labor burden of eight hours for a staff engineer and 3.36 hours for clerical support for an average per-facility expense of $733/year (2007$). This cost is incurred on an annual basis and is based on USEPA Supporting Statement for Information Collection Request Number 820.10 Hazardous Waste Generator Status, January 2008.

B11. 40 CFR 262.34(g) (LQGs), 262.34(d) (SQGs) & 264 Subpart D (TSDFs) Emergency Plan

Emergency plan costs are estimated to cover the requirements as stated in 40 CFR 264 Subpart D relating to the development of a contingency plan. LQGs and SQGs are required to prepare and maintain a emergency plan. The cost for a LQG facility includes labor burden of 4.4 hours for a staff engineer, 0.34 hours for legal review, and 2.16 hours for clerical support, and $22.84 in copying and postage, for a total expense of $481 (2007$). The cost for a SQG facility includes labor burden of 1.1 hours for a legal review, 0.1 for a managerial review, and $5 in copying and postage, for an average per-facility expense of $94/year (2007$). This cost is incurred on an annual basis. This unit cost is based on USEPA "Supporting Statement for Information Collection Request Number 820.10 Hazardous Waste Generator Status", January 2008.

B12. Closure

See Appendix C, Section C10.

B13. Post-Closure

See Appendix C, Section C10.

B14. Accumulation Time

Unit costs are a combination of disposal, recycling, transport and testing costs presented in Appendix D, Sections D1 and D3.

Appendix C
Unit Costs for Compliance with Conditions/Requirements of DSW Exclusions (Post-Rule)

C1. No Speculative Accumulation

The generator status of a facility may change when recycled wastes are no longer counted as hazardous waste under the DSW exclusion. The non-recycled quantity of hazardous waste a facility generates will determine its post-rule generator status and influence its accumulation time requirements. A change in generator status from being a LQG to either SQG, to CESQG, or to non-generator status, results in longer accumulation time for residuals and secondary materials from 90 days for LQGs to 180/270 for SQGs to 360 days as the assumed time limit based on speculative accumulation requirements for CESQGs. The extended accumulation time translates into fewer shipments, fuller truck loads, and a decreased frequency of minimum disposal/recycling and transportation charges that result from acceptance of small loads of wastes/secondary materials.

Under this existing rule, a material is accumulated speculatively if the person accumulating it cannot show that the material is potentially recyclable and has a feasible means of being recycled. The person accumulating the material must show that during a calendar year (beginning January 1) the amount of material that is recycled, or transferred to a different site for recycling, must equal at least 75% by weight or volume of the amount of that material at the beginning of the period. This provision already applies to secondary materials not otherwise considered to be wastes when recycled, such as materials used as ingredients or commercial product substitutes, materials that are recycled in a closed loop production process, or unlisted sludges and byproducts being reclaimed. These restrictions on speculative accumulation have been an important element of the RCRA recycling regulations since they were promulgated on January 4, 1985. In the cost estimates of this RIA, it is assumed that recycled materials are shipped offsite at least once per year.

To estimate the implementation impacts associated with changes in accumulation time, the following cost elements need to be estimated:

- Offsite metal recovery, solvent recovery, other recovery (represented by acid regeneration as a proxy), and residual hazardous and nonhazardous landfill costs on a per ton or minimum charge basis to estimate cost savings resulting from avoided minimum recycling process and handling charges because larger truck shipments are being received and processed;[36] and
- Disposal transportation, recycling transportation, and waste characterization testing unit costs and minimum charges to estimate cost savings resulting from fewer shipments and avoided minimum transportation charges because larger loads are being shipped.

[36] Note that onsite recovery cost estimates are not needed to estimate implementation impacts for currently regulated hazardous waste recycling that becomes exempt. Onsite recovery cost estimates are presented in another chapter because they are needed to conduct a “breakeven test” to determine which facilities may construct new recovery units onsite under the DSW final rule exclusions.

Unit costs are a combination of disposal, recycling, transport and testing costs presented in Appendix D, Sections D1 and D3.

C2. Generator Notifies USEPA Initially & Every 2-Years

Costs were estimated for generators to complete a notification of RCRA exclusion for their recycled wastes. This cost is a one-time initial cost, unless changes occur in the name, address or USEPA ID number of the facility or a change in the type of material(s) recycled, which would require submission of a revised notice (frequency and annual count of future re-notifications not estimated in this RIA). The one-time notification is assumed to require a labor burden of 0.64 hours of a project manager, 1.06 hours of a staff engineer, and 0.14 hours clerical support, for an average labor burden of 1.84 hours per notification. Multiplying these labor hour estimates by the 2007 average wage rates from Exhibit B1 yields an average cost estimate of $122 for each notification (2007$). An additional $5 per notification in miscellaneous copies and postage cost is also included. To reflect uncertainty in the average annual frequency of initial notifications and future re-notifications, this RIA converts this one-time cost into an average annualized cost by assuming 50% (i.e., $61/year per facility).

C3. Notification Signed by Corporate Official

As an option in addition to the above described one time notification of exclusion, it is assumed that certification of the one-time notification of exclusion will take extra time for the generator's staff engineer to set up a meeting and brief the generator's office manager on the new DSW exclusion rule and the implications of his/her signature on the one-time notification. This cost is a one-time initial cost, unless changes occur in the name, address or USEPA ID number of the facility or a change in the type of material(s) recycled, which would require submission of a revised notice with new certification (frequency and annual count of future re-certifications not estimated in this RIA). This RIA estimates a labor burden of 0.5 hour for an office manager and 1.0 hour for a staff engineer is estimated as additional labor burden to acquire a signature by a corporate official (i.e., 1.5 hours average added time per notification for certification). Multiplying the labor hour estimates by the 2007 average labor wage rates from Exhibit B1 yields an average added cost estimate of $123 for certification of the one-time notification (2007$). If added to the average $122 cost per facility for a one-time notification as estimated above, yields a one-time certified notification cost estimate of $251 per facility. To reflect uncertainty in the average annual frequency of certifications and re-certifications, this RIA converts this $123 one-time certification cost into an average annualized cost by assuming 50% (i.e., $61/year per facility).

C4. Generator Re-Notifies USEPA in the Event of a Change

See Appendix C, Section C2.

C5. Generator Submits Petition to USEPA to Demonstrate Materials are Not Solid Wastes

A petition to be granted a variance from classification as a solid waste was estimated using the CFR 260.31(b) and 260.33(a) rules regulating fertilizer byproducts as a proxy. The labor burden was estimated using labor hour estimates from the "Supporting Statement for USEPA Information Collection Request Number 1189.14 Identification, Listing, and Rulemaking Petitions", September 13, 2004 and the labor rates listed previously. A total labor burden of 146 hours for a staff engineer multiplied by the average labor wage rate for 2007 (from Exhibit B1), plus additional $22 for copying, shipping and communication cost was assumed, yielding an average cost estimate of $11,415 per variance. The labor burden includes presentation of the following elements: economic viability of the product; industry wide prevalence of the practice; the handling of the material prior to reclamation; the time line of storage, handling, reclamation, and reuse; describe reclamation location and process; the reuse process; describe the reclaimer; and any additional relevant information.

C6. Maintain Records of All Offsite Shipments for Recycling

Cost for recording and maintaining records of recycling activities are included in the general administrative duties described above. Additional record keeping costs for the DSW rule are not anticipated.

C7. Confirmation of Shipment Receipt

Costs for generators maintaining records of offsite recycling shipments and confirmation receipts are included in recordkeeping costs described in Appendix B, Section B2.

C8. Recycler Has Liability Insurance for Accidents

This RIA assumes no additional costs will be incurred because all affected industrial facilities are assumed to currently have liability insurance for accidents as part of standard industry practice.

