

US EPA ARCHIVE DOCUMENT

Potential Adverse Impacts Under the Definition of Solid Waste Exclusions (Including Potential Disproportionate Adverse Impacts to Minority and Low-Income Populations)

Volume 2 – Assessment of Disproportionate Adverse Impacts

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Purpose and Organization of Document

This report is Volume 2 of EPA's environmental justice analysis for the Definition of Solid Waste rule. Volume 1: *Hazard Characterization* analyzes the potential for adverse impacts to all potentially affected communities from the 2008 DSW rule.

The purpose of Volume 2 is to analyze the potential for disproportionate impacts to minority and/or low-income community.

The report is organized as follows:

- Section 1 identifies and characterizes facilities that could be affected by the DSW rule.
- Section 2 presents an analysis of demographic data about the communities surrounding the facilities identified in Section 1. EPA performed the analysis by examining the demographics of the community surrounding each facility, including race, income level, and children under five years old. EPA then compared the demographics of each community to those at the national and state levels, and by urban and rural communities, to identify communities that may potentially have EJ concerns.
- Section 3 performs a baseline analysis comparing hazardous waste facilities to commercial hazardous waste treatment and disposal facilities.
- Section 4 presents a sensitivity analysis done on the communities in close proximity to notification facilities.
- Section 5 describes other factors that could affect the vulnerability of communities, such as populations susceptible to DSW hazards, multiple and cumulative effects of releases and contamination, and unique exposure pathways.
- Section 6 summarizes the conclusions from analysis described in this report.

1 Identification of Potentially Affected Communities

This section identifies the facilities potentially affected by the DSW rule that may adversely impact the adjacent community. There are three general categories of DSW facilities that are recycling, or may in the future recycle under the rule:

1. Facilities that have notified that they are operating under the 2008 DSW rule exclusion (hereafter referred to as “notification facilities”). These are the facilities most clearly linked with the DSW rule because they are actually operating under the 2008 DSW rule. However, these “early adopters” of the DSW exclusion are unlikely to be representative of the full universe of facilities that would operate under the DSW exclusions once they are fully implemented. The notifiers are only located in the small number of states that have adopted the 2008 DSW rule. However, once the revised final rule goes into effect, EPA expects that a much larger universe of facilities will adopt the rule, greatly expanding the potential universe of facilities. Also, the regulatory uncertainty has likely led to the fact that all off-site recycling under the 2008 DSW transfer-based exclusion has been at RCRA permitted facilities, who already have the infrastructure to recycling the materials.
2. Facilities that are currently managing regulated hazardous waste, but may find it economical to participate under the DSW rule in the future once the rule is fully implemented. These facilities include RCRA permitted facilities that are managing recyclable hazardous secondary materials and facilities that generate recyclable hazardous secondary materials at large enough quantities to make it economically justifiable will switch to on-site reclamation under the DSW rule (hereafter referred to as “hazardous waste facilities”) because these facilities are located nation-wide, their inclusion helps address the state location bias in the notification facilities.
3. Newly established recycling facilities that are not currently managing hazardous waste or hazardous secondary materials that may choose to begin reclaiming hazardous secondary materials under the DSW rule. While EPA has location data on the first two categories, the locations for the third set of facilities is unknown. However, these are also the types of facilities most likely to adversely impact adjacent communities because (unlike the first two categories) they have never had a RCRA permit or otherwise been subject to RCRA regulations. To help model the potential distributional impacts of this category of facility, EPA has selected two data sets to act as surrogates for these “new” recycling facilities.
 - Facilities in EPA’s *An Assessment of Environmental Problems Associated with Recycling of Hazardous Secondary¹ Materials*, many of which operated under exclusions or reduced regulations (hereafter referred to as “damage case facilities”);

¹ This document, also known as the “Environmental Problems Study” or “study,” contains information about environmental damage cases and the types of potential hazards from the mismanagement of the HSMs. The document was originally published in January 2007 in support of the 2008 DSW Final Rule. Since the Environmental Problems Study was published in 2007, EPA has continued to assess new reports of environmental problems associated with the recycling of HSMs and, based on this information has updated the study on several occasions. The latest version of the Environmental Problems Study is dated May 3, 2012.

- Facilities currently recycling non-hazardous industrial waste (e.g., antifreeze) that could most easily switch or expand to recycling under the current DSW exclusions (hereafter referred to as “non-hazardous industrial waste facilities”).

These two sets of industrial recycling facilities were selected because they were subject to the same type of local siting restrictions and other political and social pressures as future DSW recycling facilities will also be subject to, and therefore the demographics surrounding these facilities are likely to be similar. The “damage case” facility list is EPA’s most comprehensive set of information about hazardous secondary materials recyclers. However, EPA acknowledges that the fact that these are damage case recycling facilities could also impact the demographics. Therefore the non-hazardous industrial recycling facilities were chosen in order to balance the use of the damage case recycling facilities. Because these facilities have similar industrial processes, any difference between the demographics surrounding the two classes of facilities may be attributable to the difference in environmental damage. Therefore, the demographic results are presented separately in order to provide the most complete information on potential demographics at these facilities.

It is important to note that for the hazardous waste facilities, the damage case facilities and the non-hazardous industrial waste facilities, EPA is not predicting that these specific facilities would recycle under the DSW rule but rather that their demographics reflect the types of facilities that would recycle in the future. Moreover, by including the damage case facilities, EPA is not stating that the same types of damages would automatically occur under the DSW rule. Instead, these data sets are surrogates to determine the types of communities where future facilities that would recycle under the DSW exclusion would likely be located.

In addition, this section identifies commercial disposal and treatment facilities. These facilities represent the “baseline” waste management scenario and may be affected by the DSW exclusions as hazardous waste disposal switches to recycling.

Detailed information on each set of facilities is found below.

1.1 Notification Facilities

As of February 27, 2012, 61 facilities submitted notifications to EPA that they would manage their HSM under the current DSW exclusions. These include facilities from Idaho, Iowa, New Jersey, Pennsylvania, Puerto Rico and the Virgin Islands. Because the current DSW exclusions are deregulatory in nature, they are only effective in states and territories that are not authorized to implement their own RCRA base programs, and those states with authorized programs that modify their programs to adopt it. As of February 27th Idaho, Illinois, New Jersey, and Pennsylvania have adopted the 2008 DSW final rule. The RCRA hazardous waste programs in Iowa, Puerto Rico, and the Virgin Islands are not authorized to implement the 2008 DSW final rule.

This report examines the 61 facilities that notified as of February 27, 2012 that they are following the current DSW exclusions. EPA maintains an updated list of notification facilities at <http://www.epa.gov/epawaste/hazard/dsw/notify-sum.pdf>. For each of the 61 notification facilities, EPA compiled information from data sources, such as their notification forms and other environmental reporting data sources, such as the RCRA Subtitle C Site Identification (Site ID) Forms and the most recent Hazardous Waste Report (also known as the “Biennial Report” or

“BR”) filed by the facility between 2001 and 2007. If the facility did not file a 2001-2007 BR, EPA obtained information from the Handler Module in RCRAInfo or from the Facility Registry System (FRS) database in Envirofacts (at http://www.epa.gov/enviro/html/fii/fii_query_java.html).

From these data sources, EPA compiled the following information:

- Facility EPA identification (ID) number;
- Facility name; and
- Facility location address (i.e., street address, city, state, and zip code);

EPA then compiled information on facility location coordinates (i.e., latitude and longitude) from the FRS database in Envirofacts. Where such data were not available from these sources, EPA used the facility address and publicly available mapping software (i.e. Google Earth) or geocoding software to identify the facility latitude and longitude.

EPA recognizes that facility addresses and location coordinate information sometimes are not the same as the location in which HSM generation, storage, or reclamation activities might occur. For example, the FRS may have location information for a corporate headquarters rather than production and processing facilities. However, given the national level of analysis, as well as the uncertainties inherent in the analysis in predicting future facility locations, EPA has determined that using facility address information is adequate for general rulemaking purposes, and that any additional refinement based on physical verification would not merit the additional resources needed.

EPA further determined whether any of the notification facilities were one of the 250 damage cases included in the Environmental Problems Study. Based on this review, none of the 61 notification facilities is a damage case facility.

1.2 Damage Case Facilities

The Environmental Problems Study examines the 250 facilities in which environmental damage of some kind occurred from some type of recycling activity, and that appeared to clearly fit within the scope of the study. In this context, EPA used the term “environmental damage” broadly to include leaks, spills, dumps or other types of releases of hazardous substances into the environment that were serious enough to require some type of cleanup action. The term also includes situations in which materials were abandoned (e.g., in warehouses) without having been actually released into the environment, but which posed potential threats and thus required removal actions that were conducted by one or more government agencies, and involved expenditure of public funds.

For each of the 250 damage case facilities, EPA compiled the following information:

- Facility EPA ID number;
- Facility name; and
- Facility location address (i.e., street address, city, state, and zip code).

EPA then compiled information on facility location coordinates (i.e., latitude and longitude) from the FRS database in Envirofacts. EPA recognizes that facility addresses and location coordinate information sometimes are not the same as the location in which the environmental damage occurred. For example, the FRS may have location information for a corporate headquarters rather than production and processing facilities. However, field investigation of

potentially thousands of facility locations to verify and correct GIS coordinates was beyond the scope of this analysis.

1.3 Hazardous Waste Facilities

EPA identified the facilities that are currently generating **or** managing recyclable hazardous wastes that may be likely to begin operating under the current DSW exclusions. EPA assumed that these facilities may choose to operate under this rule, regardless of whether the state has adopted the rule.² This assessment was made based on a review of hazardous waste generation and management activities conducted at each of the facilities as reported in the BR, which contains the most comprehensive information available about such activities. For this analysis, EPA assumed that facilities that currently generate or manage recyclable hazardous wastes at large enough quantities to make it economically justifiable would switch to recycling under the current DSW exclusions.³

1.3.1 Facilities Currently Generating Recyclable Hazardous Wastes

Facilities that currently generate recyclable hazardous wastes may begin recycling them under the generator-based exclusion of the current DSW exclusions. However, not all facilities that currently generate recyclable hazardous wastes will choose to begin recycling them under the current DSW exclusions. EPA believes that facilities will primarily choose to do so when it is less expensive to recycle the hazardous wastes under the current DSW exclusions than to manage them under the hazardous waste regulations. For purposes of this analysis, EPA made the following assumptions:

- All facilities currently generating and managing (onsite or offsite) their recyclable hazardous wastes through recycling will continue to do so under the current DSW exclusions. Because these facilities would not experience a change in their hazardous waste management activities under the current DSW exclusions, EPA did not include them in the analysis.
- For facilities currently generating and managing their recyclable hazardous wastes onsite through other management methods (e.g., incineration, solidification/stabilization), EPA assumed that the expense associated with replacing the existing hazardous waste management units with on-site recycling units would not be economically justifiable. Therefore, EPA did not include these facilities in the analysis.
- For facilities currently generating and shipping their recyclable hazardous wastes offsite for management through other management methods, EPA identified which facilities may choose to operate under the current DSW exclusions based on the amount of recyclable hazardous waste generated by the facility. Facilities that generate more than a truckload (25 tons) of solvent waste annually are assumed to begin managing that waste by recycling under the current DSW exclusions. Facilities that generate less than a truckload (25 tons) of solvent waste annually are assumed to be unlikely to conduct activities under the current DSW exclusions.

² EPA, *Draft Environmental Justice Methodology for the Definition of Solid Waste Final Rule*, January 13, 2010, P. 18. Available online at: <http://www.epa.gov/osw/hazard/dsw/ej-meth.pdf>.

³ Id. P 17

- Transporters haul materials in many different types of vehicles, including tankers, 18-wheel box and flatbed trucks, and vacuum tankers. DOT regulations specify that trucks must weigh less than 80,000 pounds, which, when the weight of the tractor is factored in, leaves a maximum of 50,000 pounds, or 25 tons, for material. For liquid shipments, tanker trucks have a capacity of 7,000 gallons, which (depending on the density of the liquid), translates to roughly 24 tons. Based on this, EPA assumed that a full truckload of hazardous waste would contain about 25 tons of waste. However, the actual amount of hazardous waste in a full truckload will vary based on factors such as the density of the waste, the packaging, and other factors.

Based on the above assumptions, EPA assumed that facilities that are currently generating and shipping more than a truckload (25 tons) of solvent wastes offsite for management through other management methods may switch to recycling under the current DSW exclusions.

To identify and collect information about facilities currently generating recyclable hazardous waste that may begin managing them under the generator-based exclusion of the current DSW exclusions, EPA performed the following steps:

1. *Compiled information on hazardous wastes generated by facilities.* To compile information on hazardous wastes generated by facilities and on the off-site management methods associated with each of these materials, EPA collected information from Section 1 (Generation) and Section 3 (Off-site Shipment) of the Generation and Management (GM) Forms of the 2007 BR. From these data sources, EPA compiled the following information:
 - Reporting year;
 - EPA ID of facility generating the waste;
 - Name of facility generating the waste;
 - BR form (i.e., GM);
 - Page and subpage number;
 - Source code;
 - Source code description;
 - Form code;
 - Form code description;
 - EPA hazardous waste codes representing the waste;
 - Waste description;
 - Quantity of hazardous waste generated;
 - Management method code;
 - Management method code description;
 - Quantity of recyclable hazardous waste managed, by management method code;
 - Indicator of whether the waste was managed through recycling activities (i.e., recycled); and
 - Indicator of whether the waste is considered a “recyclable hazardous waste.”

For purposes of this analysis, “recycling” activities are those associated with the management of wastes using one of the following management methods: metals recovery (BR management method code H010), solvents recovery (BR management method code H020), and other recovery (BR management method code H039).

In determining whether a waste is considered a “recyclable hazardous waste,” EPA used the methodology developed for the Regulatory Impact Analysis (RIA) of the 2011 DSW proposed rule.⁴ This methodology was designed to identify waste quantities that may be physically and chemically sufficient for potential future switchover to recycling under the DSW rule exclusions. In particular, the methodology relies on some of the data reported in the BR (e.g., BR form codes, BR source codes, EPA hazardous waste codes) to determine if a waste is a recyclable hazardous waste. Each recyclable hazardous waste is categorized within a “commodity group” according to each of the three BR recycling methods: metals recovery, solvent recovery, and other recovery. Attachment A describes the RIA methodology. Note that this methodology was only applied to hazardous wastes managed through methods other than recycling (i.e., methods other than metals recovery, solvents recovery, and other recovery).

2. *Identified facilities that currently generate recyclable hazardous wastes that may begin recycling them under the generator-based exclusion of the current DSW exclusions.* EPA identified facilities currently generating and shipping offsite more than a truckload (25 tons) of solvent wastes annually for management through methods other than recycling as those that would begin recycling under the generator-based exclusion of the current DSW exclusions. Facilities were identified by referring to data compiled under Step 1.
3. *Compiled information about location coordinates.* EPA then compiled information on facility location coordinates (i.e., latitude and longitude) from the FRS database in Envirofacts. Where such data were not available, EPA used the facility address and geocoding software to identify the facility latitude and longitude. EPA recognizes that facility addresses and location coordinate information sometimes are not the same as the location in which HSM generation, storage, or reclamation activities might occur. For example, the FRS may have location information for a corporate headquarters rather than production and processing facilities. However, field investigation of potentially thousands of facility locations to verify and correct GIS coordinates was beyond the scope of this analysis. The success rate of the geocoding is dependent on the quality of the location address data. The most accurate coordinates were obtained when street addresses could be recognized and located by the geocoding software. Generally, about 70 to 80 percent of the addresses can be recognized and located by the geocoding software. In instances in which addresses could not be geocoded (e.g., inaccurate or missing street addresses, PO boxes or rural routes), EPA used Internet searches of company Web sites or Internet business listings to obtain more accurate facility location addresses or facility coordinates.
4. *Excluded facilities that submitted notification to EPA indicating that they would be managing hazardous secondary materials under the 2008 DSW final rule.* From the list of facilities developed under Steps 2 and 3, EPA identified and excluded facilities that already notified EPA that they would be managing HSMs under the 2008 DSW

⁴ EPA, *Regulatory Impact Analysis of EPA’s 2011 Proposed Revisions to the Industrial Recycling Exclusions of the RCRA Definition of Solid Waste*, June 30, 2011. Available online at: <http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2010-0742-0002>.

final rule, since these facilities are being analyzed under Section 2.4.1 of this document (“Notification Facilities”).

5. *Excluded facilities included in the Environmental Problems Study.* From the list of facilities developed under Steps 2 and 3, EPA identified and excluded those facilities included in the Environmental Problems Study, since these facilities are being analyzed under Section 2.4.2 of this document (“Damage Case Facilities”).

1.3.2 Facilities Currently Managing Recyclable Hazardous Wastes Received from OffSite

Facilities that currently manage recyclable hazardous wastes received from offsite may begin recycling them under the transfer-based exclusion of the current DSW exclusions. However, not all facilities that currently manage recyclable hazardous wastes received from offsite will choose to begin recycling them under the current DSW exclusions. EPA believes that facilities will primarily choose to do so when it is less expensive to recycle the hazardous wastes under the current DSW exclusions than to manage them under the hazardous waste regulations. For purposes of this analysis, EPA made the following assumptions:

- All facilities that are currently managing recyclable hazardous wastes received from offsite through recycling will continue to manage those wastes by recycling under the DSW exclusion. Because these facilities would not experience a change in their hazardous waste management activities under the current DSW exclusions, EPA did not include them in the analysis.
- For facilities currently managing recyclable hazardous wastes received from offsite through other management methods (e.g., incineration, solidification/stabilization), EPA identified which facilities may choose to operate under the current DSW exclusions based on the amount of recyclable hazardous waste managed by the facility. Facilities that manage more than a truckload (25 tons) of annually are assumed to begin managing that waste by recycling under the current DSW exclusions. Facilities that manage less than a truckload (25 tons) of recyclable hazardous waste annually are assumed to be unlikely to conduct activities under the current DSW exclusions.
- Transporters haul materials in many different types of vehicles, including tankers, 18-wheel box and flatbed trucks, and vacuum tankers. DOT regulations specify that trucks must weigh less than 80,000 pounds, which, when the weight of the tractor is factored in, leaves a maximum of 50,000 pounds, or 25 tons, for material. For liquid shipments, tanker trucks have a capacity of 7,000 gallons, which (depending on the density of the liquid), translates to roughly 24 tons. Based on this, EPA assumed that a full truckload of hazardous waste would contain about 25 tons of waste. However, the actual amount of hazardous waste in a full truckload will vary based on factors such as the density of the waste, the packaging, and other factors.

Based on the above assumptions, EPA assumed that facilities currently managing more than a truckload (25 tons) of recyclable hazardous wastes received from offsite through other management methods may switch to recycling under the current DSW exclusions.

To identify and collect information about facilities currently managing recyclable hazardous wastes that may begin managing them under the transfer-based exclusion of the current DSW exclusions, EPA conducted the following steps:

1. *Compiled information on hazardous wastes managed by facilities.* To compile information on hazardous wastes received from offsite for management through methods other than recycling, EPA collected information from Waste Received from Off-site (WR) Forms of the 2007 BR. From this data source, EPA compiled the following information, as applicable:
 - Reporting year;
 - EPA ID of facility managing the waste;
 - Name of the facility managing the waste;
 - BR form (i.e., WR);
 - Page and subpage number;
 - Form code;
 - Form code description;
 - EPA hazardous waste codes representing the waste;
 - Waste description;
 - Management method code;
 - Management method code description;
 - Quantity of hazardous waste managed, by management method code;
 - Indicator of whether the hazardous waste was managed through recycling activities (i.e., recycled); and
 - Indicator of whether the waste is considered a “recyclable hazardous waste.”

For purposes of this analysis, “recycling” activities are those associated with the management of wastes using one of the following management methods: metals recovery (BR management method code H010), solvents recovery (BR management method code H020), and other recovery (BR management method code H039).

In determining whether a waste is considered a “recyclable hazardous waste,” EPA used the methodology developed for the RIA of the 2011 DSW proposed rule.⁵ This methodology was designed to identify waste quantities that may be physically and chemically sufficient for potential future switchover to recycling under the DSW rule exclusions. In particular, the methodology relies on some of the data reported in the BR (e.g., BR form codes, BR source codes, EPA hazardous waste codes) to determine if a waste is a recyclable hazardous waste. Each recyclable hazardous waste is categorized within a “commodity group” according to each of the three BR recycling methods: metals recovery, solvent recovery, and other recovery. Attachment A describes the RIA methodology. Note that this methodology was only applied to hazardous wastes managed through methods other than recycling (i.e., methods other than metals recovery, solvents recovery, and other recovery).

⁵ EPA, *Regulatory Impact Analysis of EPA’s 2011 Proposed Revisions to the Industrial Recycling Exclusions of the RCRA Definition of Solid Waste*, June 30, 2011. Available online at: <http://www.regulations.gov/#!documentDetail;D=EPA-HQ-RCRA-2010-0742-0002>.

2. *Identified facilities that currently manage recyclable hazardous wastes and may begin recycling them under the transfer-based exclusion of the current DSW exclusions.* EPA identified facilities currently managing more than a truckload (25 tons) of recyclable hazardous wastes received from offsite through other management methods as those that would begin recycling under the current DSW exclusions. Facilities were identified by referring to data compiled under Step 1.
3. *Compiled information about location coordinates.* EPA then compiled information on facility location coordinates (i.e., latitude and longitude) from the FRS database in Envirofacts. Where such data were not available, EPA used the facility address and geocoding software to identify the facility latitude and longitude. EPA recognizes that facility addresses and location coordinate information sometimes are not the same as the location in which HSM generation, storage, or reclamation activities might occur. For example, the FRS may have location information for a corporate headquarters rather than production and processing facilities. However, field investigation of potentially thousands of facility locations to verify and correct GIS coordinates was beyond the scope of this analysis. The success rate of the geocoding is dependent on the quality of the location address data. The most accurate coordinates were obtained when street addresses could be recognized and located by the geocoding software. Generally, about 70 to 80 percent of the addresses can be recognized and located by the geocoding software. In instances where addresses could not be geocoded (e.g., inaccurate or missing street addresses, PO boxes or rural routes), EPA used internet searches of company websites or internet business listings to obtain more accurate facility location addresses or facility coordinates.
4. *Excluded facilities that submitted notification to EPA indicating that they would be managing hazardous secondary materials under the 2008 DSW final rule.* From the list of facilities developed under Steps 2 and 3, EPA identified and excluded those facilities that already notified EPA that they would be managing HSMs under the current DSW exclusions, since these facilities are being analyzed under Section 2.4.1 of this document (“Notification Facilities”)
5. *Excluded facilities included in the Environmental Problems Study.* From the list of facilities developed under Steps 2 and 3, EPA identified and excluded those facilities included in the Environmental Problems Study, since these facilities are being analyzed under Section 2.4.2 of this document (“Damage Case Facilities”).
6. *Excluded facilities that may begin recycling their recyclable hazardous wastes under the generator-based exclusion of the current DSW exclusions.* From the list of facilities developed under Steps 2 and 3, EPA identified and excluded those facilities that may begin recycling their recyclable hazardous wastes under the generator-based exclusion of the current DSW exclusions, since these facilities are being analyzed under Section 2.4.3.1 of this document (“Facilities Currently Generating Recyclable Hazardous Wastes”).

1.4 Non-Hazardous Industrial Waste

In addition to facilities currently generating or managing hazardous waste, some facilities that do not currently generate or manage hazardous waste may begin recycling HSM under the current DSW exclusions. Non-hazardous industrial recycling facilities were used to represent these types of facilities in the demographic analysis not because EPA predicts that any one of these facilities would begin recycling under the DSW rule, but rather because, as a class, these industrial recycling facilities were subject to the same type of local siting restrictions and other political and social pressures as future DSW recycling facilities will also be subject to, and therefore the demographics surrounding these facilities are likely to be similar.

In addition, these industrial recycling facilities were chosen in order to balance the use of the damage case recycling facilities. Because these facilities have similar industrial processes, any difference between the demographics surrounding the two classes of facilities may be attributable to the difference in environmental damage. Therefore, the demographic results are presented separately in order to provide the most complete information on potential demographics at these facilities.

EPA identified commercial non-hazardous industrial waste recycling facilities by identifying non-hazardous industrial waste recycling facilities in the following data sources:

- EPA databases (e.g., Wastewise Database, Toxics Release Inventory (TRI));
- Department of Energy's report entitled "Used Oil Re-Refining Study to Address Energy Policy Act of 2005 Section 1838;"
- Chartwell's "Directory & Atlas of Solid Waste Disposal Facilities;"
- Waste Business Journal Databases;
- Hazardous Waste Consultant; and
- Internet research (e.g., state Web sites, company Web sites).

EPA then excluded:

- Facilities that submitted notification to EPA indicating that they would be managing HSMs under the current DSW exclusions;
- Facilities that reported generating or managing hazardous wastes in 2007 to the BR; and
- Facilities that appeared to conduct only physical separation and processing, such as scrap metal recyclers.

EPA then compiled general information about the facilities from the data sources listed above. The information compiled included the types of waste recycled and facility address. EPA then performed geocoding using facility location address information. EPA recognizes that facility addresses and location coordinate information sometimes are not the same as the location in which HSM generation, storage, or reclamation activities might occur. For example, the FRS may have location information for a corporate headquarters rather than production and processing facilities. However, field investigation of potentially thousands of facility locations to verify and correct GIS coordinates was beyond the scope of this analysis.

1.5 Commercial Disposal and Treatment Facilities

EPA identified disposal and treatment facilities that offer management services to other entities (i.e., "commercial" disposal and treatment facilities) versus disposal and treatment facilities that

exclusively manage waste generated at the same facility or received from another facility under the same organization or parent company (i.e., “non-commercial” disposal and treatment facilities).

For purposes of this analysis, “disposal and treatment facilities” include facilities that manage hazardous wastes in the following types of units:

- Landfill;
- Surface impoundment;
- Land application;
- Underground injection;
- Incineration; and
- Energy Recovery (includes thermal treatment units and fuel blending).

Information on commercial landfill, surface impoundment, land application, incineration, and energy recovery facilities (i.e., all of the above types of facilities with the exception of underground injection and fuel blending facilities) was available from a previous effort undertaken by EPA in September 2010⁶, and is used in this analysis. Information on underground injection and fuel blending facilities was compiled as part of this effort. The following sections describe the methodologies used in each of these efforts.

1.5.1 Landfill, Surface Impoundment, Land Application, Incineration, and Energy Recovery Facilities

For purposes of this methodology, commercial landfill, surface impoundment, land application, incineration, and energy recovery facilities are those that:

- Reported management of hazardous waste by the corresponding management method in the BR;
- Have an operating unit that is actively managing RCRA hazardous waste as indicated in the RCRAInfo⁷ Permit Module; and
- Use that unit for commercial purposes as indicated in the RCRAInfo Permit Module.

A facility that meets all of the above criteria for a particular management method is considered to be commercial. Otherwise, the facility is non-commercial. Under this methodology, a facility may be commercial for one type of management (e.g., landfill) and non-commercial for another type of management (e.g., incineration). A description of the approach for identifying commercial landfill, surface impoundment, land application, incineration, and energy recovery facilities is provided below.

⁶ Work performed under EPA Contract No. EP-W-07-003, Work Assignment No. 3-01.

⁷ The Resource Conservation and Recovery Act Information (RCRAInfo) system is a national program management and inventory system used by EPA to track entities regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA).

In identifying commercial landfill, surface impoundment, land application, incineration, and energy recovery facilities, EPA first verified that managers had the unit necessary to perform the reported management in the BR, using Process Code⁸ data in the RCRAInfo Permit Module. For example, if a manager reported incineration in the BR, we verified that the manager had an incineration unit in the RCRAInfo Permit Module. The following table presents a crosswalk between the Management Method Codes in the BR and the Process Codes in the RCRAInfo Permit Module:

Biennial Report Management Method Code		RCRAInfo Process Code	
Disposal Units			
H132	Landfill or surface impoundment that will be closed as landfill	D80	Landfill
		D83	Surface impoundment disposal
H131	Land treatment or application	D81	Land application

Thermal Treatment Units			
H040	Incineration	T03	Incinerator
H050	Energy recovery at this site - use as fuel (includes onsite fuel blending)	T80	Boiler
		T81	Cement kiln
		T82	Lime kiln
		T83	Aggregate kiln
		T84	Phosphate kiln
		T85	Coke oven
		T86	Blast furnace
		T88	Titanium dioxide chloride process oxidation reactor
		T89	Methane reforming furnace
		T91	Combustion device used in the recovery of sulfur values from spent sulfuric acid
		T92	Halogen acid furnace
		T93	Other industrial furnaces
		X01	Subpart X open burning/open detonation
X03	Subpart X thermal unit		

In addition to verifying that a facility had the hazardous waste management unit, EPA verified that the unit was operating and actively managing hazardous waste. In doing so, we reviewed information on the unit's Legal/Operating Status Code⁹ in the RCRAInfo Permit Module. A unit was considered to be operating and actively managing RCRA hazardous waste if it has one of the following Legal/Operating Status Codes:

RCRAInfo Legal and Operating Status Codes Considered Active	
ISOP	Interim status/operating, actively managing RCRA-regulated waste
PIOP	Permitted/operating, actively managing RCRA-regulated waste
PMOP	Pre-mod authorization/operating, actively managing RCRA-regulated waste

For each hazardous waste management unit that was operating and actively managing hazardous waste, we also reviewed information on its commercial status. For purposes of this analysis, the commercial status of a unit is determined as follows:

⁸ RCRAInfo code used to describe the unit's waste treatment, storage, or disposal process.

⁹ RCRAInfo code used to indicate programmatic (operating and legal status) conditions that reflect RCRA program activity requirements of a unit.

Commercial Status Category	RCRAInfo Commercial Status Code	
Commercial	1	Accepts waste from offsite generators
	3	Accepts waste from limited offsite generators by special arrangement/agreement
Non-Commercial	0	Does not accept waste from offsite generators
	2	Accepts waste only from related, "captive" offsite generators, i.e., offsite generators under the same organization or parent company

Once a draft list of commercial and non-commercial facilities was developed, EPA sought input from EPA Regions and states on the draft list. Based on their input, the list of commercial facilities was finalized.

1.5.2 Underground Injection and Fuel Blending Facilities

RCRAInfo does not contain complete information on underground injection and fuel blending units. As a result, a methodology based on reported BR data was used to identify commercial underground injection and fuel blending facilities. A description of the approach used to identify these facilities is provided below.

In identifying commercial underground injection and fuel blending facilities, EPA first identified facilities that reported one of the following Management Method Codes in their BR:

Biennial Report Management Method Code	Description
H134	Deepwell or underground injection
H061	Fuel blending prior to energy recovery at another site (waste generated either on site or received from off site)

In addition to identifying facilities that reported management of hazardous wastes using the above management method codes, EPA obtained the facility name of: (1) the facilities that managed the wastes and (2) the facilities that shipped or generated the wastes. We then used the facility name information to identify facilities that offer management services to other entities (i.e., "commercial" facilities) versus facilities that exclusively manage waste generated at the same facility or received from another facility under the same organization or parent company (i.e., "non-commercial" facilities).

2 Analysis of Demographics of Potentially Affected Communities

EPA analyzed the demographics of the potentially affected communities identified through the activities described in Section 1 of this report. The demographics analyzed include racial minorities (all races except non-Hispanic white), children under five years of age, American Indian and Alaskan Natives, and people with income below 200% of the poverty level. EPA determined the demographics for the population within a 3 km radius around each facility and compared these demographics to national and state-specific population demographics.

2.1 Demographic Data Sources

U.S. EPA collected demographic data from the U.S. Census Bureau's 2010 Decennial Database and the 2006-2010 American Community Survey (ACS) 5-year estimates database. The 2010 decennial database provides information at the most precise level available to the public, the block level. Each block is approximately the size of a city block. The ACS database, which replaced the Summary File 3 (SF3) database in 2006, provides data at the next most precise level, the block group level. Each block group is comprised of several blocks. Decennial data is based on data collected from all persons and households within the block. This data is a sample data of generally 1 in 6 households within a block group that includes information about more characteristics of the people and households surveyed. EPA conducted its analysis using the most precise data set available for the characteristics analyzed. Decennial data was used for the following demographics:

- Population;
- Population density;
- Minority population;
- American Indian and Alaska Native (AIAN) population; and
- Children under five years of age

Decennial data does not include data on the number of Americans below 200% poverty. According to the U.S. Census persons below 200% poverty "includes all those described in poverty under the official definition, plus some people who have income above poverty but less than 2 times their poverty threshold." Therefore ACS data was used for analysis of this demographic characteristic. Because ACS data for county populations and population density can be different than decennial data for the same location, EPA also used ACS population and population density information for analyses related to the poverty level.

All demographic variables were further divided into urban and rural populations. The U.S. Census Bureau defines urban in several ways. EPA used their most general and easily applicable definition, which is, "all territory, population and housing units in urbanized areas and in places of more than 2,500 persons outside of urbanized areas." This encompasses all regions with a population density greater than 1,000 people per square mile with a minimum residential population of 50,000 people. All areas that meet these criteria are considered urban for this analysis, and all other areas are considered rural (See Attachment E).

When determining what defined minority population, EPA first identified the population with the Census racial category "White alone, not Hispanic or Latino." The minority population was then calculated by subtracting this number from the total population. The American Indian and Alaska Native (AIAN) population is based on Census data for those with this category alone or in combination with any other category.

Table 2-1 Data Source Files from the 2010 U.S. Census Used for the DSW EJ Analysis

	2010 Decennial Data					American Community Survey 2006-2010 Data		
	Total Population	Population Density	Minority Population	American Indian and Alaska Native Population	Children Under Five	Total Population	Population Density	Population Below 200% Poverty Level
National Total	X	X	X	X	X	X	X	X
National Urban	X	X	X	X	X	X	X	X
National Rural	X	X	X	X	X	X	X	X
State Total	X	X	X	X	X	X	X	X
State Urban	X	X	X	X	X	X	X	X
State Rural	X	X	X	X	X	X	X	X

2.2 Methodology

This section describes the methodology used to develop the EJ Analysis for the current DSW exclusions, including selection of the EJ characteristics for analysis, using the areal apportionment method to determine the characteristics of the communities surrounding each facility, and conducting a statistical analysis of these results to determine how the demographic characteristics compare to those on a state and national level.

2.2.1 Selection of EJ Characteristics for Analysis

EPA selected the following population demographics for the analysis: racial minority (all races other than non-Hispanic white), American Indian and Alaska Native, children under five, and persons below 200% of the poverty level. These demographics were selected based on the Sierra Club petition, comments received in response to this petition and during public forums discussing the 2008 DSW final rule and EJ analysis, comments from the external peer review, comments on the 2011 proposed rule, and a review of past EJ analyses conducted by EPA and other entities, including:

- EPA's "Environmental Justice Smart Enforcement Assessment Tool" (EJ SEAT);
- EPA's "Toolkit for Assessing Potential Allegations of Environmental Justice" (EJ Toolkit); and
- Chapter 3 of "Toxic Wastes and Race at Twenty - 1987-2007: Grassroots Struggles to Dismantle Environmental Racism in the United States," prepared by the United Church of Christ, document the work by Dr. Paul Mohai and Dr. Robin Saha.