C9. Recycler Has Financial Assurance for Closure

To estimate this implementation condition, financial assurance costs were estimated in this RIA using the OSW's Economics, Methods and Risk Analysis Division Sept 2000 "Unit Cost Compendium" (UCC)[37]. The costs to determine the financial assurance mechanism, develop the financial test, setup the surety bond, and estimate the required funds necessary were annualized over a ten year period using a capital recovery factor at 15% (i.e., 0.19925). The costs were inflated from 1999$ to 2005$ using a CPI factor of 1.194. The annualized set up costs is estimated as $384 (2005$). An additional fee for the surety bond is estimated to cost 1.5% of the value of the following average closure cost assumptions per-facility, and a $826 (2005$) annual fee for the bond (costs inflated from 2005 to 2007 dollars using Table 1.1.9 Implicit Price Deflators for Gross Domestic Product, Bureau of Economics Analysis last revised January 30, 2008 of 1.0591):

- Metals recycler $3,340: Source: RACER 2005: Two 20 foot by 20 foot by 10 feet high holding pads one open side, a cost of high pressure wash at 137.5 SF/hour, $1.76/square foot, $337.53 Mob/Demob charge.
- Solvent recycler $2,266: Source: RACER 2005: 2 1000 gallon AST holding tanks, triple rinse two 55 gallon drums, associated piping. Pressure Cleaning, 40 SF per hour, $4.62/sf, $337.53 Mob/Demob charge.
- Acid recycler $2,266: Source: RACER 2005: 2 1000 gallon AST holding tanks, triple rinse two 55 gallon drums, associated piping. Pressure Cleaning, 40 SF per hour, $4.62/sf, $337.53 Mob/Demob charge.

For facilities currently recycling RCRA hazardous waste, the estimate for the added cost of requiring financial assurance is estimated to be an average cost of $1,397/year plus 1.5% of closure costs. Off-site recyclers are assumed to pass through 100 percent of these costs back to their customers. On average, it is estimated that 6.5 generators ship waste to each recovery facility based on 2003 Biennial Report data. Off-site financial assurance and closure costs are divided by 6.5 to estimate the cost passed through to the generator.

C10. Materials Must be Contained

This RIA assumes no additional costs because assumes all affected facilities will ensure containment (a) to avoid CERCLA liability costs, and (b) to avoid RCRA corrective action for leaks/spills.

C11. Residuals Derived from Recycling Managed in Environmentally-Protective Manner

Unit costs are a combination of disposal and fuel blending costs presented in Appendix D, Sections D3 and D4.

C12. Generator Exercises Due Diligence Reasonable Efforts to Ensure Offsite Recycling is Legitimate

37 OSW's 30 Sept 2000 "Unit Cost Compendiuim" (121 pages) is available to the public as document ID nr. EPA-HQ-RCRA-2002-0031-0429 at the Federal government docket website: http://www.regulations.gov.

A condition for Exclusion 2 is that generators need to exercise due diligence or reasonable efforts to ensure recycling is legitimate. This RIA's due diligence unit cost estimate is based on the assumption that the due diligence condition is somewhat similar, but not identical, to real estate due diligence or facility environmental compliance reviews, but different in that the generator would not be required to conduct an actual facility visit and could rely on information provided by the recycler (e.g., company brochures) and publicly-available information. On average, each due diligence event is estimated to require a labor burden of 20 hours of a staff engineer at the generator facility, plus a facility environmental data report, per each due diligence event:

- Labor: The generator's labor cost per event is estimated at ((20 staff engineer hours/event) x ($78.03/hour labor rate from Exhibit B1)) = $1,661 per event.
- Report: The facility environmental data report summarizes various listings of the recycling facility in federal, state, and local environmental files and databases at an estimated cost of $100 per event.[38]

For purpose of this RIA, an average annual of one due diligence review event is assumed to occur for each affected generator facility, at an estimated average unit cost of $1,761 (2007$) per generator facility (i.e., $1,661 labor + $100 report). However, because of the fact that industrial companies often enter into multi-year contracts and business relationships with their suppliers and vendors, this unit cost assumption may be over-estimated in this RIA based on the annually recurring assumption per generator. In addition to initial audits, companies often perform repeat audits on a regular schedule. Although the exact period of time between audits can vary depending on factors such as the nature and complexity of the vendor's operations, the relationship between the two companies, or the generator's access to audits performed by trade groups or consortiums, re-audits are usually performed every one to five years.[39] The midpoint of this re-audit frequency range is every 3-years, suggesting that this RIA's annual re-audit assumption over-estimates the average annual unit cost per generator by 300% (i.e., (3-years)/(1-year)).

On the other hand, data collected by OSW from organizations which offer environmental facility auditing services suggest that the per-event average unit cost could be higher than the $1,661/event unit cost estimate of this RIA, ranging between $2,000 to $8,000 per due diligence event.[40] Applying the midpoint annual re-audit frequency of 3-years per generator, to the $2,000 to $8,000 per event

[38] Firstar report is quoted to DPRA Inc at $95 (09/01/2005). EDR report quoted to DPRA Inc at $105 (09/01/2005).

[39] Source: page 15 of OSW's study "An Assessment of Good Current Practices For Recycling Of Hazardous Secondary Materials", 22 Nov 2006 (http://www.regulations.gov).

[40] Source: pages 16-17 of OSW's study "An Assessment of Good Current Practices For Recycling Of Hazardous Secondary Materials" (22 Nov 2006; http://www.regulations.gov). The most commonly cited organization in the materials OSW examined and among those environmental auditing services companies interviewed for this Nov 2006 study was CHWMEG. Incorporated in 1995, CHWMEG describes itself as "*a non-profit trade association comprised of manufacturing and other 'industrial' companies interested in efficiently managing the waste management aspects of their environmental stewardship programs*." In 2005, CHWMEG conducted audits of more than 225 waste and recycling facilities. The fee for annual membership to CHWMEG is $2,200 per facility and each waste facility or recycling facility audit report typically costs an additional $600 to $850. The audit reports evaluate risk in ten areas and provide quantitative risk scores for environmental, operational, and financial risk, but they do not pass or fail a facility or recommend whether or not the members should send waste to the facility. CHWMEG members must use the information in the reports to determine whether the vendor actually meets their particular standards for handling waste and to decide whether or not to use a certain vendor. Applying an average annual re-audit frequency of 3-years to the CHWMEG unit cost

unit cost range, provides an average annualized unit cost range of $670 to $2,670 per year per generator. The midpoint of this range is $1,670 per year per generator, which suggests that the $1,661/year per generator unit cost estimate developed and applied in this RIA is a reasonable assumption.

C13. Export of Materials for Recycling Requires Notice & Consent & Annual Reporting

Costs incurred by generator to notify foreign recycling facility of the requirements of the DSW exclusions. This RIA does not estimate the annual fraction (percentage) of affected hazardous secondary materials which may be exported for recycling. However, this is a baseline RCRA Subtitle C requirement (40 CFR 262.53 & 262.56) so no incremental cost impact is expected.

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yields $/year per generator (i.e., ($2,200/year) + ($600 to $850 per event)/(3 years per event) = $2,400 to $2,480 per year per generator. This unit cost is higher than the $1,661 per year per generator estimated and applied in this RIA; however, the CHWMEG audit cost includes services (e.g., site visits by generators to recyclers, and examination by generators of the recycler's financial information) beyond what the DSW rule requires for "due diligence" reasonable efforts.

Appendix D
Unit Costs for Industrial Disposal & Industrial Recycling

This appendix summarizes methods for estimating several categories of unit costs: Industrial disposal, onsite and offsite industrial recycling, managing industrial recycling residuals, and, finally, managing and generation of recycling residual waste.