2.2.2 Areal Apportionment Method

In order to perform the analysis of the demographic makeup of potentially affected communities, EPA used the ESRI geospatial software ArcMap version 10.0. Geographic coordinate points (latitude, longitude) were imported into the program using the North American Datum 1983 Geographic Coordinate System and projected onto a U.S. map using a North America Equidistant Conic projection, which is a standard projection used for national maps of the conterminous United States.. The underlying data used in the ArcMap program was the 2010 U.S. Census data, as described in Section 2.1. Once the buffers were created around each facility, data was extracted at the block group level for 2010 decennial data for the total population, minority population, American Indian/Alaska Native (AIAN) population, and children under five, and at the block group level for American Community Survey (ACS) 2006-2010 data for population below 200% poverty. To extract all the relevant demographic data, decennial and ACS census data were converted to feature layers on top of a national map. In addition to the U.S. Census data, the U.S. National Atlas Water Feature Areas layer was used to represent the water feature areas such as bays, glaciers, lakes, and swamps, of the United States. All inland water except those identified as dry lakes and swamp or marsh were used in the analysis. Once the map was created, a model was created from the ModelBuilder application in ArcToolbox to create the algorithm for the analysis.

For the Environmental Justice analysis, EPA used a three-kilometer buffer for each facility (notification, damage case, hazardous waste, and non-hazardous waste) as an approximation of the potential area that could be affected by an acute release scenario (such as a fire or explosion) at a reclamation facility. While some EJ analysis use other buffer distances, such as 1- or 2-km buffers, assessment of multiple buffers is beyond the scope of this analysis. EPA did perform an additional analysis on a 1-km buffer for the notification facilities to perform a sensitivity analysis. The results of the analysis can be found in Section 6. For each facility, EPA used ArcMap to draw a 3-km radius around the facility, and determined the demographic

characteristics of the communities within that circle. Each 3-km radius encompassed discrete or partial census block groups, and some census block groups were only partially within the circle. EPA estimated the demographics of the population within each circle using the Areal Apportionment Method (AAM) also known as the area-weighted method. For areas with inland water bodies (e.g., lakes, ponds) found within the 3-km radius, water bodies were removed from the analysis in order to accurately calculate population and population density for the potentially affected community. In the instances where multiple facilities could affect the same persons within a population, as is the case for generator and transfer-based exclusion facilities, overlapping radii were extracted and the affected sub-population was counted once to increase accuracy of the potentially affected community numbers used in the analysis.

The population numbers for each demographic category were not a simple sum of the population contained in every block group intersected by the buffer. It was a weighted sum in which the population in the block group was multiplied by the proportion of area contained within the buffer region. For example, if 100% of the block group was contained within the buffer region then 100% of the population was tallied; however, if 50% of the block group was contained within the buffer then only 50% of that population was tallied. If the buffer contained three block groups, one completely contained and the others partially contained the calculation would be the following:

Block group 1: Total population of 50, 100% contained in buffer

Block group 2: Total population 50, 50% contained in buffer

Block group 3: Total population 30, 30% contained in buffer

Total population for the buffer = $(1 * 50) + (0.5 * 50) + (0.3 * 30) = 84$

The degree of hazards presented by HSM generation and management activities are typically related to the distance of receptors from the HSM. EPA used the areal apportionment method because it provides an estimate of the socioeconomic characteristics close to specific locations, such as facilities addresses. The Census data used for this analysis is based on administratively determined boundaries including census block groups. The Census block groups can vary significantly in size and shape. When used for EJ analyses, they may provide inaccurate results, particularly when they are large or irregularly shaped, resulting in inclusion of populations that are not within the 3-km radius EPA used for this analysis.

While AAM will not provide the exact characteristics of the populations within the 3-km radius, it provides an adjustment for the limitations of available census data and the geographic boundaries provided by the census. EPA considered other methods, such as including the entire population of all census block groups where any part of it was contained within the 3-km radius, and including only those where the entire area of the block group was contained within the 3-km radius. However, these methods do not adjust for census block groups that cross the 3-km boundary and have areas (and associated populations) both inside and outside the 3-km radius, some of which could be potentially large. In addition, the AAM approach used by EPA for this analysis is consistent with other EJ tools and analyses, including those discussed in Section 2.2.1. AAM assumes that all populations are equally distributed within a block group. An accurate analysis of the impact of this assumption could not be conducted with the information available from the sources used for this analysis.

2.2.3 Comparison of Demographic Characteristics of Affected Population versus Comparison Population

The demographics of the population within a 3 km radius of each facility were compared to its defined population cohort at a national and state level. The potentially affected community population is defined as the minority, persons below 200% poverty, American Indian and Alaska Native, and children under age five cohorts residing within 3km radius of a facility. The national-level comparison is intended to capture any regional disproportionality (for example, if the potentially affected communities are all located in states with minority and/or low-income populations that are higher than the national average). The state-level comparison is intended to capture any disproportionality occurring within the state. (In most cases, the RCRA program is implemented by the state.)

In addition, comparisons were done for urban **and** rural populations to check if the tendency to locate industrial facilities in urban populations was a factor. . Most facilities analyzed were not in areas with large AIAN populations. EPA neither analyzed facilities on tribal lands as a separate category nor explicitly factor in the capacity of local government to oversee HSM facilities.

2.2.4 Statistical Analysis

The next section describes the statistical analysis approach used for defining the affected and comparison populations for the demographic groups (i.e. minorities, American Indian/Alaska Native, persons below 200% poverty or children under five) within a 3 km radius around each facility, and for comparing the demographic characteristics of the affected and comparison populations.

The affected populations are those within the 3 km radius around the facilities analyzed. The comparison population is the population selected for comparison with the affected population to evaluate whether there is a significant difference between them with respect to demographic characteristics. This implies that it is a group of people that could have been equally likely to be affected if the facility was in alternative location. The comparison populations used in this analysis were the national population and the state population in which each facility was located.

The data for hazardous waste facilities was adjusted for the statistical analyses to avoid double counting persons who were affected by two or more facilities due to the large number of facilities analyzed and the resulting overlap of some facility populations. As a result, the total state affected population was a count of all persons in the state who were affected by at least one facility, instead of a sum of the individual facility populations in the state. The total national affected population was a sum of the state affected populations.

2.3 Statistical Comparison of Demographic Characteristics of Affected Population versus Comparison Population

As described above, the goal of this disparity analysis was to assess two comparisons:

- a) Whether there was a substantially greater probability of members in a population group (e.g., minority populations) being affected than members of a comparison population group (i.e., non-Hispanic White), and
- b) Whether members of the population group of interest (e.g., minority population) comprised a substantially greater proportion of the affected population than of the non-affected population in the selected buffer regions.

This document refers to comparison (a) as the “Affected Population Ratio” and comparison (b) as the “Demographic Ratio.” The methodology for calculating these ratios is described in Attachment B. .

EPA tested these comparisons for statistical significance to identify the probability that the observed differences could have arisen due to chance. A statistical significance test result can be expressed either as a probability (p-value) that an outcome could have been the result of chance, or as the number of standard deviations from the mean value. For individual states and the nation as a whole, EPA conducted two statistical tests for significance, the Kendall test and Fisher’s Exact test. The Kendall test is the standard test for large samples.¹⁰ Fisher’s Exact test is conditional on the total numbers of affected, non-affected, demographic group G, and non-demographic group G populations (Kendall and Stuart, 1973 sections 33.19 and 33.20).¹¹ Attachment B. includes the methodology used to calculate the results of these tests.

For variables with a normal distribution, approximately 95% of the values are within two standard deviations of the mean, so this indicates that there would be only a 5% or less probability of a value outside this range.¹² EPA also calculated the corresponding number of standard deviations (SD) based on each test. Attachment B includes the methodology used to calculate the number of standard deviations. The SD indirectly provides a statistical test since the SDs have a standard normal distribution under the hypothesis of homogeneity (i.e., no ethnic group disparity), for large samples (i.e., when n is large).

Fisher’s Exact test tests whether there is a difference between Group G and other people in their probability of being inside the boundary area. The smaller the p-value (i.e., the closer to zero), the stronger the difference, also shown is the equivalent number of standard deviations based on a standard normal distribution¹³. In some cases the Fisher’s Exact test p-values are too small to compute readily (e.g., below 10^{-300}), which in turn prevents the computation of “equivalent” SD values. Kendall test results are provided when Fisher’s Exact test cannot be calculated. The Kendall test results provide a close approximation of the Fisher’s Exact test results. These statistics provide information about the statistical significance of any observed disparity.

To summarize and evaluate the disparities for different states, two additional statistical procedures were used. As detailed in Attachment B. , the Mantel-Haenszel method was used to estimate a common Affected Population Ratio (APR) and a common Demographic Ratio (DR), under the assumption that all states have the same underlying ratios. These ratios are weighted averages of the state-specific ratios. They differ from the nationwide Affected Population Ratio and Demographic Ratio because they only include states that have at least one facility and because the statistical calculation is different. As detailed in Attachment B. , the Cochran-Mantel-Haenszel test, a generalization of the standard chi-square test, was used to test the null hypothesis of no disparity in every state against the alternative hypothesis of a disparity in one or more states. The p-value for this test is provided.

¹⁰ Apart from the very small bias adjustment factor of $n/(n-1)$, the Kendall test is mathematically equivalent to a standard chi-square test.

¹¹ The Kendall and the chi-square tests are approximations to the Fisher Exact test.

¹² Consistent with several court-approved precedents in Title VII discrimination cases, a 2-sided significance test is used, i.e., EPA test the hypothesis that the population ratio $pr1/pr2 = 1$ against the alternative hypothesis that $pr1/pr2 \neq 1$. This alternative hypothesis means that either demographic group G populations are more adversely affected ($pr1/pr2 > 1$) or non-affected demographic group G populations are more adversely affected ($pr1/pr2 < 1$). If, instead, the goal of the analysis were to test only whether demographic group G populations were more adversely affected, then the alternative hypothesis would be $pr1/pr2 > 1$ and the probabilities of chance occurrence (p-values) would be halved (assuming that the estimated ratio $pr1/pr2$ exceeds 1).

¹³ The “equivalent” number of standard deviations for Fisher’s Exact test do not exactly equal SD but they are approximately equal.

EPA selected these standard statistical analyses and tests based on technical literature and their historical use in EJ analyses and discrimination cases^{14, 15}. EPA Office of Civil Rights used the same Affected Population Ratio (referred to as “Relative Ratio”), Kendall test, and Fisher Exact Test, and a similar Demographic Ratio (referred to as “Population Ratio”) in a past Title VI analysis and investigation guidance document^{16,17}. EPA Office of Civil Rights also used the same statistical analyses for a recent Title VI disparity analysis¹⁸. In addition, there are numerous applications of these same statistical methods¹⁹ in Title VII court cases^{20,21}.

2.4 Results of Demographic Analysis

This section contains the results of the demographic analyses for the four groups of facilities in the DSW EJ analysis:

1. Results for notification facilities (presented in Section 2.4.1).
2. Results for damage case facilities (presented in Section 2.4.2).
3. Results for hazardous waste facilities (presented in Section 2.4.3).
4. Results for non-hazardous industrial waste facilities (presented in Section 2.4.4).

Results of the analyses for each set of facilities are presented in bar charts, demographic comparison tables, and statistical analysis tables.

The bar charts are histograms of the percent in each demographic category of the population within a 3 km radius around each group of facilities. For example, Figure 2.1 shows the percent of notification facilities with different levels of demographic groups (minority, persons below 200% poverty, American Indian and Alaskan Native, and children under the age of 5) in the surrounding population; About 30% of notification facility populations were 0 to 10% minority, 24% were 11 to 20% minority, 15% were 21 to 30% minority, 8% were 31 to 40% minority, 13% were 41 to 50 % minority, and 10% were 51 to 100% minority.

The demographic comparison tables present the analyses discussed in Section 2.2.3. For example, Table 2-2 Table 3.2 compares the percent of the population of each demographic group within a 3-km radius around the notification facilities to the percent of each demographic group in the national population. This table shows that of the 60 notification facilities²², 16 had a

¹⁴ Biddle, Richard E. “Disparate Impact Reference Trilogy for Statistics”, 46 Labor Law J 651. November 1995.

¹⁵ US Department of Justice, Civil Rights Division. 2001. Title VI Legal Manual. January 11, 2001.

<http://www.justice.gov/crt/cor/coord/vimannual.php>

¹⁶ EPA Office of Civil Rights, “Draft Revised Investigation Guidance”, Federal Register, Vol 65. No. 124, June 27, 2000, pp. 39667ff. http://www.epa.gov/civilrights/docs/frn_t6_pub06272000.pdf

¹⁷ EPA Office of Civil Rights 1998. Title VI Administrative Complaint re: Louisiana Department of Environmental Quality; Permit for Proposed Shintech Facility; Draft Revised Demographic Information. April, 1998.

<http://www.epa.gov/civilrights/shinfileapr98.htm>

¹⁸ EPA Office of Civil Rights 2011. Exposure Assessment and Disparity Analysis for Administrative Complaint 16R-99-R9. April, 2011. <http://www.epa.gov/ocr/TitleVICases/exposure-disparity-analysis-20110421.pdf>

¹⁹ For employment discrimination the probability ratio (referred to as the “Impact Ratio” or “Selection Ratio” is usually defined as $P(\text{selection} | \text{minority}) / P(\text{selection} | \text{non-minority})$, and corresponds to the Affected Population Ratio used here. In this case, a low ratio is evidence towards disparate impact. Statistical significance tests include the “Z-test,” or “Number of standard deviations,” which is mathematically the same as the Kendall test, and, more recently, the Fisher Exact Test.

²⁰ Peresie, Jennifer L. “Towards a Coherent Test for Disparate Impact Discrimination”. 84 Indiana Law J 773. July 2009.

²¹ United State District Court, District of Connecticut. Civil Action No. 3:08-CV-0826 (JCH). Ruling Re: Plaintiff’s Motion for Summary Judgment (Doc. No. 106) and Defendant’s Motion for Summary Judgment (Doc. No. 113). May 2011.

²² Excluding the notification facility located in the Virgin Islands.

greater percent minority population than the national population, 44 had a lower percent minority population than the national population, and none had the same percent minority population. The mean difference between the percent minority population in the national population and the percent minority population in notification facility populations was -11.84% (meaning that, on average, the percent minority population around notification facilities was 11.84% less than the national average) and the median difference was -18.97.

Statistical analysis tables present the results from the analyses discussed in Section 2.2.4 and are located below the demographic comparison tables. For example, Table 2-3 Table 3.3 shows the statistical analysis results of the national demographic comparison for notification facilities and Table 3.5 shows results at the state level. Values that could not be computed are represented as “N/A”; for a description of why some values could not be computed, please see Section 2.2.4 and Attachment B.

Attachment E contains further demographic analysis results for each group of facilities. Each group of facilities has demographic comparison tables that compare the percent of the population of each demographic group within a 3-km radius around each facility to the national and state level.

Data for facilities located in Puerto Rico were included in the bar charts and demographic comparison tables but were excluded from the statistical analyses. There were 22 total facilities located in Puerto Rico (1 notification facility, 3 damage case facilities, 18 hazardous waste facilities, and no non-hazardous industrial waste facilities).

2.4.1 Notification Facilities

This section presents the demographic results for the 60 of the 61 notification facilities as of February 27, 2012. This includes facilities in Iowa, Idaho, Illinois, New Jersey, Pennsylvania, and Puerto Rico. The demographics for the one notification facility in the Virgin Islands were not reviewed for this report.

EPA acknowledges that a selection bias may exist for the notification facilities. The statistical analyses focus on whether the population demographics near each group of facilities are different from the population demographics elsewhere in the same state or in the US as a whole. The factors that influence whether a facility chooses to be a “notification” facility, or whether a facility becomes a damage case, might include the population demographics near the facility, but might also include other factors such as the state or region, the type or size of the facility, or other factors. EPA did not investigate these additional factors that might influence whether facilities become notification facilities. EPA analyzed the notification facilities separately from other facility categories, in part, to isolate factors that might result in a selection bias.

Figure 2.1 Demographics for Notification Facilities

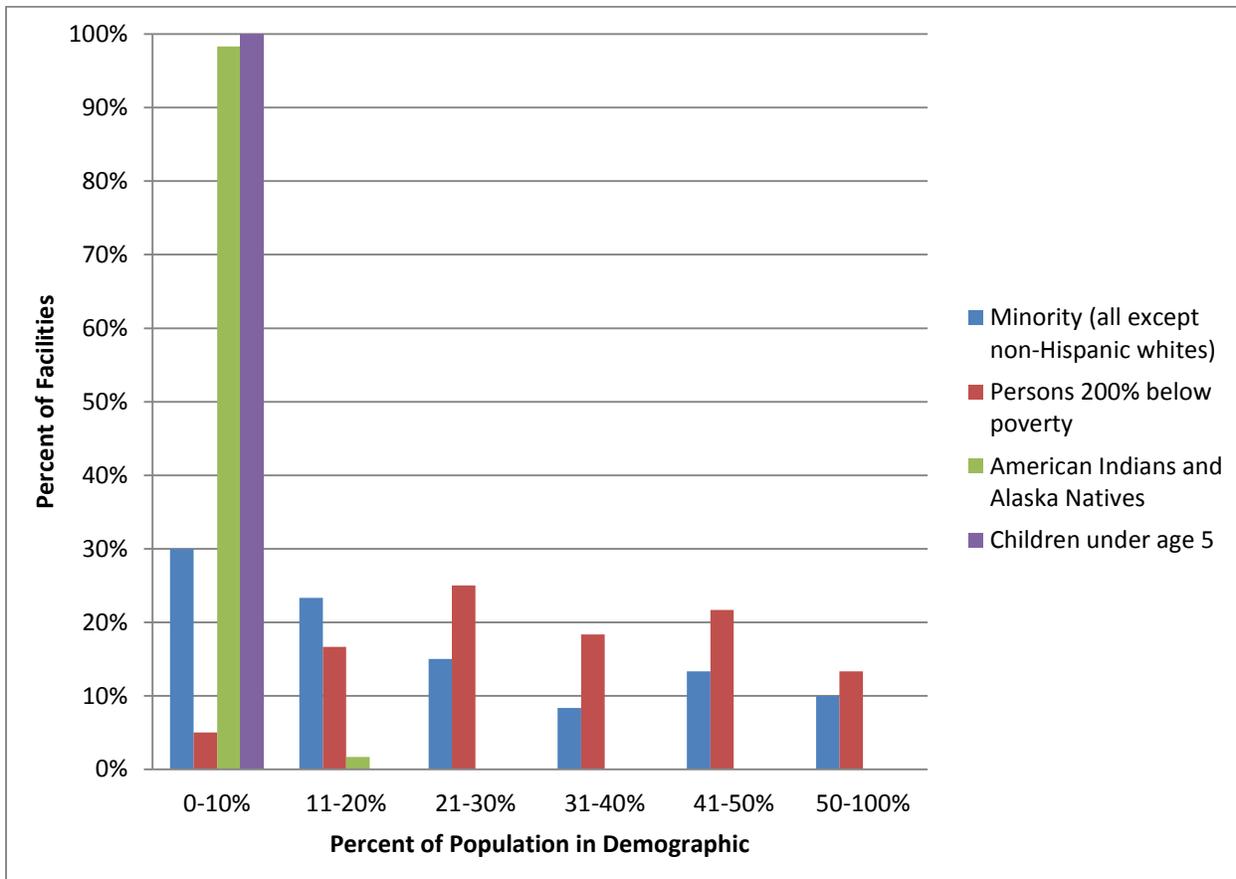


Table 2-2 National Demographic Comparison for Notification Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	16	44	0	-11.84%	-18.97%
Below 200% Poverty Level	31	29	0	1.17%	0.73%
American Indians or Alaska Natives	13	47	0	-0.52%	-0.95%
Children under age 5	24	36	0	-0.14%	-0.22%

Table 2-3 National Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	0.832528802	0.885798957	N/A	N/A	0.003154776	84.476352	~0
Persons below 200% poverty	0.997628352	0.998372693	2.76E-01	1.088600737	0.003154776	1.0892051	2.76E-01
American Indians and Alaska Natives	0.538212053	0.540998022	N/A	N/A	0.003154776	54.399087	~0
Children under age 5	0.99203719	0.992536947	5.08E-02	1.952793488	0.003154776	1.9542705	5.07E-02

Table 2-4. State Demographic Comparison for Notification Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	29	31	0	0.23%	-0.94%
Below 200% Poverty Level	41	19	0	5.25%	4.89%
American Indians or Alaska Natives	25	35	0	0.27%	-0.13%
Children under age 5	32	28	0	0.24%	0.21%

Table 2-5. State Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.38648607	1.25762176	~0
Persons below 200% poverty	1.305166262	1.212958074	~0
American Indians and Alaska Natives	1.252372909	1.262561834	2.16E-87
Children under age 5	1.062016336	1.060169958	1.54933E-50

2.4.2 Damage Case Facilities

This section presents the demographic results for the 250 damage case facilities.

Figure 2.2 Demographics for Damage Case Facilities

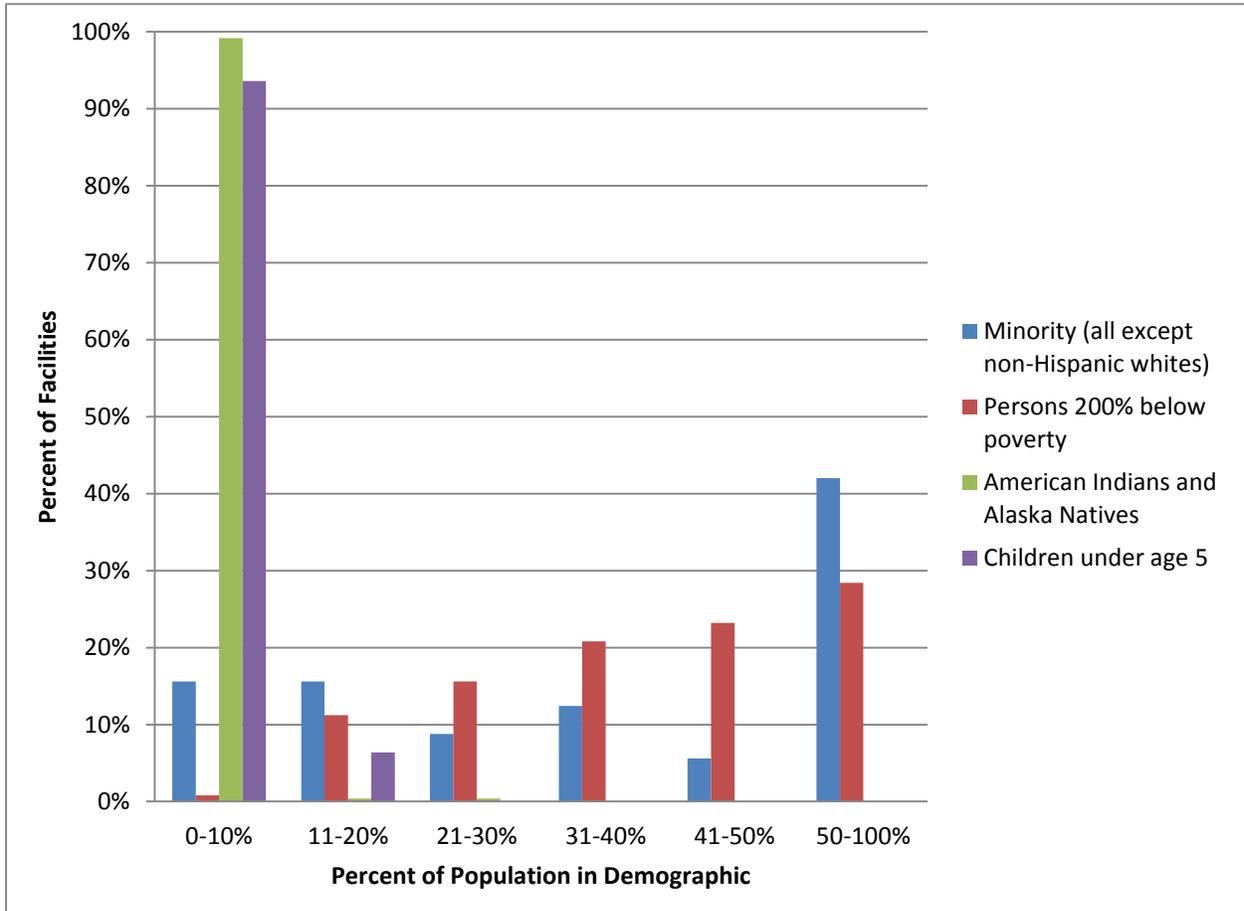


Table 2-6 National Demographic Comparison for Damage Case Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	131	119	0	6.97%	2.38%
Below 200% Poverty Level	170	80	0	8.65%	8.77%
American Indians or Alaska Natives	65	185	0	-0.14%	-0.57%
Children under age 5	135	115	0	0.18%	0.10%

Table 2-7 National Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	2.454957933	1.636984709	~ 0	N/A	0.026930687	1336.7438	~0
Persons below 200% poverty	1.601149695	1.358164374	~0	N/A	0.026930687	685.40726	~0
American Indians and Alaska Natives	0.856035499	0.854435181	N/A	N/A	0.026930687	-49.92378	~0
Children under age 5	0.994547714	0.994766533	7.53E-05	3.959039252	0.026930687	-3.9564542	7.61E-05

Table 2-8. State Demographic Comparison for Damage Case Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	131	119	0	7.20%	0.86%
Below 200% Poverty Level	178	72	0	8.98%	8.33%
American Indians or Alaska Natives	111	139	0	0.00%	-0.09%
Children under age 5	143	107	0	0.26%	0.28%

Table 2-9. State Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	2.278778605	1.490322666	~0
Persons below 200% poverty	1.75523922	1.464551275	~0
American Indians and Alaska Natives	1.004158185	1.004347597	1.76E-01
Children under age 5	1.002331559	1.002305546	0.087053808

2.4.3 Hazardous Waste Facilities

This section presents the demographic results for 2,115 facilities that reported generating or managing hazardous wastes in 2007 that **may** choose to operate under the current DSW exclusions (“hazardous waste facilities”). .

Figure 2.3 Demographics for Hazardous Waste Facilities

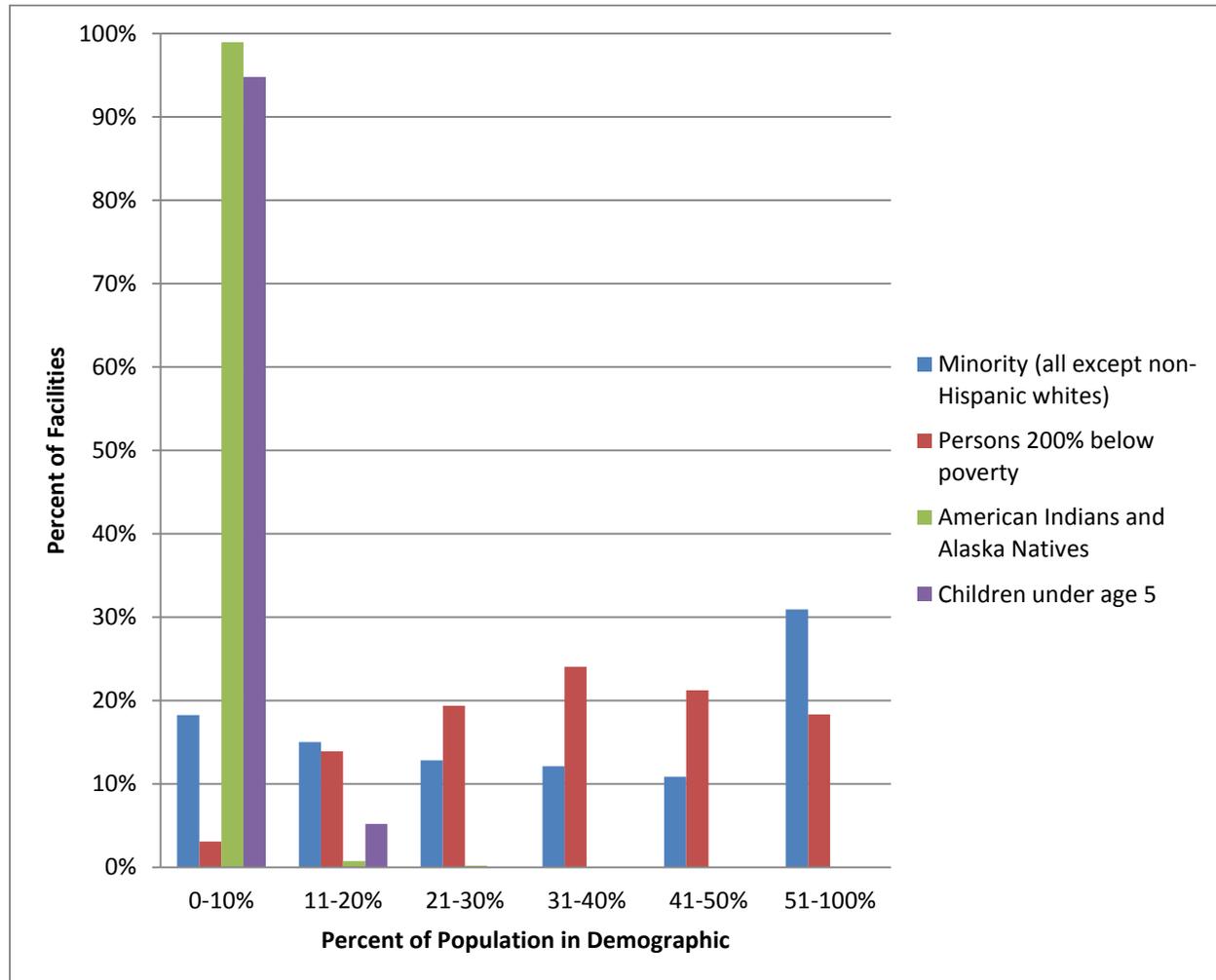


Table 2-10 National Demographic Comparison for Hazardous Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	989	1126	0	1.37%	-2.98%
Below 200% Poverty Level	1262	853	0	4.27%	4.19%
American Indians or Alaska Natives	458	1657	0	-0.24%	-0.68%
Children under age 5	1129	986	0	0.24%	0.15%

Table 2-11 National Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	1.680615 321	1.4172884 25	~0	N/A	0.121226 233	1709.4322 97	~0
Persons below 200% poverty	1.261363 882	1.1921192 76	~0	N/A	0.121226 233	731.38959 33	~0
American Indians and Alaska Natives	0.729979 194	0.7067524 36	N/A	N/A	0.121226 233	- 209.43092 48	~0
Children under age 5	1.051925 362	1.0553574 77	~0	N/A	0.121226 233	83.804669 57	~0

Table 2-12. State Demographic Comparison for Hazardous Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	1131	984	0	5.07%	1.30%
Below 200% Poverty Level	1278	837	0	4.37%	4.10%
American Indians or Alaska Natives	818	1297	0	0.00%	-0.18%
Children under age 5	1194	921	0	0.32%	0.30%

Table 2-13. State Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.407514066	1.217556699	~0
Persons below 200% poverty	1.091250847	1.06015238	8.7085E-214
American Indians and Alaska Natives	0.834668652	0.834863239	3.35E-29
Children under age 5	1.05262912	1.049306306	1.92595E-22

2.4.4 Non-Hazardous Industrial Waste Facilities

This section presents the demographic results for 25 facilities not currently generating or managing hazardous wastes that **may** choose to begin reclaiming HSM under the current DSW exclusions (non-hazardous industrial waste facilities).

Figure 2.4 Demographics for Non-Hazardous Waste Facilities

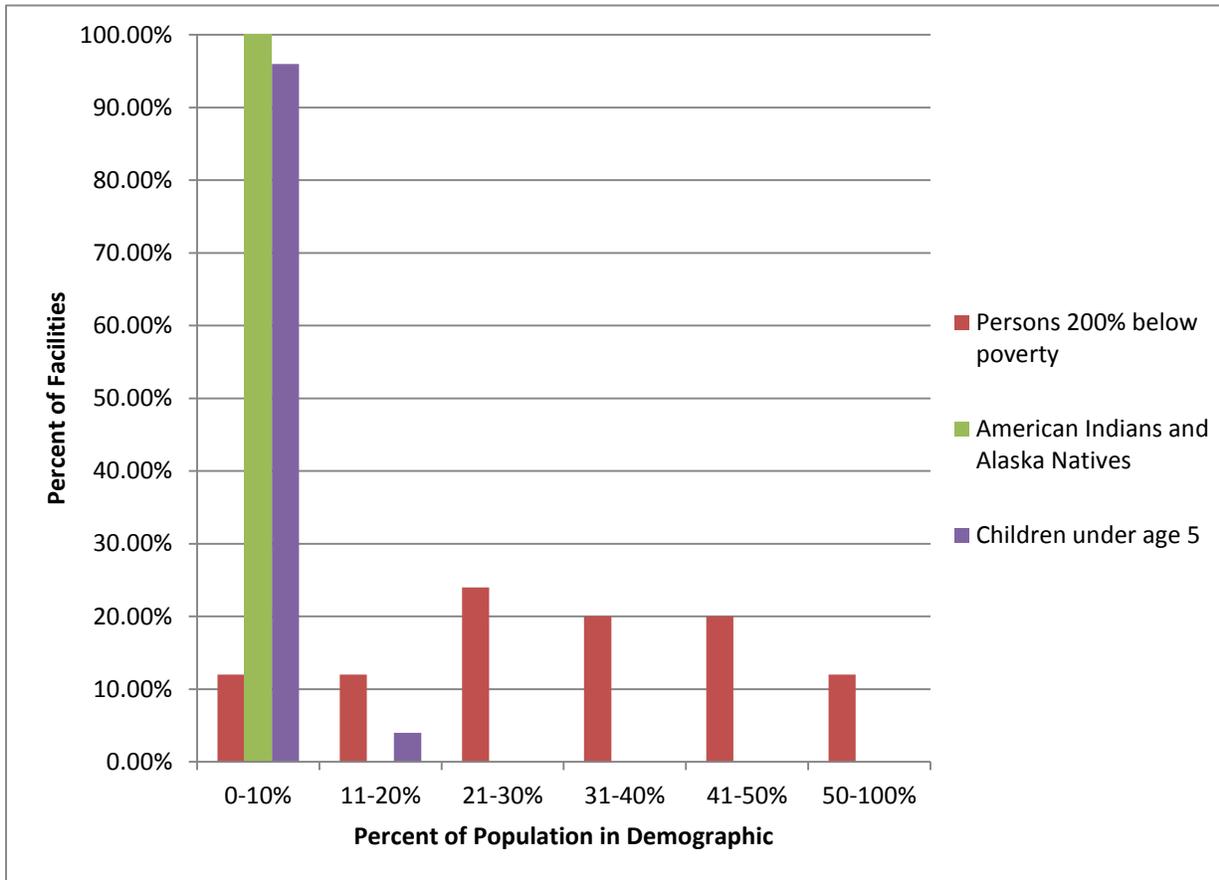


Table 2-14 National Demographic Comparison for Non-Hazardous Industrial Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	9	16	0	-4.00%	-10.69%
Below 200% Poverty Level	12	13	0	-0.08%	-1.03%
American Indians or Alaska Natives	2	23	0	-0.76%	-0.80%
Children under age 5	11	14	0	-0.18%	-0.31%

Table 2-15 National Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	1.23230635	1.137215001	~0	N/A	0.001828514	77.2778184	~0
Persons below 200% poverty	1.1307444	1.085980217	~0	N/A	0.001828514	43.83506903	~0
American Indians and Alaska Natives	0.474107255	0.477235781	N/A	N/A	0.001828514	-47.17615327	~0
Children under age 5	1.037831425	1.035306009	2.41E-12	7.008352197	0.001828514	7.042585889	1.89E-12

Table 2-16. State Demographic Comparison for Non-Hazardous Industrial Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	11	14	0	-0.82%	-1.99%
Below 200% Poverty Level	11	14	0	-0.73%	-1.75%
American Indians or Alaska Natives	8	17	0	-0.14%	-0.21%
Children under age 5	13	12	0	-0.05%	0.06%

Table 2-17. State Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.407514066	1.217556699	~0
Persons below 200% poverty	1.091250847	1.06015238	8.7085E-214
American Indians and Alaska Natives	0.834668652	0.834863239	3.35E-29
Children under age 5	1.05262912	1.049306306	1.92595E-22

3 Comparison of Hazardous Waste Facilities to Commercial Hazardous Waste Treatment and Disposal Facilities That Do Not Recycle

In response to comments on the 2011 DSW proposed rule, EPA compared existing commercial hazardous waste treatment and disposal facilities that do not recycle (commercial hazardous waste facilities that do not recycle) to the hazardous waste facilities identified as potentially operating as recyclers under the current DSW exclusions (hazardous waste facilities). The treatment and disposal facilities that do not recycle represent the “baseline” waste management practices absent the DSW rule.