D1. Industrial Disposal Unit Costs

Unit costs for the year 2005 were reported in Remedial Action Cost Engineering and Requirements (RACER) 2005 cost estimating software, published by Earthtech, Inc., for RCRA Subtitle C hazardous waste commercial landfill disposal costs. These unit costs were inflated from 2005 to 2007 dollars using the GDP Price Deflator from January 2008 (1.059). The cost reported in ECHOS was inflated to $223 per ton for bulk hazardous waste with stabilization (2007$). RCRA Subtitle D non-hazardous waste commercial landfill costs were estimated using the National Solid Wastes Management Association 2004 annual survey[41]. The US national average tipping fee for non-hazardous disposal was reported as $37 per ton in bulk quantities inflated to 2007 dollars. Earl Finnder of the US Filter Company estimated that electroplaters pay approximately $260 to $300 per ton for Subtitle C landfill disposal.[42] The RACER 2005 unit cost was used as an average disposal cost for hazardous waste. The RACER 2005 disposal cost for hazardous is presented as a 30-city average of US major cities. The landfill disposal costs assumed under baseline are presented in Exhibit D1 below. A minimum charge for hazardous waste disposal is estimated as half a full load (nine tons) at $2,004. No minimum charge is assumed for the disposal of waste in RCRA Subtitle D landfills as there is no regulation of non-hazardous waste storage times; therefore, each non-hazardous waste load will be a full 18-ton load (see Exhibit D1 for unit costs). The cost estimates for landfill management are overstated, particularly for smaller generators, because other forms of hazardous waste are usually generated by a single facility. These wastes may be shipped with the reclaimable waste to the landfill in the same truck if the wastes are compatible, resulting in lower per-unit transportation costs due to a generator's ability to take advantage of economies-of-scale and avoid incurring the minimum landfill charge on multiple loads.

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[41] National Solid Wastes Management Association (http://www.nswma.org) 2005 tip fee survey (2004 data) National Average.

[42] Telephone communication with Mr. Earl Finnder, US Filter, October 2001.

Exhibit D1 RCRA Subtitle C & Subtitle D Landfill Unit Costs (2007$)	
Cost Element	($/ton)
Subtitle C Landfill with Stabilization [1]	$223/ton ($2,004 minimum charge)
Subtitle D Landfill [2]	$37/ton
[1] Costs inflated from 2005 dollars to 2007 dollars. [2] Costs inflated from 2004 dollars to 2007 dollars.	

- **Transportation Costs**

Exhibit D2 below presents estimates of hazardous waste transportation costs (excluding manifesting costs which are estimated separately) based on unit costs reported in RACER 2005 cost estimating software for van trailers and tanker trucks. These unit costs were inflated from 2005 to 2007 dollars using the GDP Price Deflator from January 2008 (1.059). Costs are based on distance and maximum truck load size of 18 tons for van trailers and 5,000 gallons for tanker trucks.[43] A minimum of four loads per year is assumed based on the maximum accumulation period of 90 days for hazardous waste landfill disposal and 180 days for recycling based on accumulation time regulations. Otherwise, the number of loads per year is calculated by dividing the total annual generation quantity by the assumed maximum truck load size of 18 tons. The RACER 2005 shipment fee of $1,000 (2007$) is used to determine transportation unit costs below 200 miles for hazardous waste. For example, the transportation cost for shipping waste 100 miles is calculated by dividing the minimum shipment fee by 100 miles ($1,000/100 miles = $10.00/mile). Shipping distances vary when shipping to Subtitle C landfills (338 mile average) compared to recycling facilities (521 mile average). The distances presented reflect estimates for shipments of F006 wastes from the USEPA December 2001 draft report, *Evaluation of Cost and Economic Impacts of F006 Recycling Rulemaking Options*, for landfill and metals recovery facilities as a proxy for the transportation distances within the same industry (4-digit NAICS code) and residual disposal.

Non-hazardous waste transportation costs (excluding manifesting costs) also were estimated based on bulk hazardous waste transportation cost reported in RACER 2005. Costs are based on distance and maximum load size of 18 tons. Due to the relatively close transportation distances estimated for RCRA Subtitle D landfills, a unit cost of $3.30 per mile ($0.183 per ton-mile) was used. The transportation cost is estimated to be less than the hazardous transportation unit cost due to the regularly scheduled, full 18-ton, bulk non-hazardous waste shipments. For non-hazardous waste and post-rule recycling, no minimum number of loads is assumed. The number of shipments per year is calculated by dividing the total annual generation quantity by the assumed maximum truck load size of 18 tons.

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[43] USEPA's Common Sense Initiative Report indicates 15 tons-per-truck load size and ECHOS 2001 indicates a maximum truck load size of 18 tons. RACER indicates a tanker truck capacity of 5,000 gallons.

Exhibit D2 Waste Transportation Unit Costs (2007$)		
Cost Element	Baseline	
	Van Trailer	Tanker Truck
Loading/Unloading	$37.89/ton	$50.20/ton
Hazardous Waste Minimum Charge	$1,063/shipment	$1,000/shipment
Hazardous Waste Shipping		
200-299 miles	$4.06/mile	$3.77/mile
300-399 miles	$3.76/mile	$3.26/mile
400-499 miles	$3.39/mile	$3.31/mile
500-599 miles	$3.21/mile	$3.40/mile
600-699 miles	$3.16/mile	$3.21/mile
700-799 miles	$3.03/mile	$3.13/mile
800-899 miles	$3.03/mile	$3.09/mile
900-999 miles	$3.31/mile	$3.08/mile
1,000+ miles	$3.17/mile	$3.04/mile
Non-Hazardous Waste	$3.30/mile	POTW discharge

Weighted transportation costs are presented in Exhibits D3 and D4:

- Transport to Subtitle C landfills: The weighted average transportation unit cost to Subtitle C landfill is $6.34/mile and the weighted average distance is 338 miles.
- Transport to solvent recycling: The weighted average transportation unit cost to a solvent recovery facility is $10.03/mile and the weighted average distance is 521 miles.
- Transport to Subtitle D landfills: The assumed average transportation unit cost to a Subtitle D landfill is $3.30/mile and an average distance of 50 miles.
- Transport to Fuel blending: The assumed average transportation unit cost to a fuel blending facility is $4.24/mile and an average distance of 577 miles.
- Transport to acid recovery: The assumed average transportation unit cost to an acid recovery/acid neutralization facility is $4.10/mile and an average distance of 405 miles.
- Transport to metals recycling: The estimates for metals recovery distances from facilities identified in the USEPA report "Evaluation of Cost and Economic Impacts of F006 Recycling Rulemaking Options" from December 2001 were used to model recycling and RCRA Subtitle C landfill distances.

Transportation distances for fuel blending, and acid recovery/acid neutralization were determined after review of 1999 Biennial

Report data of facilities shipping the wastes and the receiving facilities. A distribution for shipping was generated using potential transportation ranges of 250, 350, 450, 550, 650, 750, 850, 950, and 1050 miles:

- For waste streams with facilities tending to ship within-state the transportation distribution was skewed to the 250 and 350 mile range.
- For waste streams with facilities tending to ship out-of-state the transportation distribution was skewed to the 450 and 650 mile range.

An average distance of 1,000 miles for incineration managed waste streams was estimated due to the limited number of facilities available providing the service. Based on a review of the 1999 Biennial Report data, no incineration managed waste streams were shipped within state.

Exhibit D3
Weighted Average Transportation Unit Costs to Subtitle C Landfills for SIC 3471 Generators (2007$)

Percentile (%)	Distance to Landfill or Stabilization for Top 95% of Waste Shipped (miles, n = 75)	Average Distance per 10th Percentile (miles)	Weighted Distance to Subtitle C Landfill (miles)	Unit Cost ($/mile)	Weighted Unit Price ($/mile)
0	38	---	---	---	---
10	129	83.5	8.35	$13.48	$1.35
20	147	138	13.8	$8.16	$0.82
30	166	156.5	15.65	$7.19	$0.72
40	175	170.5	17.05	$6.60	$0.66
50	234	204.5	20.45	$5.50	$0.55
60	283	258.5	25.85	$4.98	$0.50
70	348	315.5	31.55	$4.52	$0.45
80	434	391	39.1	$4.37	$0.44
90	636	535	53.5	$3.65	$0.37
100	1627	1,131.5	113.15	$3.38	$0.34
	Total =		338.45		$6.34

Exhibit D4 Weighted Average Transportation Unit Costs to Metals Recovery (Secondary Smelting) for SIC 3471 Generators[1] (2007$)					
Percentile (%)	Distance to Metals Recovery Facilities for Top 95% of Waste Shipped (miles, n = 51)	Average Distance per 10th Percentile (miles)	Weighted Distance to Metals Recovery (miles)	Unit Cost ($/mile)	Weighted Unit Price ($/mile)
0	7	---	---	---	---
10	32	19.5	1.95	$56.78	$5.68
20	193	112.5	11.25	$9.84	$0.98
30	231	212	21.2	$5.22	$0.52
40	329	280	28.0	$4.35	$0.43
50	372	350.5	35.05	$4.23	$0.42
60	481	427	42.7	$3.91	$0.39
70	567	524	52.4	$3.69	$0.37
80	846	706.5	70.65	$3.43	$0.34
90	1,253	1,049.5	104.95	$3.20	$0.32
100	1,802	1,527.5	152.75	$3.13	$0.31
	Total =		520.9		$10.03

[1] These values were used as a proxy for metals recovery distances and transportation unit costs.

- **Waste Characterization Testing**

Ongoing characterization of hazardous waste and recycled materials is estimated to include sampling labor burden and waste characterization analytical costs. The sampling is estimated to require a labor burden of 2 hours of field technician labor. The analytical costs were estimated using RACER 2005 cost estimating software at a cost of $284 per sample (2007$). One sample is collected for each waste or recycled materials load for a total cost of $346 (2007$).

D2. Offsite Industrial Recycling Unit Costs

- **Offsite Metal Recycling**

Recycling cost estimates were taken from a previous USEPA rulemaking titled *Regulatory Impact Analysis of the Final Rule for a 180-Day Accumulation Time for F006 Wastewater Treatment Sludges*, 12 Jan 2000; http://www.epa.gov/epaoswer/hazwaste/gener/f006/s0001.pdf. In that RIA recycling costs for recovering metals from F006 wastewater treatment sludges were estimated from 1993 cost data provided in Exhibit 7-1 of Cushnie, George C., CAI Engineering, "Pollution Prevention and Control Technology for Plating Operations," prepared for NCMS/NAMF.

Exhibit D12 below presents the estimate from the above report for the metal recycling unit costs being paid by F006 sludge generators. Transportation costs were subtracted from the estimated recycling costs. 1997 unit transportation prices reported in Environmental Cost Handling Options and Solutions (ECHOS), Environmental Remediation Cost Data-Unit Price, 4^{th} Annual Edition, published by R.S. Means and Delta Technologies Group, Inc., 1998, were used to estimate transportation costs in that analysis. Differences in average unit recycling costs in Exhibit D12 are the result of variability in the amount various recyclers charge generators. A major factor contributing to the differences in recycling costs is metal content (i.e., concentration and type of metals present in the waste). The generally lower costs for the small facilities that recover metals may be due to the fact that these facilities tend to generate single-metal wastes which are more amenable to recycling.

In OSW's F006 180-Day Accumulation Final Rule 2000 RIA (http://www.epa.gov/epaoswer/hazwaste/gener/f006/s0001.pdf), an average unit recycling cost of $0.20/lb was assumed as an upper-end typical price charged by a metals recovery facility based on the 1993 data provided in Cushnie. One recycler that was contacted provided an average 1998 price of approximately $0.10/lb. For that analysis, impacts are evaluated based on average recycling prices ranging from $0.10/lb to $0.20/lb ($200/ton to $400/ton).[44] In some cases, when the metal value is very high, the charges can be somewhat lower.[45] Minimum charges are at least sometimes avoided when the recycler actually picks up the F006 electroplating wastewater treatment sludge directly from the generator.[46] For purposes of this rule making, a unit cost of $345 per ton (2007$) is assumed for commercial metals recovery. This value is the mid-point of the estimated range of $200/ton to $400/ton range inflated from 2002$ to 2007$. The commercial unit cost is assumed to include all capital and annual expenditures necessary for the metals recovery system. Metal salvage value was considered separate from the recycling unit cost.

No minimum charge is assumed for transfers of bulk shipments within the same company. It is assumed that transfers are typically occurring within the same parent company and that they would not charge a minimum fee, unlike a commercial metal recovery facility. A commercial offsite metal recovery facility will have a minimum charge of approximately half of a full load (nine tons) for accepting small waste quantities for recycling. The minimum charge is estimated to be $3,101 (9 tons x $344.59/ton). The minimum charge equates to $0.17/lb for a 9-ton load, $0.52 per pound for a 3-ton load, and $1.55 per pound for a 1-ton load which are

[44] The estimates of average recycling costs were confirmed by industry contacts (Jarvis, 1999, Personal Communication, Eritech, North Carolina; Anonymous, 1999, Personal Communication, Sun-Glo Pating, Florida).

[45] Shields, 1999, Personal Communication, American Nickeloid, Illinois.

[46] Jarvis, 1999, Personal Communication, Eritech, North Carolina; and Anonymous, 1999, Personal Communication, Dearborn Brass, Texas.

in the range of values reported by F006 recyclers in Exhibit D12 if the numbers are inflated from 1993$ to 2007$. A minimum recycling charge is applied in the cost estimate if the generator ships less than 9 tons per truck load to the recycling facility at the end of its accumulation time period. Changes in generator status pre- and post-rule will allow longer accumulation time periods resulting in larger truck loads and fewer minimum charges. Shipments above 9 tons are charged $345/ton.

Exhibit D12
Estimated Offsite Metals Recycling Costs (1993$)

Generator Type	No. of Unit Cost Estimates	Transport: Average Unit Cost ($/lb) (+/- st. dev.)	Transport: Min/ Median/ Max Unit Cost ($/lb)	Recycling: Average Unit Cost ($/lb) (+/- st. dev.)	Recycling: Min/ Median/ Max Unit Cost ($/lb)
Small LQG - small shipment (<13.2 tons/year)*	31	0.49 +/-0.50	0.11 0.27 2.07	0.02 +/-0.56	-1.77 0.07 0.76
Small LQG - large shipment (13.2 to <60 tons/year)	36	0.11 +/-0.08	0.02 0.08 0.39	0.20 +/-0.21	-0.14 0.18 1.04
Large LQG shipment (60 tons/year or greater)	20	0.06 +/-0.05	0.02 0.02 0.16	0.17 +/-0.15	0.01 0.14 0.61
Total =	87	0.15 +/-0.18	0.02 0.09 1.04	0.22 +/-0.27	-0.74 0.18 0.90

Explanatory Notes:
* Assumes all facilities are LQGs and ship 4 times per year. This data may include SQGs which ship at a maximum of 2 times per year. If these facilities are SQGs, the average transport unit cost is $0.25/lb (+/-0.25) and average recycling unit cost is $0.26/lb (+/-0.36). Assumptions:

Step 1: Used 1993 cost data provided in Exhibit 7-1 of Cushnie, George C., CAI Engineering, "Pollution Prevention and Control Technology for Plating Operations," prepared for NCMS/NAMF.

Step 2: Eliminated seven data records from Cushnie that do not provide either shipping distance, quantity shipped, or unit cost. Based on inspection, four records eliminated as statistical outliers.

Step 3: Assumed the following distances:
Category < 500 miles = 250 miles,
Category 500 to 1,000 miles = 750 miles,
Category 1,000 to 1,500 miles = 1,250 miles,
Category 1,500 to 2,000 miles = 1,750 miles, and
Category 2,000 to 2,500 miles = 2,250 miles.

Step 4: Assumed LQG and 90-day storage if > 26,400 lbs generated annually.

Step 5: Assumed a full shipment size of 15 tons based upon USEPA's Common Sense Initiative report.

Step 6: Assumed minimum of 4 shipments/year (i.e., 90-day storage limit) for LQGs.