One expected outcome of the rule is that hazardous wastes will be managed in different locations, including changing waste management from the commercial hazardous waste facilities that do not recycle to management onsite at hazardous waste facilities. Therefore, EPA compared the population demographics of commercial hazardous waste facilities that do not recycle to hazardous waste facilities, to illustrate the potential change in population demographics affected by the handling of hazardous waste under the current DSW exclusions.

Table 3-1 is similar to the demographic comparison tables presented in Attachment E; it compares the percent of the population of each demographic group within a 3 km radius around facilities to the percent of each demographic group in the state in which each facility is located. It shows the demographic comparison for both the commercial hazardous waste facilities that do not recycle and the hazardous waste facilities, and calculates the difference from the former to the latter. For example, 58.56% of commercial hazardous waste facilities that do not recycle have a greater percent minority population than the corresponding state minority populations, while 53.48% of hazardous waste facilities have a greater percent minority population than the corresponding state minority populations. The resulting difference shows that there are 5.08% fewer hazardous waste facilities compared to commercial hazardous waste facilities that do not recycle with a greater percent minority than the corresponding state minority populations.

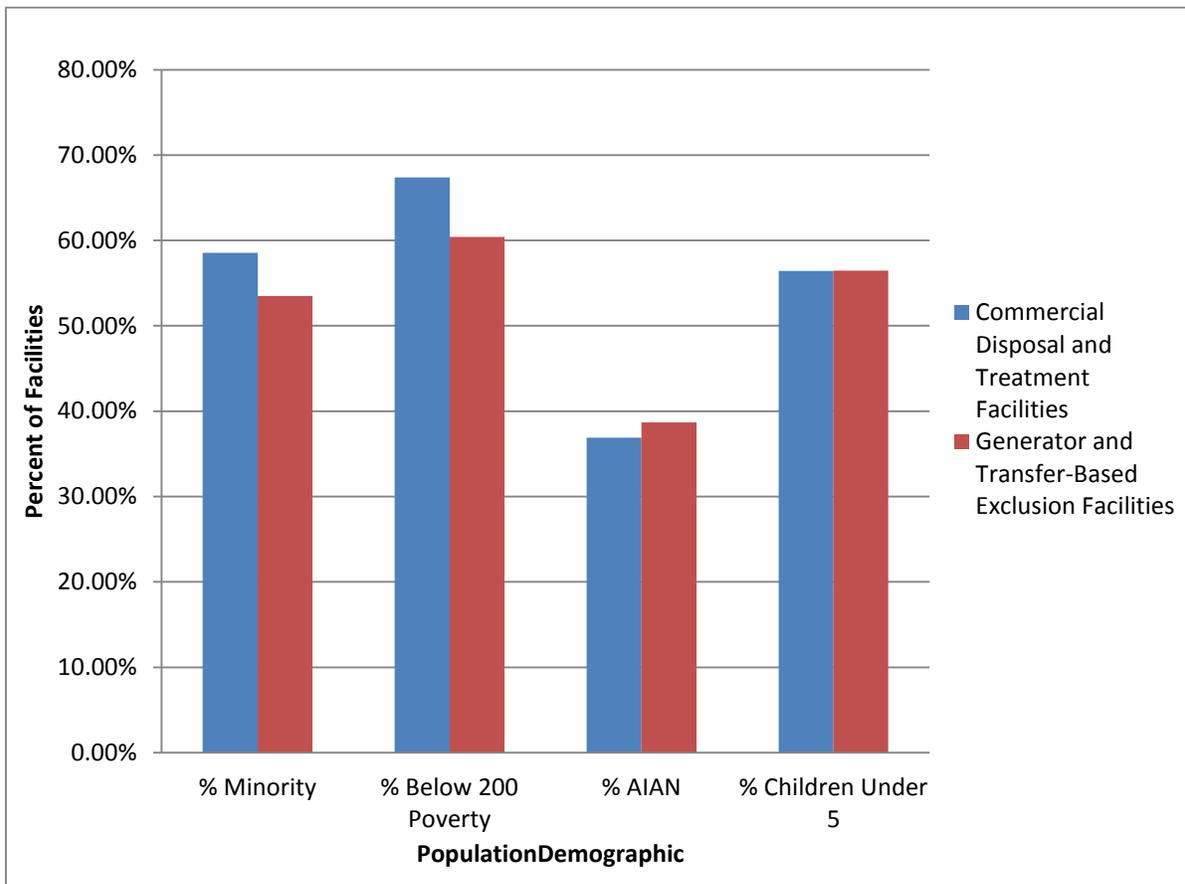
Figure 3.1 shows the comparison from Table 3-1 in a bar chart for just those facilities with greater percent population demographics than the corresponding state population demographics.

The results of the demographic analysis of commercial hazardous waste facilities that do not recycle can be found in Attachment E.

Table 3-1 Comparison of Population Demographics at a State Level Between Commercial Disposal and Treatment Facilities and Hazardous Waste Facilities

Demographic Group	% of Facilities with % Demographics Greater than State			% of Facilities with % Demographics Less than State			Mean Difference Between Facility and State % Demographics			Median Difference Between Facility and State % Demographics		
	Commercial Hazardous Waste Facilities that do not Recycle	Hazardous Waste Facilities	Difference	Commercial Hazardous Waste Facilities that do not Recycle	Hazardous Waste Facilities	Difference	Commercial Hazardous Waste Facilities that do not Recycle	Hazardous Waste Facilities	Difference	Commercial Hazardous Waste Facilities that do not Recycle	Hazardous Waste Facilities	Difference
Minority (all except non-Hispanic whites)	58.56%	53.48%	-5.08%	41.44%	46.52%	5.08%	10.57%	5.07%	-5.50%	5.94%	1.30%	-4.63%
Below 200% Poverty Level	67.38%	60.43%	-6.95%	32.62%	39.57%	6.95%	7.17%	4.37%	-2.80%	7.11%	4.10%	-3.01%
American Indians or Alaska Natives	36.90%	38.68%	1.78%	63.10%	61.32%	-1.78%	-0.01%	0.00%	0.01%	-0.24%	-0.18%	0.07%
Children under age 5	56.42%	56.45%	0.04%	43.58%	43.55%	-0.04%	0.22%	0.32%	0.09%	0.29%	0.30%	0.01%

Figure 3.1 Comparison Between Commercial Disposal and Treatment Facilities and Hazardous Waste Facilities with Population Demographics Greater than State Population Demographics



4 Sensitivity Analysis

EPA conducted a sensitivity analysis on the notification facilities for the four demographic cohorts. This analysis is used to demonstrate if the composition of the potentially affected community changes significantly in regards to distance from a facility and if those changes could present an additional burden on specific cohort within the population.

EPA evaluated population demographics within 1-km and 3-km radius from a notification facility using the areal apportionment method referenced in Section 2.2.2 Figure 6.1. displays the following populations percentages for minority, persons below 200% poverty, American Indian and Alaska Native, and children under five within 1-km, 3-km, or at the national level. As shown in Figure 6.1 below, minority populations are higher within a 1-km radius of the facility than between one and 3-km; however, it is still under the national percentage. Populations within 1-km of a facility had the highest percentage of persons below 200% poverty, but the lowest percentage of American Indian and Alaska Native or children under five. National percentages were generally higher than percentage populations within 3-km and 1-km for all categories except persons below 200% poverty.

The United Church of Christ report²³ conducted a similar analysis focusing on the percent people of color living near hazardous waste facilities. The authors evaluated all people of color, African Americans, Hispanic or Latino, Asian/Pacific Islander, and Native American populations within 1-km, between 1- and 3-km, between 3- and 5-km, and beyond 5 km of a hazardous waste facility. Despite the difference in scope, the EPA analysis did provide some similar results. The percentages of American Indian and Alaska Native in both reports were similar. The evaluation of minority, or people of color, was different for both reports. Although the percentage was higher at within 1-km compared to between 1 and 3-km, the analyses differed beyond 3-km. This could be attributed to the difference in scope (i.e. beyond 3-km versus national percentages) and the difference in sample size, as the sensitivity analysis in this report was limited to notification facilities.

Additional analyses, such as historical changes demographic changes, are beyond the scope of this analysis.

Table 4-1 Sensitivity Analysis for Notification Facilities Comparing Demographics within 1 km and 1 to 3 km Compared to National Demographics

Demographic Group	Percentage of Population in Each Demographic Group		
	Within 1 km Radius Around Facility	Between 1 and 3 km Around Facility	National
Minority (all except non-Hispanic whites)	25.31%	24.09%	36.11%
Below 200% Poverty Level	33.11%	32.55%	31.65%
American Indians or Alaska Natives	0.72%	0.90%	1.43%
Children under age 5	6.27%	6.48%	6.62%

²³ Mohai, P. and R. Saha. 2007. Toxic Wastes and Race at Twenty - 1987-2007: Grassroots Struggles to Dismantle Environmental Racism in the United States. United Church of Christ. pp. 175

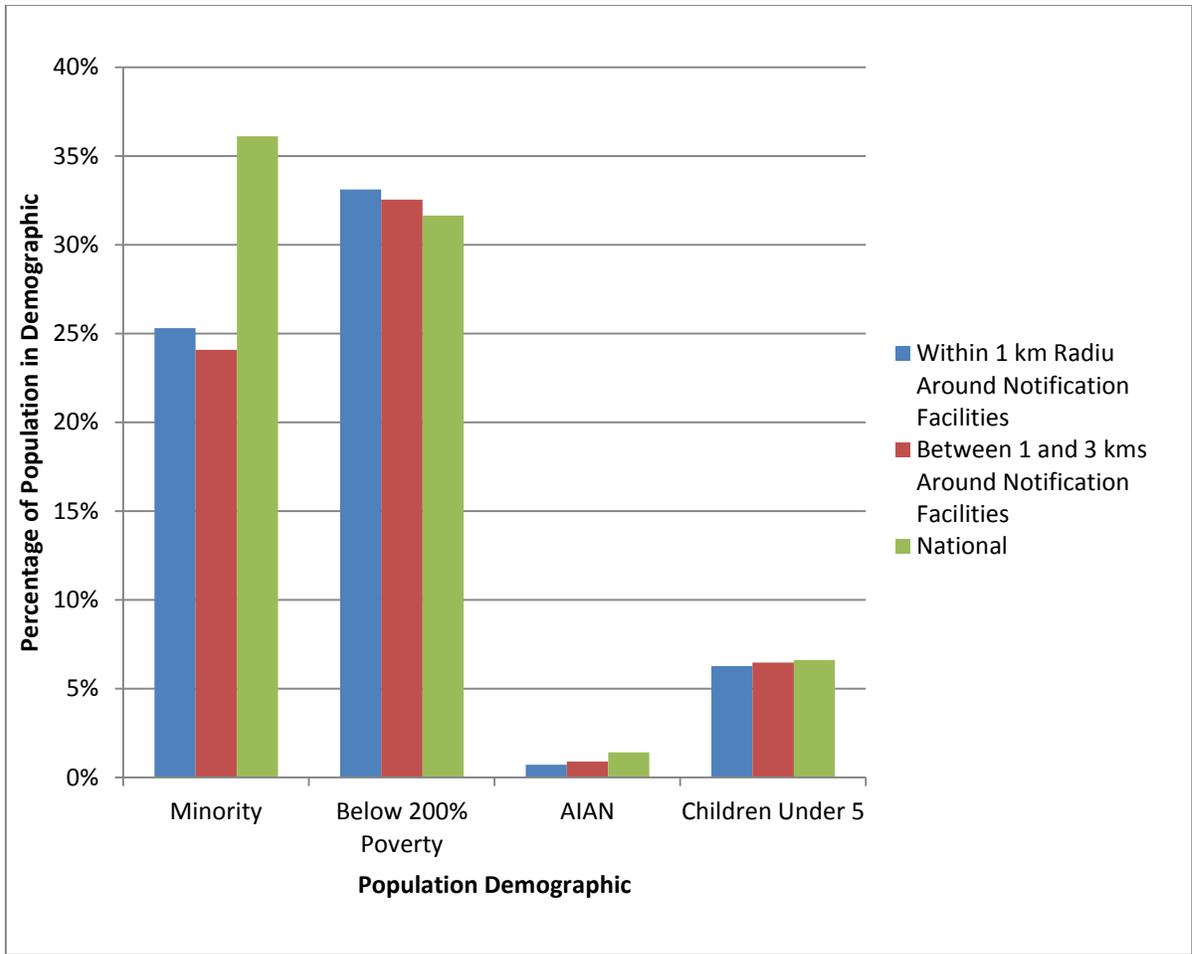


Figure 2.1 Sensitivity Analysis for Notification Facilities Comparing Demographics within 1 km and 1 to 3 km Compared to National Demographics

5 Other Factors that Affect Vulnerability in Communities

Environmental justice means that all people, regardless of race, color, national origin, or income, receive fair treatment and equal environmental protection, and have the opportunity for meaningful involvement in decisions that will affect the environment and/or the health of their community. The previous chapters of this report present a detailed analysis of a number of indicators related to the facilities and surrounding communities that could be impacted under the current DSW exclusions. However, because of the broad and encompassing definition of EJ, there are many other ways to examine factors that could affect the vulnerabilities of communities.

This chapter examines a number of additional factors that could affect the vulnerabilities of communities under the current DSW exclusions. Section 5.1 identifies and briefly describes some additional factors not analyzed in the previous chapters, while Section 5.2 summarizes data that EPA has compiled on some of these factors to characterize the vulnerabilities of communities surrounding the 61 notification facilities.

5.1 Overview of Factors that Affect Vulnerability

This section identifies additional factors that could affect a community's vulnerability under the rule. These factors are described under four broad categories:

- Susceptible Populations
- Multiple and Cumulative Effects
- Unique exposure pathways
- Ability to Participate in the Decision-Making Process
- Physical Infrastructure

While this report does not attempt to quantify all the potential factors that could affect a community's vulnerability to environmental pollutants, the following discussion is intended to give an overview of other considerations that may apply in some cases. The health of community can be looked at in many ways. EPA selected specific factors for analysis based on their relevance to the risks associated with HSM reclamation and the availability of information about those factors from reliable information sources such as the EJView tool.

5.1.1 Susceptible Populations

Susceptible populations are groups that are at a relatively high risk of suffering the adverse effects of environmental hazards. Certain factors may render different groups less able to resist or tolerate an environmental stressor. These susceptibility factors may be intrinsic in nature (e.g., based on age, sex, genetics, and race). For example, young children, pregnant women, nursing mothers, and the elderly may be more likely to suffer health consequences from a toxic chemical exposure than healthy adults. The proximity of children under five to facilities that may begin operating under the current DSW exclusions is presented in Section 2, although there are likely other types of susceptible populations in these communities as well.

5.1.2 Multiple and Cumulative Effects

Minority, low-income, and indigenous communities that have been impacted by multiple environmental hazards may be at risk for increased adverse health consequences. Environmental hazards can include, for example, industrial facilities, landfills, transportation-related air pollution, poor housing, leaking underground tanks, pesticides, and incompatible land uses. An

analysis of the cumulative effects from multiple stressors can provide a more complete evaluation of a population's health risks from pollutants. For example, an analysis of discrete stressors and effects on a population might conclude that nearby pollution sources are within regulatory limits; however, the cumulative effects might result in a person's aggregate exposure to a particular contaminant from multiple sources exceeding a health-based limit.