Step 7: Used 1998 ECHOS transportation unit price estimates ($/mile) for van trailer transportation of hazardous waste. Assume

Exhibit D12 Estimated Offsite Metals Recycling Costs (1993$)					
		Transport		Recycling	
Generator Type	No. of Unit Cost Estimates	Average Unit Cost ($/lb) (+/- st. dev.)	Min/ Median/ Max Unit Cost ($/lb)	Average Unit Cost ($/lb) (+/- st. dev.)	Min/ Median/ Max Unit Cost ($/lb)
transportation prices have not changed significantly since 1993 given that increased labor costs are likely being balanced by historically low fuel costs. Step 8: Used 1998 ECHOS minimum charge for van trailer transportation of small hazardous waste loads of $732.33 per shipment as a minimum cost. Assumed $2.64/each supersack for loading on to the truck. Assumed transportation prices have not changed significantly since 1993 given that increased labor costs are likely being balanced by historically low fuel costs.					

- **Offsite Solvent Recycling (Distillation) Costs**

Commercial offsite solvent recovery costs were developed using US Army Corp of Engineers Public Works Technical Bulletin 200-01-04, 19 Aug 1999 (USACE Tech Bulletin). Recycling costs include handling and transportation of the solvent waste stream. The cost estimate is a service contract with one recycling facility for annual management of 1,000 gallons at a cost of $4.23 per gallon ($976/ton, 2007$).

No minimum charge is assumed for transfers of bulk shipments within the same company. It is assumed that transfers are typically occurring within the same parent company and that they would not charge a minimum fee, unlike a commercial metal recovery facility. A commercial offsite solvent recovery facility will have a minimum charge of approximately half of a full load (2,500 gallons or 10.425 tons) for accepting small waste quantities for recovery. The minimum charge is estimated to be $10,171 (10.425 tons x $975.65/ton). A minimum recycling charge is applied in the cost estimate if the generator ships less than 10.425 tons per truck load to the recycling facility at the end of its accumulation time period. Changes in generator status pre- and post-rule will allow longer accumulation time periods resulting in larger truck loads and fewer minimum charges. Shipments above 10.425 tons are charged $976 per ton.

- **Offsite Acid Recycling Costs (Used in this RIA as Proxy for Other Types of Recycling)**

Other recycling includes a mixture of waste forms. In 2003, the predominant waste forms recycled include very dilute aqueous waste (W101), spent concentrated acid (W103), other organic liquid (W219), contaminated soil (W301), batteries, battery parts, cores, casings (W309), and other sludges from wastewater treatment or air pollution control (W504). The largest quantity waste form is other organic liquid (W219) which is dominated by one waste stream that involves a “catoxid” reactor system that converts miscellaneous organic liquids into hydrochloric acid to be used in making ethylene dichloride. The second largest quantity waste form are very dilute aqueous waste (W101) which primarily involves the recycling of water at wood preserving plants. The remaining four waste forms are reported in relatively equal quantities. Acid regeneration is used as a proxy for the cost of other recycling category given spent concentrated acid (W103) is a predominant waste form and that most of the largest quantity waste form (W219) involves the generation of hydrochloric acid.

Commercial offsite acid recovery costs were estimated using Pilot of the Pollution Prevention Technology Application Analysis Template Utilizing Acid Recovery System prepared by Zero Discharge Technologies, Inc for the USEPA Region 1, October 1999. Commercial offsite acid recovery was estimated using the system capital cost and operation and maintenance costs curves with an additional 30% for commercial profit. A capital cost of roughly $17,500 to $31,800 for recycling systems sized at 20 and 65 gallons per day (gpd) were utilized for this estimate (1999$). A factor of 1.5 was assumed to cover installation and startup costs for the systems. An annual expenditure of $639 for operation and $1,418 for repair and maintenance was estimated per system, respectively (1999$). Each system was assumed to operate with a through-put of 25 to 160 tons of acid recoverable waste per year. Larger systems are composed of multiple units in 20 and 65 gallon increments. Smaller systems would be composed of a 20 gallon unit, with reduced operational period (see Exhibit D13 for cost equations). Capital costs were annualized using a 10-year life for the equipment at a 15% discount rate. Costs are assumed to be the same for recycling at offsite ("sister") facilities owned by the same company within the same industry.

A range of facility sizes for offsite recycling operations was estimated using 1999 Biennial Report data. Acid recovery facilities were identified using the offsite USEPA ID (receiver) of waste streams with the reported management system of acid recovery (M031). The average acid recovery facility size used is 250 tons per year. A facility size of 250 tons per year is estimated to have an unit acid recovery cost of $180 per ton (2007$). Unit costs for facilities sized above 250 tons per year begin to reach asymptotic limits, with a minimum unit cost for acid recovery of approximately $163 tons per year. Commercial offsite recovery unit costs do not include transportation and handling.

No minimum charge is assumed for transfers of bulk shipments within the company. It is assumed that transfers are typically occurring within the same parent company and that they would not charge a minimum fee, unlike a commercial metal recovery facility. A commercial offsite acid recovery facility will have a minimum charge of approximately 50% a full load (2,500 gallons or 10.425 tons) for accepting small waste quantities of waste for recycling. The minimum charge is estimated to be $1,879 (10.425 tons x $180.25/ton). A minimum recycling charge is applied in the cost estimate if the generator ships less than 10.425 tons per truck load to the recycling facility at the end of its accumulation time period. Changes in generator status pre- and post-rule will allow longer accumulation time periods resulting in larger truck loads and fewer minimum charges. Shipments above 10.425 tons are charged $180 per ton.

Exhibit D13
Estimated Acid Regeneration Offsite Recycling Costs (2007$)

Cost Element [1]	Annual Expenditure ($/ton)
Capital Expenditure (Annualized)[2]	($136.87* (Recycled Waste Quantity) + $3,105) * 1.30
Operation & Maintenance	($21.33* (Recycled Waste Quantity) + $1,810) * 1.30

[1] Costs inflated from 1999$ to 2005$.
[2] Costs annualized over 10 years at 15% discount rate using a CRF of 0.19925.

D3. Unit Costs for Managing Industrial Recycling Residuals

Following most recycling processes, residuals may remain in the equipment or may be generated as a by-product or co-product that require disposal via landfilling, incineration, or other disposal method. These wastes face handling and characterization costs as well. These costs are typically paid by the generators of the residuals, but in the case of commercial recyclers, the cost for recycling residual management may be passed-on to their customers who initially generated the waste being recycled by the commercial recycler.

- **Landfill Costs**

Exhibit D14 summarizes four different unit costs applied in the breakeven test for estimating disposed waste and residual landfill costs pre- and post-rule:

1. Subtitle C landfill with stabilization unit cost has been developed to estimate management of disposed electroplating wastewater treatment sludge (F006), spent petroleum refining catalyst (K171 and K172), lead-bearing materials, and metal recovery residuals. Unit costs for 2005 were reported in Remedial Action Cost Engineering and Requirements (RACER) 2005 cost estimating software, published by Earthtech, Inc., for RCRA Subtitle C commercial landfill disposal costs. The cost reported in RACER was $210 per ton for bulk hazardous waste with stabilization (2005$). The unit cost was inflated to $223 per ton (2007$) using the GDP Price Deflator January 2008. Because the above-mentioned wastes contain metals, stabilization of these metals is included for meeting land disposal restriction treatment standards. The RACER 2005 unit cost was used as an average disposal cost for hazardous waste. The RACER 2005 disposal cost for hazardous is presented as a 30 city average of major cities across the United States. The landfill disposal costs assumed under baseline are presented below. A minimum charge for hazardous waste disposal is estimated as half a full load (nine tons) totaling $2,004 (2007$).
2. Subtitle D landfill unit cost has been developed to estimate the disposal cost of non-hazardous residuals from recovery processes. RCRA Subtitle D non hazardous commercial landfill costs were estimated using the National Solid Wastes Management Association 2004 annual survey[47]. The national average tipping fee for non-hazardous disposal was reported as $35 per ton in bulk quantities ($37 per ton inflated to 2007$). No minimum charge is assumed for the disposal of waste in Subtitle D landfills as there is no regulation of non-hazardous waste storage times; therefore, each non-hazardous waste load will be a full 18-ton load.
3. Specialized stabilization technology (Super Detox) by Envirosource is used for baseline management of electric arc emission control dust (K061). USEPA granted a multi-site delisting of this technology in 1995. Electric arc furnace emission control dust (EAF) K061 waste is disposed by Envirosource using a stabilization technology called Super Detox®. Estimates for disposal of EAF range from $100 to $175[48] (1999$) to $150 to $200[49] (2002$) per ton. A disposal cost of $150 per ton was selected based on these numbers and inflated to 2007 dollars ($183 per ton) from 1999 dollars for this estimate.

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[47] National Solid Wastes Management Association http://www..nswma.org, 2005 tip fee survey (2004 data) National Average, inflated to 2005$ using the CPI factor 1.026.

[48] Bagsarian, Tom Ed. "Cashing in on steelmaking byproducts", New Steel March 1999, http://www.newsteel.com/features/NS9903f2.htm

[49] MR3 Systems Inc., http://www.mr3systems.com

4. Acid hazardous waste landfill unit cost was developed for disposal of residuals from acid recovery processes. Acid recovery residual costs were assumed to be disposed at a hazardous waste landfill. Unit costs for off-site residual disposal were estimated using RACER 2005 cost estimating software. RACER 2005 lists costs for disposing of acidic liquid wastes at $1.50 per gallon (2005$). The residuals density was assumed to be 1 ton per cubic yard, for a unit cost of $381 per ton (2007$) using the GDP Price Deflator from January 2008. A minimum charge of half a load is assumed for acid liquid waste disposal, totaling $3,971 (2007$).

Exhibit D14 Recycling Residuals Disposal: RCRA Subtitle C and Subtitle D Landfill Unit Costs (2007$)	
Cost Element[1]	($/ton)
Subtitle C Landfill with Stabilization	$223/ton $2,004 minimum charge
Subtitle D Landfill	$37/ton
EAF Disposal (Super Detox®)	$183/ton
Acid Disposal	$381/ton $3,971 minimum charge
[1] Costs inflated from 1999 dollars to 2007 dollars for EAF disposal and from 2005 to 2007 dollars for all other costs.	

- **Fuel Blending/Energy Recovery and Incineration**

Fuel Blending/Energy Recovery was assumed as the management method for residuals generated from solvent recovery processes and for the disposal of organic liquid wastes. These wastes are assumed to energetic and have a minimum 4,000 BTU energy value, which would provide for a self sufficient burn and require less additive fuel for incineration. Energetic incineration costs were estimated using RACER 2005 unit costs for incineration of wastes with thermal energy values greater than 2,000 BTU and the Assessment of the Potential Costs, Benefits, & Other Impacts of the Hazardous waste Combustion MACT Standards: Final Rule, USEPA OSW, July 1999. The reported costs were averaged for an estimated unit cost of $225 per ton ($2007). A minimum charge of half a 5,000 gallon tanker truck or 10.42 ton disposal load was assumed for disposal by incineration. The minimum charge is estimated as $2,352 ($2007). An incineration unit cost of $571per ton is assumed for bulk materials such as spent activated carbon.[50]

- **Waste Shipment Loading/Handling Cost**

[50] Bulk contaminatied soil http://www.etc.org/costsurvey8.cfm Inflated from 2004$ to 2007$).

Cost for loading/handling waste streams and residuals disposed offsite were estimated based on costs reported in RACER 2005. Three waste/residual streams are assumed; solids, sludges, and liquids. Solids, such as electric arc furnace dust, can be loaded with front end loaders into roll-off bins. Sludges, such as solvent recovery distillation bottoms, are contained in 55 gallon drums for handling. Liquids, such as acid recovery residuals, condensed acids with other impurities, are pumpable and stored in tanks and containers prior to loading into a tanker truck. Solid waste, sludge waste, and liquid waste loading/handling unit costs are estimated to be $0.47 per ton, $37.89 per ton, and $50.20 per ton, respectively.

- **Initial Waste Characterization & Waste Shipment Characterization Costs**

- Initial characterization: An initial physical and chemical characterization cost is incurred once for each hazardous waste or recovered waste. Generators may no longer incur this cost under the DSW rule exclusions. This cost element consists of two sub-elements:
  1. The initial characterization includes a cost of $1,417 for an average 20 hours of staff engineer employee time to collect, prepare, and submit an average of three analytical samples (i.e., (20 hours) x ($70.83/hour)). The estimated labor hours are from "Supporting Statement for Information Collection Request (ICR) Number 0820.10: Hazardous Waste Generator Standards", January 2008.
  2. Average analytical cost of $852/facility for analysis of three samples (i.e., ($284/sample) x (3 samples)); source: RACER 2005 software inflated to 2007 dollars.

  The generator per-facility per-waste stream average unit cost annualized over 3 years at 15% CRF is estimated at $1,056 ($2007) per waste stream.

- Shipment characterization: Waste characterization costs are also assumed for all recovery or hazardous waste disposal shipments. As the number of shipments decrease with longer accumulation times provided by the DSW exclusions, waste characterization costs may be expected to decrease. This cost element consists of two sub-elements based upon RACER 2005 software:
  1. Average cost of $62 per waste shipment for two hours process technician labor burden per-shipment to collect, prepare, and submit the analytical sample (i.e., (2.0 hours) x ($31.41/hour) ($2007).
  2. Average analytical cost of $284 for analysis of each waste stream for disposal purposes (e.g., TCLPs, BTU values, or other regulated constituents).

  Total cost per shipment for waste characterization is estimated as $346 ($2007).

D4. Methodology for Estimating Industrial Recycling Residual Waste Generation & Management

This section presents the methodology used to estimate metal, solvent, and acid recycling waste residual generation quantities and disposal management practices and recovered product quantities. It was developed using 1999 Biennial Report data for the 2003

DSW proposed rule. Records in the 1999 Biennial Report for generators reporting waste management with system types M013 (secondary smelting), M021 (fractionation/distillation), and M031 (acid regeneration) were reviewed. Due to the limited number of facilities reporting wastes managed with system types M013 and M031, all such facilities were reviewed. Facilities reporting management by system type M021 were divided into five groups. The five groups of facilities are approximately equal in number with one group containing the smallest generators based on quantity of waste managed by system type M021, the next group containing the next smallest generators, and so on. The data are divided into five groups based on quantity of waste managed to try and capture any variation in residual generation and management based on generator size. Six facilities were randomly selected from each group. The groups were divided as follows:

- <1.1 tons/year managed
- 1.1 to 5 tons/year managed
- 5 to 13.5 tons/year managed
- 13.5 to 55 tons/year managed
- >55 tons/year managed

Exhibit D15 below presents the data results. The following assumptions were made regarding the waste recycling processes:

- Recycling systems for acid and solvents are closed loop. That is no losses from spillage or waste are assumed. This is a simplification of the actual process as many processes may include settlement tanks or other open-air sections that may allow evaporation or spillage.
- All ineffective products are removed with the process residuals. An effectiveness factor or assay value is included to estimate the "purity" of the recovered solvent, acid, or metal.
    - Metals: For the metals recovery process, 32% of the waste quantity processed by the metals recovery unit is assumed to be waste residual. 20% of the waste stream is assumed recovered metal in higher quality wastes and 5% in lower quality disposed wastes. The remaining 48% or 63% (for lower quality disposed wastes) of the waste stream mass is assumed to be components that are volatilized (e.g., water vapor) in the recycling process.
    - Solvents: Mass is assumed to be balanced in the solvent recovery process. No additives or precipitants are assumed into the process, or the change in product/residual mass in comparison to the total mass is minor. For the solvent recovery process, 33% of the waste quantity processed by the recycling unit is assumed to be waste residual. The remaining 67% of the waste stream is assumed recovered solvent.
    - Acids/other: Mass is assumed to be balanced in the acid recovery process. No additives or precipitants are assumed into the process, or the change in product/residual mass in comparison to the total mass is minor. For the acid recovery process, 26% of the waste quantity processed by the recycling unit is assumed to be waste residual. The remaining 74% of the waste stream is assumed recovered acid.