Some factors may provide data on the potential sources of cumulative stress, such as the total number of facilities that may emit environmental pollutants. Other factors may provide data on environmental conditions that could cause stress (e.g., transport routes, such as water or air quality or meteorological conditions). Finally, other factors may provide data on potential or actual human exposures to stressors, such as health data. Examples of factors include the following:

Existing Pollution Sources

- Number of facilities reporting to EPA – EPA's Envirofacts database keeps track of regulated facility data from 14 data systems. Examples are listed below. The number of regulated facilities within a community can indicate the number or proximity of pollution sources.
 - Resource Conservation and Recovery Act Information (RCRAInfo) – contains information on facilities that generate, transport, treat, store or dispose of hazardous waste. This factor is examined in Section 5.2.
 - Air Facility System (AFS) - contains compliance and permit data for stationary sources regulated by EPA, state and local air pollution agencies. This factor is examined in Section 5.2.
 - Comprehensive Environmental Response, Compensation & Liability Information System (CERCLIS) – contains information on hazardous waste sites, potentially hazardous waste sites and remedial activities across the nation, including sites that are on the National Priorities List (NPL) or being considered for the NPL. This factor is examined in Section 5.2.

Environmental Quality Factors

- Non-Point Source Air Emissions - The CAA requires EPA to set National Ambient Air Quality Standards (NAAQSs) for pollutants considered harmful to public health and the environment. EPA has set NAAQSs for six principal pollutants, which are called "criteria" pollutants (e.g., carbon monoxide, ozone, particulate matter). In addition, the CAA requires EPA to identify and list all air pollutants (not already identified as criteria pollutants) that "may reasonably be anticipated to result in an increase in mortality or an increase in serious irreversible or incapacitating reversible illness." For each hazardous air pollutant (HAP) identified, EPA was to then promulgate national emissions standards for hazardous air pollutants (NESHAPs). The quantity of these pollutants in the local atmosphere can help to indicate cumulative air hazards. This factor is examined in Section 5.2 for a limited number of criteria pollutants and HAPs.

Health-Related Factors

- Cancer – The threat of cancer can be measured based on the total cancer risk per million, by tract or county, as determined by the 2002 National-Scale Air Toxics Assessment (NATA). NATA is EPA's ongoing comprehensive evaluation of air toxics in the U.S. EPA developed the NATA as a state-of-the-science screening tool for State/Local/Tribal

Agencies to prioritize pollutants, emission sources and locations of interest for further study in order to gain a better understanding of risks. NATA assessments do not incorporate refined information about emission sources, but rather, use general information about sources to develop estimates of risks which are more likely to overestimate impacts than underestimate them. NATA provides estimates of the risk of cancer and other serious health effects from breathing (inhaling) air toxics in order to inform both national and more localized efforts to identify and prioritize air toxics, emission source types, and locations which are of greatest potential concern in terms of contributing to population risk.²⁴ This factor is examined in Section 5.2.

- Non-cancer – The threat of a non-cancer illness (neurological or respiratory) can be measured based on the sum of hazard quotients that affect the same target organ, by tract or county, as determined by the 2002 NATA. See above for a description of NATA. This factor is examined in Section 5.2.

5.1.3 Unique Exposure Pathways

Other susceptibility factors may stem from unique pathways for exposure. For example, certain lifestyle patterns may present unique exposure pathways, such as relative source contributions for people that get a significant portion of their diet from food they grow or catch themselves. For example, some indigenous peoples that use fishing and hunting to provide food for their families may be more susceptible to contaminants found in the natural environment, such as chemicals that bioaccumulate in flora or fish. Section 2 of this report includes information about the American Indian and Alaska native populations in proximity to facilities that may generate or manage HSM under the current DSW exclusions. While this does not automatically correspond to individuals experiencing unique exposures pathways, it does indicate that such exposures might occur.

5.1.4 Ability to Participate in Decision-Making Process

A key element of environmental justice is ensuring that all people have an opportunity for meaningful involvement in decision-making. Certain groups may not have participated in decision making historically because of economic (e.g., income), social (e.g., language barriers, education levels, distrust of government), and structural reasons. A critical concern is whether, and the extent to which, communities have the ability to influence the types and number of regulated activities taking place in their community, as well as the requirements, conditions, and parameters by which they must operate (e.g., permit conditions).

Under the current DSW exclusions, facilities claiming an exclusion must submit an initial and biennial notification to EPA or the state, providing general facility information and describing the HSM types and activities. Thus, under both the existing hazardous waste regulations and the DSW rule, EJ communities have a similar ability to identify the facilities that are recycling HSM in their communities, and the types and amounts of waste recycled.

However, the existing hazardous waste regulations require some hazardous waste recycling facilities to get a RCRA permit. Permitted facilities are subject to public involvement during the permitting process, and facilities and regulators are required to solicit and consider community input into the permitting decision-making process. Under the current DSW exclusions, HSM reclaimers may not be subject to permitting requirements, and EJ communities may not have the same opportunities be informed about the siting and permitting of HSM reclaimers and participate in the decision-making process. Thus, by removing the RCRA permitting

²⁴ For additional information on NATA, go to: <http://www.epa.gov/ttn/atw/natamain/>.

requirement, the current DSW exclusions also inadvertently removed one of the key provisions allowing the community to participate in the regulatory process. Communities with lower participation levels may experience greater adverse impacts because their input has not been considered fully, particularly if competing interests are set forth more effectively. This effect is most likely to occur in communities that have traditionally been excluded from the decision making process. However, not all hazardous waste recycling facilities are required to get permits under the hazardous waste regulations.

In addition to the permitting process, the DSW Rule requires that generators make reasonable efforts to ensure that their hazardous secondary materials are safely and legitimately recycled. When HSM reclaimers are located in EJ communities, and the generators of the wastes are small businesses, the generators' ability to conduct reasonable efforts determinations may be impacted. Not all generators will have the same ability to perform reasonable efforts audits, and the efficacy of these efforts will depend on the ability of the generator. For example, small or independent generators may have fewer financial resources or staff to use to conduct such audits, and may be more likely to miss indications that reclaimers are not legitimately recycling HSM. EPA did not analyze whether HSM reclaimers managing waste from small or independent generators were more likely to be located in EJ communities.

There are a number of factors that can measure the ability of a community to gain access to information or to meaningfully participate in the decision-making process. There also are factors that can measure whether and how well the community appears to be able to participate in the environmental decision-making process. Examples of possible factors include the following:

- Education level – Persons with less education may be generally less likely to participate in environmental decision-making. Because of less education, they may not be able to fully understand the information in local newspapers, notices, and other written media. They may also be less informed about events within their communities. This factor is examined in Section 5.2.
- English literacy – People who cannot speak or read English well may be less informed about activities of interest in their community because they cannot fully understand the information in local newspapers, broadcasts, notices, and other media, unless such information has been translated into a language that they are comfortable with. A lack of English literacy is an indicator that members of the community are immigrants or foreign born²⁵. Immigrant status, particularly new immigrants and undocumented workers and residents may experience significant communication barriers to participating in decision making. This factor is examined in Section 5.2.
- Communication channels – Some regulations require that regulated entities issue public announcements of their proposed actions and solicit public comments. Without such communication channels, meaningful community involvement is less likely.

5.1.5 Physical Infrastructure

The physical infrastructure of a community can contribute to making some residents more vulnerable to environmental hazards. Physical infrastructure can include, for example, public buildings (proximity to hospitals), safe drinking water, sewage treatment, public transportation,

²⁵ According to the U.S. Census 2007 American Community Survey, approximately 20% of the population spoke a language other than English at home. About half of these speakers reported not speaking English "very well." People speaking at a level below "very well" (ranging from well to not at all) are considered to need English assistance in some situations. In addition, more than half of non-English language speakers were foreign born.

and communication systems (e.g., telephones, Internet access). Access to such infrastructure may affect a community's ability to avoid exposures to harmful pollutants or, if they are already exposed, to detect the exposure, get proper treatment, or take other mitigating steps.

For example, some groups or communities have insufficient access to health care facilities. Those without access may go undiagnosed and untreated. People without easy access to health care facilities include those without health insurance and those unable to travel to health care facilities. For example, low-income groups and some elderly and disabled individuals, with limited or no access to private transportation, may need public transportation to access health care facilities. If nearby public transportation does not exist, they may not be able to receive the level of health care that they need.

Examples of possible factors include the following:

- Number of hospitals – Some groups, such as inner city residents or indigenous populations, might not live near a hospital and therefore have to travel longer distances for medical care; this may limit the frequency and quality of care they receive. Communities with more hospitals have a wider selection of medical resources from which to choose; they can select the type and quality of health care appropriate for their particular needs. This factor is examined in Section 5.2.
- Medically underserved – Some groups may differ in the level and quality of health care they traditionally receive. This may be due to cultural differences, treatment disparities stemming from socio-economic barriers (e.g., lack of insurance) or other factors. This factor is examined in Section 5.2.

5.2 Summary of Analysis of Factors that Affect Vulnerability for 61 Notification Facilities

EPA has compiled data on some of the factors described above to characterize the vulnerabilities of communities potentially affected by the DSW rule. Specifically, EPA has compiled these data on the communities surrounding the 61 notification facilities. While EPA does not have information to know whether or not these results would reflect or represent all of the facilities that may eventually have claimed an exclusion under the current DSW exclusions, EPA believes it provides preliminary information regarding the possible extent of multiple exposures to the 61 notification facilities. EPA did not analyze factors that affect vulnerability for communities around damage case facilities because these facilities represent historical hazards, and may not be indicative of facilities that will generate and manage HSM under the DSW rule in the future. In addition, EPA did not analyze factors that affect vulnerability for communities around hazardous waste facilities and non-hazardous industrial waste facilities because these analyses were beyond the scope of this analysis. The results of this data collection are summarized in Table 4.1.

Because of the potential for adverse impacts to communities located around DSW facilities, each of the factors described in Section 5.1 has the potential to exacerbate those adverse impacts. While EPA has not attempted to quantify or determine the potential disproportionality of every possible factor, Table 4.1 does demonstrate that some communities around DSW facilities are potentially affected by these factors.

In particular, an examination of the facilities that have notified under the current DSW exclusions shows that multiple environmental hazards are a potential concern for communities around these facilities. All have multiple facilities reporting to EPA, either under RCRA, the Clean Air Act (CAA), or Comprehensive Environmental Response, Compensation and Liability

Act, (CERCLA - also known as Superfund) within a 3-km radius of the facility. Twenty-six of the forty facilities had communities with cancer rates greater than the 80th percentile, and twenty-seven showed a greater than the 80th percentile in neurological hazard rates. Twenty-seven facilities also had no hospital facilities within the 3-km area.

In addition, as noted in Section 5.1, one of the specific potential impacts of the current DSW exclusions is that facilities and regulators are not required to solicit or consider community input into the decision-making process regarding DSW facilities, as is the case with RCRA permitted facilities. Thus by removing the RCRA permitting requirement for facilities that manage excluded hazardous secondary materials, the current DSW exclusions also removed one of the key provisions for allowing communities to participate in the regulatory process (at least as it concerns the management of the hazardous secondary materials excluded under the rule). Communities with lower participation levels may experience greater adverse impacts from environmental decision-making because their input has not been considered fully, particularly if competing interests are set forth more effectively. This effect is most likely to occur in communities that have traditionally been excluded from the decision-making process.

Table 4.1. Other Factors that Affect Vulnerability in Communities Affected By Recycling Notification Facilities

Facility			Ability to Participate in Decision Making Process		Physical Infrastructure		Multiple and Cumulative Effects												
			Percent of Population (Within 3 km of the Facility)		Transportation and Health Care Availability (Within 3 km of the Facility)		Health Risks (Persons per Million Expected to Contract Disease Over a 70 Year Period Within the County of the Facility)			Non-Point Source Air Emissions (Tons Per Year Within the County of the Facility)						Number of Facilities Reporting to EPA (Within 3 km of the Facility)			
Name	City	State	Education Less than High School Diploma	Non-English Speaking	Number of Hospitals	Medically Underserved	Cancer	Neurological Hazard	Respiratory Hazard	Carbon Monoxide	Ammonia	Nitrogen Oxide	Particulates (size < 10 µm)	Particulates (size < 2.5 µm)	Sulfur Dioxide	Volatile Organic Compounds	RCRA	AFS	CERCLIS
Curries 12th St NW Facility IA0000362905	MASON CITY	IA	16.5%	3.8%	1	No	21.75 (70.5 Percentile)	.04 (68.5 Percentile)	1.67 (71.6 Percentile)	1,339	2,634	258	5,121	1,008	322	1,200	78	22	1
Curries 9th Street Facility IAD043490150	MASON CITY	IA	15.6%	4.1%	1	No	21.75 (70.5 Percentile)	.04 (68.5 Percentile)	1.67 (71.6 Percentile)	1,339	2,634	258	5,121	1,008	322	1,200	94	36	1
Diamond Vogel Paint Co., Inc. IAD055803423	BURLINGTON	IA	20.0%	3.4%	2	Yes	32.37 (90.4 Percentile)	.08 (93.4 Percentile)	1.01 (52.3 Percentile)	592	569	287	4,143	677	329	914	45	21	1
Fres-co System USA, Inc IAR000007013	RED OAK	IA	27.0%	4.3%	0	No	14.31 (32.6 Percentile)	.03 (40.4 Percentile)	.58 (31.1 Percentile)	137	1,367	51	2,865	499	60	261	26	9	0
Iowa Contract Fabricators Inc IA0000990762	RICEVILLE	IA	22.3%	7.5%	2	No	11.34 (14.2 Percentile)	.02 (17 Percentile)	.28 (14.5 Percentile)	497	2,123	70	3,424	647	71	223	3	3	0
Iowa Mold Tooling Company Inc IAD005286539	GARNER	IA	11.1%	1.6%	1	No	12.42 (19.2 Percentile)	.03 (52.2 Percentile)	.41 (21.2 Percentile)	597	2,484	67	4,588	846	60	553	11	5	0
John Deere Davenport Works IAD073489726	DAVENPORT	IA	8.0%	4.1%	0	No	33.17 (91.1 Percentile)	.09 (95.3 Percentile)	2.34 (81.4 Percentile)	1,071	1,964	1,037	8,066	1,251	1,040	2,990	35	11	0
John Deere Des Moines Works IAD069624500	ANKENY	IA	5.4%	6.9%	1	No	26.04 (81.2 Percentile)	.2 (98.7 Percentile)	2.56 (83.7 Percentile)	2,587	1,642	1,717	16,882	2,479	3,003	7,512	18	16	1
John Deere Dubuque Works IAD005269527	DUBUQUE	IA	16.9%	2.9%	0	No	23.75 (76.2 Percentile)	.05 (74.2 Percentile)	1.56 (69.3 Percentile)	2,452	4,603	561	8,248	1,477	739	2,368	7	3	2
John Deere Engine Works IAD000678094	WATERLOO	IA	8.8%	8.2%	1	No	27.95 (84.4 Percentile)	.04 (72.1 Percentile)	2.13 (78.6 Percentile)	2,642	2,245	687	7,244	1,351	853	3,007	25	14	0
John Deere Waterloo Works IAD000805168	WATERLOO	IA	19.9%	5.2%	0	No	27.95 (84.4 Percentile)	.04 (72.1 Percentile)	2.13 (78.6 Percentile)	2,642	2,245	687	7,244	1,351	853	3,007	7	5	0
Siegwerk USA Co IAD078096732	DES MOINES	IA	30.7%	16.1%	2	Yes	26.04 (81.2 Percentile)	.2 (98.7 Percentile)	2.56 (83.7 Percentile)	2,587	1,642	1,717	16,882	2,479	3,003	7,512	208	141	0
Siegwerk USA Co IAR000007377	DES MOINES	IA	9.0%	6.2%	0	No	26.04 (81.2 Percentile)	.2 (98.7 Percentile)	2.56 (83.7 Percentile)	2,587	1,642	1,717	16,882	2,479	3,003	7,512	34	46	1
Vogel Paint & Wax Co Inc IAD007276728	ORANGE CITY	IA	16.8%	5.1%	1	No	20.62 (66.4 Percentile)	.04 (70.6 Percentile)	.46 (24.6 Percentile)	1,309	13,326	187	7,169	1,306	226	1,117	10	7	0

Table 4.1. Other Factors that Affect Vulnerability in Communities Affected By Recycling Notification Facilities

Facility			Ability to Participate in Decision Making Process		Physical Infrastructure		Multiple and Cumulative Effects												
			Percent of Population (Within 3 km of the Facility)		Transportation and Health Care Availability (Within 3 km of the Facility)		Health Risks (Persons per Million Expected to Contract Disease Over a 70 Year Period Within the County of the Facility)			Non-Point Source Air Emissions (Tons Per Year Within the County of the Facility)					Number of Facilities Reporting to EPA (Within 3 km of the Facility)				
Name	City	State	Education Less than High School Diploma	Non-English Speaking	Number of Hospitals	Medically Underserved	Cancer	Neurological Hazard	Respiratory Hazard	Carbon Monoxide	Ammonia	Nitrogen Oxide	Particulates (size < 10 µm)	Particulates (size < 2.5 µm)	Sulfur Dioxide	Volatile Organic Compounds	RCRA	AFS	CERCLIS
Aleris Rolled Products, Inc NJD051415909	CLAYTON	NJ	19.9%	6.7%	0	Yes	32.12 (90.1 Percentile)	.05 (81.8 Percentile)	4.08 (93 Percentile)	4,428	688	797	3,015	842	389	6,882	41	5	1
Aluminum Shapes LLC NJD002338267	CAMDEN	NJ	22.3%	12.6%	0	No	39.26 (95.8 Percentile)	.07 (91.7 Percentile)	5.09 (95.8 Percentile)	3,166	720	1,497	2,978	670	504	6,803	187	47	12
Anadigics, Inc. NJR000036301	WARREN	NJ	7.6%	21.2%	0	No	33.08 (90.9 Percentile)	.06 (85.4 Percentile)	4.39 (93.9 Percentile)	2,055	538	1,047	3,214	560	272	3,907	38	3	0
Melton Sales & Service NJD981483035	BORDENTO WN	NJ	16.2%	9.9%	0	No	33.54 (91.7 Percentile)	.06 (87.7 Percentile)	4.94 (95.4 Percentile)	6,877	960	1,351	4,869	1,330	454	10,554	7	2	1
Melton Sales & Service NJR000075796	BURLINGTO N	NJ	14.9%	11.8%	1	No	33.54 (91.7 Percentile)	.06 (87.7 Percentile)	4.94 (95.4 Percentile)	6,877	960	1,351	4,869	1,330	454	10,554	49	9	0
Safety-Kleen Systems, Inc (Linden Facility) NJD002182897	LINDEN	NJ	22.9%	32.3%	0	No	51.24 (98.8 Percentile)	0.11 (96.1 Percentile)	7.49 (98.6 Percentile)	1,889	692	1,632	1,600	379	602	8,419	380	71	3
Sancoa International NJD986629491	LUMBERTO N	NJ	8.0%	7.9%	0	No	33.54 (91.7 Percentile)	.06 (87.7 Percentile)	4.94 (95.4 Percentile)	6,877	960	1,351	4,869	1,330	454	10,554	10	2	0
Siegfried USA Incorporated NJD064344575	PENNSVILLE	NJ	22.5%	6.5%	0	Yes	28.42 (85.1 Percentile)	.04 (72.9 Percentile)	3.19 (88.2 Percentile)	2,366	784	226	1,583	448	156	1,481	13	3	0
Veolia ES Technical Solutions LLC NJD002454544	MIDDLESEX	NJ	16.6%	29.8%	1	No	42.44 (97.1 Percentile)	0.08 (94 Percentile)	5.89 (97 Percentile)	2,313	1,110	2,352	4,212	624	688	11,328	207	41	8
Viking Yacht Company NJD002482545	NEW GREटना	NJ	21.2%	4.4%	0	No	33.54 (91.7 Percentile)	.06 (87.7 Percentile)	4.94 (95.4 Percentile)	6,877	960	1,351	4,869	1,330	454	10,554	2	1	0
BAE Systems, Land & Armaments PAD003025418	YORK	PA	20.8%	3.5%	0	No	38.59 (95.3 Percentile)	0.09 (94.9 Percentile)	4.15 (93.3 Percentile)	10,384	3,488	1,904	17,754	3,425	1,940	8,496	9	3	0
Carpenter Technology Corporation PAD002344315	READING	PA	34.6%	31.6%	1	Yes	39.16 (95.7 Percentile)	.08 (93.1 Percentile)	3.29 (88.7 Percentile)	8,000	4,298	1,802	14,280	2,690	2,367	10,315	156	34	0
Cherokee Pharmaceutical s, LLC PAD003043353	RIVERSIDE	PA	20.1%	5.2%	0	No	23.91 (76.6 Percentile)	.08 (93.8 Percentile)	2.04 (77.3 Percentile)	3,940	1,628	409	4,675	911	800	1,785	19	5	0
Erie Plating Co PAD005031448	ERIE	PA	22.1%	11.8%	4	No	28.53 (85.3 Percentile)	0.06 (88.9 Percentile)	1.32 (63.2 Percentile)	2,570	822	1,631	7,677	1,279	2,032	9,674	206	38	0
International Metals Reclamation	ELLWOOD CITY	PA	17.6%	3.9%	0	No	26.33 (81.9 Percentile)	0.06 (84 Percentile)	1.97 (76.4 Percentile)	1,512	610	451	3,661	647	577	2,071	41	16	0

Table 4.1. Other Factors that Affect Vulnerability in Communities Affected By Recycling Notification Facilities

Facility			Ability to Participate in Decision Making Process		Physical Infrastructure		Multiple and Cumulative Effects												
			Percent of Population (Within 3 km of the Facility)		Transportation and Health Care Availability (Within 3 km of the Facility)		Health Risks (Persons per Million Expected to Contract Disease Over a 70 Year Period Within the County of the Facility)			Non-Point Source Air Emissions (Tons Per Year Within the County of the Facility)					Number of Facilities Reporting to EPA (Within 3 km of the Facility)				
Name	City	State	Education Less than High School Diploma	Non-English Speaking	Number of Hospitals	Medically Underserved	Cancer	Neurological Hazard	Respiratory Hazard	Carbon Monoxide	Ammonia	Nitrogen Oxide	Particulates (size < 10 µm)	Particulates (size < 2.5 µm)	Sulfur Dioxide	Volatile Organic Compounds	RCRA	AFS	CERCLIS
Company, Inc PAD087561015																			
Jerr-Dan Corp PAD047518014	GREENCASTLE	PA	20.1%	3.1%	0	Yes	21.25 (68.6 Percentile)	0.05 (73.7 Percentile)	1.75 (73.2 Percentile)	3,371	4,933	531	8,056	1,420	596	3,645	15	2	0
Jerr-Dan Corp Wrecker Div PAR000029769	GREENCASTLE	PA	24.5%	3.8%	0	Yes	21.25 (68.6 Percentile)	.05 (73.7 Percentile)	1.75 (73.2 Percentile)	3,371	4,933	531	8,056	1,420	596	3,645	28	12	0
John Maneely Co Wheatland Tube Division PAD004322863	SHARON	PA	21.0%	4.6%	0	Yes	22.01 (71.4 Percentile)	0.07 (90.1 Percentile)	1.58 (69.6 Percentile)	2,184	1,036	644	6,286	1,049	797	3,290	49	4	2
John Maneely Co Wheatland Tube Division PAD004338091	WHEATLAND	PA	29.0%	4.4%	0	No	22.01 (71.4 Percentile)	0.07 (90.1 Percentile)	1.58 (69.6 Percentile)	2,184	1,036	644	6,286	1,049	797	3,290	39	12	1
John Maneely Co Wheatland Tube Division PAR000038067	WHEATLAND	PA	25.4%	5.6%	0	No	22.01 (71.4 Percentile)	0.07 (90.1 Percentile)	1.58 (69.6 Percentile)	2,184	1,036	644	6,286	1,049	797	3,290	42	12	1
Johnson Matthey Emissions Control Technologies PAD980829287	WAYNE	PA	2.9%	13.0%	0	No	39.04 (95.6 Percentile)	.08 (92.6 Percentile)	5.61 (96.5 Percentile)	3,689	337	1,902	5,456	1,144	2,034	10,014	47	6	0
Johnson Matthey Emissions Control Technologies PAR000519322	SMITHFIELD	PA	27.6%	2.9%	0	Yes	26.6 (82.5 Percentile)	0.04 (67.6 Percentile)	1.78 (73.3 Percentile)	3,522	424	633	4,885	900	1,097	2,749	6	1	0
Piezo Kinetics Inc PAR000036772	BELLEFONTAINE	PA	19.3%	4.0%	0	No	26.15 (81.6 Percentile)	.05 (80.1 Percentile)	1.91 (75.4 Percentile)	6,428	953	603	7,483	1,457	1,147	2,911	18	7	0
Spectrum Control Technology Inc PAD043882323	STATE COLLEGE	PA	5.0%	16.2%	0	No	26.15 (81.6 Percentile)	0.05 (80.1 Percentile)	1.91 (75.4 Percentile)	6,428	953	603	7,483	1,457	1,147	2,911	48	13	0
Triangle Circuits PAD981037377	OAKMONT	PA	13.8%	5.6%	0	No	63.86 (99.5 Percentile)	0.12 (96.9 Percentile)	5.34 (96.1 Percentile)	8,744	499	5,159	8,770	2,071	5,179	22,416	108	36	0
World Resources Company PAD981038227	POTTSVILLE	PA	25.1%	4.7%	0	No	22.08 (71.9 Percentile)	.07 (90.9 Percentile)	1.87 (74.8 Percentile)	11,143	998	768	6,657	1,404	2,018	3,623	23	9	1

Source - EPA EJView tool

6 Summary of Results: Assessment of Disproportion Adverse Impacts

6.1 Community-level and Population-level Impacts

Disproportionality was evaluated both at the community and at the population level.

For the community-level analysis, the question is whether the communities in a facility category had a higher or lower percentage of minority and/or low-income population as compared to the comparison population (i.e., national or state population). In general, some communities will have a higher percentage than the comparison population, some will have a lower percentage. As long as these differences have a regular distribution, they would not indicate disproportionate impact. However, if the number of communities with a higher percentage of minority and/or low-income population is greater than that of the comparison populations, then there is a potential for disproportionate impact. The higher the average difference between the potentially affected communities and the comparison group, the greater the potential disproportionality.

In the chart below, the damage case facilities are the only category that consistently demonstrates the potential for disproportionate impact on both minority and low-income communities. For both the national and the state comparison populations, more than 50% of the damage case facilities are located in communities with minority and low-income populations that have a higher representation than the comparison populations. In addition, the average difference in these cases (i.e., the average amount that the damage case facilities have a higher-than-average percentage of minorities or low-income populations) range from 7-9%. Hazardous waste facilities demonstrate a potential for disproportionate impacts to minority communities in the state comparison but not the national.

Notification and hazardous waste facilities consistently demonstrate the potential for disproportionate impact on low-income communities at both the national and state level, an increase as compared to the results in the draft 2011 DSW environmental justice analysis, likely attributable to the fact that EPA revised the standard for identifying “low income” community to two times the poverty level in response to peer review and public comments.

**Community-Level Analysis of Potential Disproportionate Impacts
of the DSW Exclusions to Minority and Low-Income Communities**

Highlighted Values Indicate Potential Disproportionate Impact

	National Comparison % communities with higher minority representation (average difference)	National Comparison % communities with higher low-income representation (average difference)	State Comparison % communities with higher minority representation (average difference)	State Comparison % communities with higher low-income representation (average difference)
Notification Facilities (60 total)	26.7% (-11.84%)	51.7% (1.17%)	48.3% (0.23%)	68.3% (5.25%)
Damage Case Facilities (250 total)	52.4% (6.97%)	68.0% (8.65%)	52.4% (7.20%)	71.2% (8.98%)
Hazardous Waste Facilities (2,115 total)	46.8% (1.37%)	59.7% (4.17%)	53.5% (5.07%)	60.4% (4.37%)
Non-Hazardous Industrial Waste Facilities (25 total)	36.0% (-4.0%)	48.0% (-0.08%)	44.0% (-0.82%)	44.0% (-0.73%)

The population-level analysis examines the demographics of the total potentially affected population as compared to the total comparison population to determine (1) whether there is a substantially greater probability of members in a population group of concern (minority or low-income) being present as compared to members of the comparison population, and (2) whether members of the population group of concern comprised a substantially greater proportion of the potentially affected population than the comparison populations. These two comparisons are referred to as (1) the Affected Population Ratio, and (2) the Demographic Ratio. In both cases, if the ratio is greater than 1.0, then there is a potential for disproportionate impact to the population of concern, and the larger the ratio, the greater the disproportionality.

**Population-Level Analysis of Potential Disproportionate Impacts
to Minority and Low-Income Communities**

*Highlighted Values Indicate Potential Disproportionate Impact to Population of Concern
All Results Statistically Significant (p-value <0.05)*

	National Comparison Minority Population Affected Population Ratio Demographic Ratio	National Comparison Low-Income Population Affected Population Ratio Demographic Ratio	State Comparison Minority Population Affected Population Ratio Demographic Ratio	State Comparison Low-Income Population Affected Population Ratio Demographic Ratio
Notification Facilities (60 total)	0.83	1.00	1.39	1.31
	0.89	1.00	1.26	1.21
Damage Case Facilities (250 total)	2.45	1.60	2.28	1.76
	1.64	1.36	1.49	1.46
Hazardous Waste Facilities (2,115 total)	1.68	1.26	1.41	1.09
	1.42	1.19	1.22	1.06
Non- Hazardous Industrial Waste Facilities (25 total)	1.23	1.13	1.41	1.09
	1.14	1.09	1.22	1.06

The population-level analysis shows a greater incidence of potential disproportionate impact to minority and low-income populations than the community-level analysis. For the population-level analysis, the potential for disproportionate impact (i.e., ratios greater than one) occur under all categories. This difference can occur when the populations of those communities that do have a greater percentage of minority or low-income individuals also have a significantly higher total population than those communities that do not.

The level of statistical significance (p-value) depends on the size of the difference as well as the total population analyzed. Thus the same Affected Population or Demographic Ratio could be non-significant for a small number of facilities or a small state or region, but highly significant for a larger number of facilities or when data from multiple states are pooled. The Affected

Population and Demographic Ratios are presented as an indicator of the statistical significance of the results.

The analysis includes comparisons of data at county, state, and national levels to help assess the sensitivity of the results to sample size. The notification facilities were located in only a small number of states, and therefore EPA analyzed each individual state. For other facility types, facilities were located in a large number of states, which presented challenges for presenting the information concisely. While EPA conducted analyses for each state in which a facility was located, EPA aggregated the state-level comparison data into a single table for each facility category to streamline the presentation of the results.

In regions with few minorities, the minority population comparisons may be less important than the comparisons of low income populations because a larger percentage of the low income community may be White, non-Hispanics in such areas. Results for both minority and low-income populations are presented for each analysis.

Affected Population Ratios are presented in this chapter to help readers determine the statistical significance of the results presented. They are also used in the calculation of the Fischer's Exact test and Kendall test.

The statistical analyses for race differences focus on comparing minority (i.e., all populations except White, Non-Hispanic) and the minority sub-population of American Indian or Alaska Native (AIAN) with White Non-Hispanic populations. For the notification facilities, EPA analyzed some minority and key subpopulations, including minority, AIAN, Black or African American, Native Hawaiian or other Pacific Islander, Hispanic or Latino, or some other race. These race and ethnicity categories are those identified by the U.S. Census for 2010. Additional analyses of other racial or ethnic groups for damage cases, hazardous waste facilities, and non-hazardous industrial waste facilities are beyond the scope of this effort.

6.2 Underlying Vulnerabilities Traditionally Associated with Minority and Low-Income Communities Pose the Potential to Exacerbate Potential Adverse Impacts of the DSW Rule

As discussed in Section 5 of this report, other factors can increase the vulnerability in potentially affected communities to the potential adverse impact of the current DSW exclusions.²⁶ These factors are described under five broad categories: (1) Susceptible Populations, (2) Multiple and Cumulative Effects, (3) Unique Exposure Pathways, (4) Ability to Participate in the Decision-Making Process, and (5) Physical Infrastructure.

All of these factors have the potential to exacerbate the potential for adverse impacts to minority and low-income communities, but two of these factors are of particular concern to the current DSW exclusions: Ability to Participate in the Decision-Making Process, and Multiple and Cumulative Effects

Ability to Participate in the Decision-Making Process

²⁶ U.S. EPA *Interim Guidance on Considering Environmental Justice During the Development of an Action* July 2010. <http://www.epa.gov/environmentaljustice/resources/policy/considering-ej-in-rulemaking-guide-07-2010.pdf>

A key element of environmental justice is ensuring that all people have an opportunity for meaningful involvement in decision-making which may impact them. Certain groups may not have historically participated in decision-making because of economic (e.g., income), social (e.g., language barriers, education levels, distrust of government), and infrastructural reasons (e.g., access to public transportation). In addition, community groups may face higher barriers to participation than government or private sector entities. For example, taking advantage of existing public participation mandates may require a significant investment of community resources or volunteer effort, while government and private sector entities may have more resources or paid staff to perform these functions. A critical concern is whether, and the extent to which, communities have the ability to influence the types and number of regulated activities taking place in their community as well as the requirements, conditions, and parameters by which such activities must operate (e.g., permit conditions). Under the current DSW exclusions, facilities claiming an exclusion must submit an initial and biennial notification to EPA or the state, providing general facility information and describing hazardous secondary material types and activities under the exclusion.

However, under the current DSW exclusions this information is not made directly available to potentially affected communities, and facilities and regulators are not required to solicit or consider community input into the decision-making process as is the case with RCRA permitted facilities. Thus by removing the RCRA permitting requirement for facilities that manage excluded hazardous secondary materials, the current DSW exclusions also removed one of the key provisions for allowing communities to participate in the regulatory process (at least as it concerns the management of the hazardous secondary materials excluded under the rule). Communities with lower participation levels may experience greater adverse impacts from environmental decision-making because their input has not been considered fully, particularly if competing interests are set forth more effectively. This effect is most likely to occur in communities that have traditionally been excluded from the decision-making process.

Multiple and Cumulative Effects

Minority, low-income, and indigenous communities that have been affected by multiple pollution sources may be at risk for increased health consequences. Potential sources of pollution can include, for example, industrial facilities, landfills, transportation-related air emissions, poor housing conditions (e.g., lead-based paint), leaking underground tanks, pesticides, and incompatible land uses. An analysis of the cumulative effects from multiple stressors can provide a more complete evaluation of a population's health risks from pollutants. For example, an analysis of discrete stressors and effects on a population might conclude that nearby pollution sources are within regulatory limits; however, an analysis of cumulative effects might determine that a person's collective exposure to a contaminant from multiple sources exceeds a health-based limit.

An examination of the facilities that have notified under the current DSW exclusions shows that multiple environmental hazards are a potential concern for communities around these facilities. All have multiple facilities reporting to EPA, either under RCRA, the Clean Air Act (CAA), or Comprehensive Environmental Response, Compensation and Liability Act, (CERCLA - also known as Superfund) within a three-kilometer radius of the facility. Twenty-six of the forty facilities had communities with cancer rates greater than the 80th percentile, and twenty-seven showed a greater than the 80th percentile in neurological hazard rates. Twenty-seven facilities also had no hospital facilities within the three kilometer area.