Exhibit D15 Estimate of Hazardous Waste Recycling Residuals as Percentage of Waste Recycled			
Statistical Measures	H010 Metal Recycling	H020 Solvent Recycling	H039 Other recycling
1. No. Data Points	7	23	18
2. Range of Percentages	0.42% to 84%	0.46% to 140%	0% to 105%
3. Average Percentage (applied in this RIA for impact estimation)	**32%**	**33%**	**26%**
4. Standard Deviation	+/-33.92%	+/-32.13%	+/-31.92%

- Metal recovery: Total of 19 facilities reporting wastes managed by secondary smelting (M013). A total of seven facilities were used in the percent residual calculation. Residual waste streams could not be identified for the remaining facilities. The management system type reported for the residuals identified for secondary smelting (M013) system processes are:
  - M061 (fuel blending),
  - M111 (cementitious stabilization)
  - M112 (other stabilization)
  - M119 (stabilization - type unknown), and
  - M132 (landfill).

  Five of seven waste generating facilities managed their secondary smelting residuals by stabilization (M111, M112, and M119). The likely final deposition of the stabilized wastes are in a RCRA Subtitle C hazardous waste landfill.
- Solvent recovery: Residuals generated by fractionation/distillation (M021) system processes were reported managed by the following system types:
  - M042 (incineration - sludges)
  - M051 (energy recovery - liquids)
  - M061 (fuel blending), and
  - M081 (biological treatment).

  A total of 28 facilities were reviewed, of which five facility residual waste streams could not be identified. Fuel blending (M061) was reported by 17 of 22 facilities for management of fraction/distillation (M021) residuals. An additional three facilities managed fractionation/distillation residuals by other co-burning or incineration systems (M042 and M051). The likely final disposition of fractionation/distillation residuals is energy recovery.
- Acid recovery: Residuals generated by acid regeneration (M031) system processes were assumed to be similar in form to the spent acid waste stream. That is, the contaminants (generally metals) were concentrated in a smaller portion of the waste stream for management. The disposal quantities of these residuals were

identified by their description and management system type. A total of 23 facilities were reviewed, of which five facility residual waste streams could not be identified. Residuals were reported managed by:

- M039 (other recovery - type unknown)
- M042 (incineration - sludges)
- M043 (incineration - solids)
- M051 (energy recovery - liquids)
- M077 (chemical precipitation)
- M104 (solvent extraction)
- M109 (sludge treatment - type unknown)
- M121 (neutralization only)
- M134 (deepwell/underground injection), and
- M136 (NPDES discharge to surface water).

Chemical precipitation (M077) was reported by seven of eighteen facilities for management of acid regeneration residuals. One additional facility reported management by neutralization only, which is similar to chemical precipitation.

- **Unit Costs for Managing Recycling Residuals**

In the cost estimates, metal recovery residuals are assumed to be managed by stabilization and disposed in RCRA Subtitle C hazardous waste landfills. Solvent residuals are assumed to be managed by energy recovery. Acid recovery residuals are assumed to be managed by chemical precipitation. Cost assumptions for management of acid recovery residuals include stabilization and landfill disposal of precipitates and sewer discharge of neutralized wastewater.

If recycled materials are no longer hazardous, they no longer carry the label of being a listed waste, if applicable. Residuals from the recycling of listed wastes will no longer be considered "derived-from" wastes and no longer regulated under RCRA 40 CFR 261.3(c)(2)(I). A condition of the DSW final rule exclusions is the "listed" waste definition will no longer be attached to residuals and management depends upon if the waste is characteristically hazardous only. To estimate the implementation impacts (i.e., cost savings) from not regulating residuals derived from recyclable materials as hazardous unit costs are needed for residual hazardous disposal (hazardous landfill, fuel blending, and acid precipitation/ dewatering/ stabilization/ landfill) and residual nonhazardous disposal (nonhazardous landfill, fuel blending, and acid precipitation/ dewatering/ stabilization/ landfill). In addition, estimates for the amount of residuals generated and the fraction that is characteristically hazardous or "listed" hazardous are needed. Landfill unit cost estimates are presented earlier in this chapter.

- Recycling: Offsite recycling fees already include the cost of residual management. Residual management costs only are needed for estimating the full cost of onsite recycling. For facilities currently recycling waste, the estimated incremental cost savings from larger residual hazardous waste disposal shipments resulting from longer accumulation times and residuals being defined as nonhazardous is calculated within the cost analysis using nonhazardous disposal costs and calculated reductions in the number of shipments/loads per year..

- Fuel Blending: Fuel blending was assumed as the disposal method for solvents and solvent still bottoms. Fuel blending costs were estimated using RACER 2005 unit costs for incineration of wastes with thermal energy values greater than 2000 BTU and the Assessment of the Potential Costs, Benefits, & Other Impacts of the Hazardous waste Combustion MACT Standards: Final Rule, USEPA OSW, July 1999. The reported costs were averaged for an estimated unit cost of $225 per ton ($2007). A minimum charge of half a disposal load was assumed for disposal by fuel blending. The minimum charge is estimated as $2,352 ($2007).
- Acid Precipitation/Dewatering/Stabilization/Landfill: Disposal of acid liquids costs were estimated using RACER 2005 cost estimating software. Mineral acids disposal was used as a proxy for acid waste disposal, with stabilization, at a landfill. The cost is estimated as $378 per ton ($2007).
- Residual Characteristics: Residuals generation from metals recovery was estimated using 1999 Biennial Report data. Waste streams at selected recycling facilities were reviewed by comments, disposal system type, and origin to determine the likely waste streams generated from the recycling operations.
  - Metals: Approximately 32% of the metals recovery mass was identified as residuals in the Biennial Report data. The recovered metals are assumed to be 20% of the mass for waste streams currently recycled and 5% of the mass for waste streams currently disposed. The remaining mass fraction is volatilized out the stack in the smelting process. The hazardous fraction of the residuals were determined by reviewing the waste codes for the waste streams reporting metals reclamation. Waste streams reporting characteristic codes were assumed to have residuals that would be characteristically hazardous waste. 95% of the metals recovery residual waste volume and frequency of waste streams are estimated to be characteristically hazardous with the remaining 5% containing listed hazardous wastes which are assumed in this RIA to become non-hazardous post-rule.
  - Solvents: 33% of solvent recovery mass was identified as residuals and 67% as recovered solvent in the Biennial Report data. For currently disposed organic liquids the residual fraction was doubled to 66% to reflect a lower percentage of potential solvent quantity for recovery. The hazardous fraction of the residuals was determined by reviewing the waste codes for the waste streams reporting solvent recycling. Waste streams reporting characteristic codes were assumed to have residuals that would be characteristically hazardous waste. For solvent recycling, approximately 85% of the residual waste volume is estimated to be characteristically hazardous with the remaining 15% containing listed hazardous wastes which are assumed in this RIA to become non-hazardous post-rule.
  - Acids: 26% of the acid regeneration mass was identified as residuals and 74% as recovered acid in the Biennial Report data. The hazardous fractions of the residuals were determined by reviewing the waste codes for the waste streams reporting acid regeneration. Waste streams reporting characteristic codes were assumed to have residuals that would be characteristically hazardous waste. For acid regeneration, approximately 75% of the residual waste volume is estimated to be characteristically hazardous with

the remaining 25% containing listed hazardous wastes which are assumed in this RIA to become non-hazardous post-rule.

Appendix E
Data for Estimating State Government Hazardous Waste Fee Revenues

Exhibit E1 below displays the state government hazardous waste generation taxes and fees identified in this RIA for industrial hazardous waste generator facilities in 31 states. The two primary data references consulted for this RIA did not contain sufficient data, without further analysis outside the scope of this RIA, for eight states (DE, IL, NE, NV, NY, OH, TX, WV) to determine if "recovery" is included under their regulatory definition of "treatment." For only one of the 31 states for which there are fee data (CO) an annual operating fee is charged to hazardous waste TSDFs, but this RIA simply assumes this fee is passed on to the generator and includes it with the generator fee impact estimate. In the typical preferred management hierarchy of reuse, recycling, energy recovery, treatment, and disposal, these states may not tax or assess fees on preferential forms of management.

Exhibit E1
State Government Hazardous Waste Taxes & Fees

A		B	C	D	E	F	G	H	I	J	K	L
				Size-specific Taxes and Fees*								
State		Non-size Specific Tax or Fee	Tax or Fee	Description	LQG >2,000 tons/yr	LQG 1,000 - 2,000 tons/yr	LQG 500 - 1,000 tons/yr	LQG 250 - 500 tons/yr	LQG 50 - 250 tons/yr	LQG 13.2 50 tons/yr	SQG 1.3 - 13.2 tons/yr	CESQG < 1.3 tons/yr
1	AL	NA=Not available	NA									
2	AK	None	$0									
3	AZ	Generators of waste that retain the waste onsite for disposal or who ship it offsite to a facility owned or operated by that generator	$4.00/ton									
4	AR			Monitoring/inspection fees	$500/yr	$500/yr	$500/yr	$500/yr	$500/yr	$500/yr	$150/yr	$0/yr
5	CA			Generator fee & generator waste reporting	$71,432/yr	$53,573/yr	$35,717/yr	$17,858/yr	$3,572/yr	$1,429/yr	$177/yr	$0/yr

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				surcharge								
6	CO	Haz waste TSDF annual operating fee (assumed offsite passed on to generator): Class III (resource recovery)	$2.50/ton									
7	CT	Haz waste generator tax	$9.59/ton									
8	DC	NA	NA									
9	DE	Fee for offsite treatment. Unclear if treatment equals recovery in this state ($16/ton)	Further Analysis Needed									
10	FL	NA	NA									
11	GA			Haz waste mgt fee	$1/ton	$1/ton	$1/ton	$1/ton	$1/ton	$1/ton	$100/yr	$0/yr
12	HI	NA	NA									
13	ID	Haz waste fee	$30.00/ton									
14	IL	Fee for on- or offsite treatment. Unclear if treatment equals recovery in this state ($7.19/ton)	Further Analysis Needed									
15	IN	NA	NA									
16	IA	NA	NA									
17	KS			Generator annual monitoring fee	$5,000/yr	$5,000/y r	$5,000/y r	$1,000/y r	$1,000/y r	$500/yr	$500/yr	$100/yr
18	KY	Generator haz	$2.00/ton									

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		waste fee	(onsite) $4.00/ton (offsite)									
19	LA	NA	NA									
20	ME	Offsite handling fee (assume handling = recovery)	$30.00/ton									
21	MD	NA	NA									
22	MA	NA	NA									
23	MI	NA	NA									
24	MN			Quantity fee and tax & statewide program fee	$3,290/yr	$3,290/yr	$3,290/yr	$3,290/yr	$13.50/ton	$52.20/ton	$115.41/ton	$274.72/ton
25	MS			Pollution prevention fee for generators	$2,500/yr	$2,500/yr	$1,500/yr	$1,500/yr	$1,500/yr	$500/yr	$250/yr	$250/yr
26	MO	Haz waste fee. For category tax, unclear if treatment equals recovery in this state [$0.7/ton + $20/yr]	$1.00/ton									
27	MT	Generator fee. Did not have “Class” definition. Assume middle class/fee.	$600.00/yr									
28	NE	TSDF fee. Unclear if treatment equals	Further Analysis Needed									

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				Size-specific Taxes and Fees*								
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		recovery in this state ($1.92/ton)										
29	NV	Offsite treatment fee. Unclear if treatment equals recovery in this state ($40.20/ton)	Further Analysis Needed									
30	NH			Haz waste fee	$60/ton	$60/ton	$60/ton	$60/ton	$60/ton	$60/ton	$60/ton	$0/ton
31	NJ	Manifest processing fee (assumed 18 tons shipped per manifest)	$0.50/ton	Haz waste generator biennial reporting fee & inspection & compliance review fee	$2,981/yr	$2,981/yr	$2,981/yr	$2,981/yr	$2,681/yr	$2,428/yr	$651/yr	$67/yr
32	NM			Generation fee & business fee	$20/ton $2,500/yr	$20/ton $2,500/yr	$20/ton $2,500/yr	$20/ton $2,500/yr	$20/ton $2,500/yr	$20/ton $2,500/yr	$250/yr $200/yr	$100/yr $0/yr
33	NY	Special assessment on offsite generation, treatment or disposal. Unclear if treatment equals recovery in this state ($16/ton)	Further Analysis Needed	Haz waste program fees for generators	$40,000/yr	$40,000/yr	$20,000/yr	$6,000/yr	$6,000/yr	$1,000/yr	$0/yr	$0/yr
34	NC			Generator fee	$0.50/ton	$0.50/ton	$0.50/ton	$0.50/ton	$0.50/ton	$0.50/ton	$25/yr	$0/yr
35	ND	None	$0									
36	OH	Haz waste treatment & disposal fee.	Further Analysis Needed									

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				Size-specific Taxes and Fees*								
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		Unclear if treatment equals recovery in this state ($24/ton)										
37	OK	Annual fee for offsite recycling	$4.00/ton	Generator fee	$100/yr	$100/yr	$100/yr	$100/yr	$100/yr	$100/yr	$25/yr	$0/yr
38	OR	Annual haz waste generation fee	$45.00/ton	Annual activity verification fee	$525/yr	$525/yr	$525/yr	$525/yr	$525/yr	$525/yr	$300/yr	$0/yr
39	PA	NA	NA									
40	RI	NA	NA									
41	SC	Annual haz waste fee. Annual non-haz waste fee	$34.00/ton $13.70/ton									
42	SD	NA	NA									
43	TN			Annual generator fee	$900/yr	$900/yr	$900/yr	$900/yr	$900/yr	$900/yr	$550/yr	$0/yr
44	TX	Facility fee. Unclear if treatment equals recovery in this state ($4.80/ton)	Further Analysis Needed	Generation fee	$2/ton	$2/ton	$2/ton	$2/ton	$2/ton	$100/yr	$100/yr	$0/yr
45	UT	Haz waste generation fees	$28.00/ton									
46	VT	NA	NA									
47	VA	NA	NA									
48	WA	Haz waste education fee	$35.00/yr									
49	WV	Generator fee. Unclear if treatment equals recovery in state	Further Analysis Needed									
50	WI	Tonnage fee & manifest fee	$0.26/ton									

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				Size-specific Taxes and Fees*								
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		(assume 18 tons shipped per manifest)										
51	WY	NA	NA									

Explanatory Notes:
NA = Data not available.
* The 8 generator size (tons/year) categories do not fit all states. For this RIA, taxes/fees for states with different size categories are approximated to the 8 categories.
Sources of state government hazardous waste fee/tax data:

- US Army Corps of Engineers “Treatment, Storage & Disposal Facilities for Hazardous, Toxic, and Radioactive Waste”, HTRW Center of Expertise Information - TDSF, Section 8.2, http://www.environmental.usace.army.mil/library/pubs/tsdf/sec8-2/sec8-2.html, 11 Sept 2002.
- MN data from Minnesota Pollution Control Agency, Small & Large Quantity Generator License Fees & Generator (Superfund) Tax, Waste/Hazardous Waste #1.03b, March 2002.