6.3 Preventative and Mitigative Steps That Address the Potential Adverse Impacts to Minority and Low-Income Communities

The 2014 DSW final rule includes regulatory changes to the 2008 DSW final rule that address the potential adverse impacts from the current DSW exclusions, including potential adverse impacts to minority and low-income communities. As discussed in further detail in the preamble to the 2014 DSW final rule, these changes were made according to EPA's authority under RCRA to regulate discarded material. Because of these changes, the 2014 DSW final rule is expected to increase the level of environmental protection for all affected populations without having any disproportionately high and adverse human health or environmental effects on any population, including any minority or low-income population.

Below is a summary of the major changes to the current DSW exclusions promulgated in the 2014 DSW final rule, and how they address the potential adverse impacts to human health and the environment (including impacts to minority and low-income populations).

Replacement of the Transfer-Based Exclusion with the Verified Recycler Exclusion

The withdrawal of the transfer-based exclusion and its replacement with the verified recycler exclusion addresses the concerns regarding third-party recyclers. Under the new exclusion, generators must send their hazardous secondary materials to a RCRA-permitted reclaimer or to a verified hazardous secondary materials reclaimer who has obtained a solid waste variance from EPA or the authorized state.

For reclaimers without a RCRA permit, in order to obtain a variance and become verified, the third-party reclaimer must address criteria that essentially mirrors the criteria under the reasonable efforts condition in the transfer-based exclusion. This includes: (1) demonstrate their recycling is legitimate, (2) must have financial assurance in place to properly manage the hazardous secondary material, (3) must not have had any formal enforcement actions for RCRA violations in the previous three years and is not classified as a significant non-complier with RCRA Subtitle C, or must provide credible evidence that the facility will manage the hazardous secondary materials properly, (4) must have the proper equipment, trained personnel, and meet emergency preparedness and response requirements to safely reclaim the material, (5) must manage the residuals from reclamation properly, and (6) must address risk to nearby communities from potential releases of the hazardous secondary material and in consideration of existing environmental stressors.

Before a variance can be granted, it will also go through a public notice and comment process, allowing communities the opportunity to have a voice in the environmental decisions that may affect them.

Because of the additional oversight, public participation and controls under the verified recycler exclusion, the potential for increased adverse impact under Scenarios 4, 5, and 6 and the off-site options under Scenarios 1, 7, and 8 is minimized (see Section 2.1 of Volume 1 Hazard *Characterization* for an explanation of the scenarios).

Codified “Contained” Standard

In addition, the codification of the “contained” standard addresses the lack of preventative measures and the lack of RCRA air standards under the generator-controlled exclusions. Under the 2014 DSW final rule, the HSM must be contained in a unit (including a land-based unit) that meets the following criteria:

- (1) The unit is in good condition, with no leaks or other continuing or intermittent unpermitted releases of the hazardous secondary materials to the environment, and is designed, as appropriate for the hazardous secondary material, to prevent releases of the hazardous secondary materials to the environment. Unpermitted releases are releases that are not covered by a permit (such as a permit to discharge to water or air) and may include, but are not limited to, releases through surface transport by precipitation runoff, releases to soil and groundwater, wind-blown dust, fugitive air emissions, and catastrophic unit failures;
- (2) The unit is properly labeled or otherwise has a system (such as a log) to immediately identify the hazardous secondary materials in the unit; and
- (3) The unit holds hazardous secondary materials that are compatible with other hazardous secondary materials placed in the unit and is compatible with the materials used to construct the unit and addresses any potential risks of fires or explosions. Hazardous secondary materials in units that meet the applicable requirements of 40 CFR parts 264 or 265 are presumptively contained.

This contained definition provided both the regulated community and the implementing agencies with an approach that helps address the potential for fires/explosions, environmental contamination and human exposure under the generator-controlled exclusions in Scenarios 1, 2, 3, 7 and 8.

Emergency Preparedness

New emergency preparedness and response requirements under the generator-controlled exclusion and the verified recycler exclusion address the risk of fires, explosions and other accidents. Specifically, EPA is requiring that generators that accumulate less than or equal to 6,000 kg of hazardous secondary material on site comply with the emergency preparedness and response requirements equivalent to those in part 265 subpart C, which discuss maintaining appropriate emergency equipment on site, having access to alarm systems, maintaining needed aisle space, and making arrangements with local emergency authorities. A generator must also have a designated emergency coordinator who must respond to emergencies and must post certain information next to the telephone in the event of an emergency. For generators that accumulate more than 6,000 kg of hazardous secondary material on site, EPA is requiring that generators comply with requirements equivalent to those in part 265 subparts C and D, which includes all the requirements already discussed above for those accumulating less than or equal to 6,000 kg, as well as requiring a contingency plan and sharing the plan with local emergency responders.

These new requirements help address the potential for fires/explosions, environmental contamination and human exposure in Scenarios 1, 2, 3, 4, 6, 7 and 8.

Additional Recordkeeping Requirements For Speculative Accumulation and for Transfers Under the Tolling and Same-Company Provisions Under the Generator-Controlled Exclusion

Under the 2014 DSW final rule, all persons subject to the speculative accumulation requirements of 40 CFR § 261.1(c)(8) (including, but not limited to, persons operating under the generator-controlled exclusion) must place materials subject to those requirements in a storage unit with a label indicating the first date that the material began to be accumulated. If placing a label on the storage unit is not practicable, the accumulation period must be documented through an inventory log or other appropriate method. This provision will allow inspectors and other regulatory authorities to quickly ascertain how long a facility has been storing an excluded hazardous secondary material, and, therefore, whether that facility is in compliance with the accumulation time limits.

In addition, the 2014 DSW final rule includes revisions to the generator-controlled exclusion for tolling and “same-company” recycling that require recordkeeping for shipments sent and received under the exclusion. The records must contain the name of the transporter, the date of the shipment, and the type and quantity of hazardous secondary material shipped or received. These records may consist of normal business records. Such recordkeeping will facilitate enforcement of the exclusion and will allow tracking of hazardous secondary materials to ensure that these materials remain within the control of the generator and are not discarded.

Together, these provisions help address the concern that the HSM could become abandoned under the generator-controlled exclusions in Scenarios 1, 2, 3, 7 and 8.

6.3.1 Implementation Measures

In addition to the regulatory changes to address potential adverse impacts of hazardous secondary materials recycling, EPA can take non-regulatory steps to help mitigate the potential adverse impacts. These steps include closely monitoring the facilities notifying under the 2014 DSW final rule, making information about the DSW facilities available to the public, and working with states and EPA Regions to ensure they have the information they need to ensure compliance with the provisions of the rule, and making available to the public information about the facilities that have notified. EPA has begun this process for the states and territories currently operating under the 2008 DSW final rule, and plans to continue these efforts in order to help prevent potential adverse impacts under the 2014 DSW final rule.

In particular, the notification condition will allow EPA (and the public) to know exactly who is operating under the DSW exclusions. EPA has the authority to inspect these facilities and enforce Subtitle C regulations if the facilities are not meeting the conditions of the exclusions. This enforcement authority, coupled with the new condition that EPA is imposing requiring third-party recyclers be verified prior to operating under the exclusion, will help ensure that recyclers operating the DSW exclusions are capable of safely and legitimately recycling hazardous secondary materials prior to beginning operations, and that they continue to do so as long as they operate under the exclusions.

**Attachment A. Methodology for Identifying Potentially Recyclable
Hazardous Wastes**

The Regulatory Impact Analysis (RIA) developed for the Definition of Solid Waste (DSW) Rule²⁷ uses a two-step data screening (i.e., data selection) process or methodology to identify potentially recyclable hazardous wastes. This methodology is applied to wastes reported to the Biennial Report that are managed through methods other than recycling (i.e., methods other than metals recovery, solvents recovery, or other recovery).

A detailed description of the methodology for identifying potentially recyclable hazardous wastes is provided below.

Step 1: Primary screening criteria to identify wastes disposed of containing constituents of potential commodity value

The first data screening step is structured according to each of the three Biennial Report recycling methods: metals recovery, solvent recovery, and other recovery. Each materials recovery method is categorized as a “commodity group” according to the respective types of materials involved in each of these three recovery methods. EPA identified and assigned the screening codes based on determining whether each of the 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.

Possible Metals Recovery

- If the waste is represented by one of the following waste form codes, it is assigned to this commodity group:

Form Code	Form Code Description
W107	Aqueous waste containing cyanides
W117	Waste liquid mercury
W303	Ash
W304	Slags, drosses, and other solid thermal residues
W307	Metal scale, filings and scrap (including metal drums)
W312	Cyanide or metal cyanide bearing solids, salts or chemicals
W316	Metal salts or chemicals not containing cyanides
W501	Lime and/or metal hydroxide sludges and solids with no cyanides
W505	Metal bearing sludges (including plating sludge) not containing cyanides
W506	Cyanide-bearing sludges

²⁷ EPA, Regulatory Impact Analysis - USEPA’s 2008 Final Rule Amendments to the Industrial Recycling Exclusions of the RCRA Definition of Solid Waste, September 25, 2008. Available online at: <http://www.regulations.gov/search/Regs/home.html#documentDetail?R=0900006480728a11>, last accessed on May 25, 2010.

- If the waste is not associated with any of the above waste form codes, but is represented by one of the following source codes, it is assigned to this commodity group:

Source Code	Source Code Description
G03	Plating and phosphating (electro- or non-electroplating or phosphating)
G04	Etching (using caustics or other methods to remove layers or partial layers)

- If the waste is not associated with any of the above waste form or source codes, but is represented by one of the following EPA hazardous waste codes, it is assigned to this commodity group:

Waste Code	Waste Code Description
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 manufacturing
K171, K172	Petroleum refining spent catalysts

- Note that, if the waste stream is represented by waste form code W312 (cyanide or metal cyanide bearing solids, salts or chemicals) and EPA hazardous waste code K088 (aluminum production spent potliners), it is moved from Commodity Group #1 (Possible Metals Recovery) to Commodity Group #3 (Possible Other Recovery). Wastes that fit this description are generally not recycled by metals recovery, but by other recovery processes.

Possible Solvents Recovery

- If the waste is represented by one of the following waste form codes, it is assigned to this commodity group:

Form Code	Form Code Description
W202	Concentrated halogenated (e.g., chlorinated) solvent
W203	Concentrated non-halogenated (e.g., non-chlorinated) solvent
W204	Concentrated halogenated/ non-halogenated solvent mixture
W209	Paint, ink, lacquer, or varnish
W211	Paint thinner or petroleum distillates

- If the waste is not associated with any of the above waste form codes, but is represented by one of the following source codes, it is assigned to this commodity group:

Source Code	Source Code Description
G01	Dip, flush or spray rinsing (using solvents to clean or prepare parts or assemblies for further processing - i.e. painting or assembly)
G06	Painting and coating (manufacturing, building, or maintenance)

- If the waste is not associated with any of the above waste form or source codes, but is represented by one of the following EPA hazardous waste codes, it is assigned to this commodity group:

Waste Code	Waste Code Description
F001, F002, F003, F004, F005	Spent solvents
F024, F025	Chlorinated aliphatic manufacturing
K086	Solvent washes of ink equipment

Possible Other Recovery (Carbon Regeneration and Sodium Fluoride)

- If the waste is represented by the following waste form code, it is assigned to this commodity group:

Form Code	Form Code Description
W310	Filters, solid adsorbents, ion exchange resins and spent carbon (spent carbon only)

- If the waste is not associated with the above waste form code, but is represented by the following EPA hazardous waste code, it is assigned to this commodity group:

Waste Code	Waste Code Description
K088	Aluminum production spent potliners (sodium fluoride)

- Note that, if the waste is represented by waste form code W312 (cyanide or metal cyanide bearing solids, salts or chemicals) and EPA hazardous waste code K088 (aluminum production spent potliners), it is moved from Commodity Group #1 (Possible Metals Recovery) to Commodity Group #3 (Possible Other Recovery). Wastes that fit this description are generally not recycled by metals recovery, but by other recovery processes.

Step 2: Secondary screening criteria (physical quality)

The purpose of these secondary screening criteria is to introduce a consideration of the anticipated physical quality of the waste. The secondary screening criteria consist of six elements as follows:

- (1) Remove wastes 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 wastes with source code G25. Wastes that are disposed of 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 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 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 makeup 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 criterion was only applied to wastes 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 with less than 5% acid.
- (5) Remove some miscellaneous wastes:
 - On-site Commodity Group #2 quantities were primarily managed by non-beneficial incineration (H040), or by beneficial energy recovery (H050), or beneficial fuel blending (H061). For the purposes of the RIA, it was assumed that facilities that generate and managed wastes on site via beneficial energy or fuel recovery (i.e., H050 or H061) will not change to a materials recovery process under the 2008 DSW final rule exclusions. All these processes require relatively large on-site capital investments and air pollution control permitting costs, which make it less likely that on-site H040, H050 or H061 wastes will switch over to materials recovery under the 2008 DSW final rule. . This corresponds to removing wastes corresponding to on-site management involving H040, H050 and H061. Note, however, that the RIA does not remove wastes corresponding to off-site management involving H040, H050, and H061.
 - All records with form code W310 not containing the word “carbon” or “charcoal” in the waste description were deleted. This is necessary because the definition of the W310 physical/chemical form code allows reporting together in this single code for four different types of materials: (1) filters, (2) solid adsorbents, (3) ion exchange resins, and (4) spent carbons. Because of the lack of characterizing data on the other three waste types—filters, solid adsorbents, and ion exchange, only spent carbon from these four waste types is evaluated.
- (6) Because of the fact there are tens of thousands of individual wastes in the Biennial Report for any given data year, it was beyond the time and resource constraints of the RIA to individually examine each narrative comment for wastes containing the “other” code sub-categories. This corresponds to removing wastes for H129 “other treatment.” The “other” form codes already were removed by their exclusion from the “primary” screening selection criteria.

Attachment B. Statistical Calculations

Affected Population Ratio

The Affected Population Ratio is calculated as follows.

There is a disparity if $pr1/pr2 \neq 1$,

where

$pr1 = \text{prob}(\text{within 3-km of facility} \mid \text{in demographic group})$

$pr2 = \text{prob}(\text{within 3-km of facility} \mid \text{not in demographic group})$

$pr1/pr2 = \text{the Affected Population Ratio.}$

Demographic Ratio

The Demographic Ratio is calculated as follows:

There is a disparity if $pr3/pr4 \neq 1$,

where

$pr3 = \text{prob}(\text{in demographic group} \mid \text{within 3-km of facility})$

$pr4 = \text{prob}(\text{in demographic group} \mid \text{not within 3-km of facility}).$

$pr3/pr4 = \text{the Demographic Ratio.}$

Fisher Exact Test

The Fisher Exact test is calculated as follows (Kendall and Stuart, 1973, sections 33.19 and 33.20):

The Fisher Exact Test calculates the probability that the demographic distributions of the affected and non-affected populations are as or more extreme than the observed counts. Let H be the total number in the demographic group and N be the total number not in the demographic group. Let A be the total number living within 3 km of a facility and let U be the total number not living within 3 km of a facility. Let x be the number of persons in the demographic group that also live within 3 km of a facility. Given the values of H, N, A, and U, the Fisher Exact Test probability (p-value) is twice the sum of the probabilities of all possible x values equal to or above the observed x (but cannot be more than 1). When some of H, N, A, and U are too large, the software is unable to compute the p-value which is reported as “N/A” and in such cases the Kendall Test results can be used as a good approximation.

Kendall Test

The Kendall test is calculated as follows (Kendall and Stuart 1973, sec 33.22):

$$\begin{aligned} \text{Std Error (pr1-pr2)} &= [q(1-q)\{n/(n-1)\}\{(1/H + 1/N)\}]^{1/2} \\ \text{SD} &= (\text{pr1-pr2})/[\text{Std Error (pr1-pr2)}] \\ &= (\text{pr1-pr2})/[q(1-q)\{n/(n-1)\}\{(1/H + 1/N)\}]^{1/2}, \end{aligned}$$

where n = total population,
 q = total within 3-km of facilities/n,
 H = total in demographic group, and
 N = total not in demographic group, and
 SD = the number of standard deviations that the difference (pr1-pr2) is away from 0, the value indicating no disparity under the null hypothesis.

Mantel-Haenszel Common Relative Risk

The procedure developed by Mantel and Haenszel (see Agresti, 2002) was used to estimate the overall Affected Population Ratio and Demographic Ratio for all states that have one or more facilities. Assume that all the states have the same underlying Affected Population Ratio. Using the notation in the above table, the Affected Population Ratio for a given state is estimated by $\{a / (a + b)\} / \{c / (c + d)\}$. The common Affected Population Ratio is estimated using the formula

$$\text{Common Affected Population Ratio} = \{\sum a(c + d) / n\} / \{\sum c(a + b) / n\},$$

where each sum is over all the tables for the individual states. It can be shown that this value is a weighted average of the state-specific Affected Population Ratios.

In a similar manner, the Demographic Ratio for a given state is estimated by $\{a / (a + c)\} / \{b / (b + d)\}$. The common Demographic Ratio is estimated using the formula

$$\text{Common Demographic Ratio} = \{\sum a(b + d) / n\} / \{\sum b(a + c) / n\},$$

where each sum is over all the tables for the individual states. It can be shown that this value is a weighted average of the state-specific Demographic Ratios.

Cochran-Mantel-Haenszel Test

The procedure developed by Cochran, Mantel and Haenszel (see Cochran, 1954 and Mantel and Haenszel, 1959) was used to test whether there was a disparity in one or more of the states that have one or more facilities. The null hypothesis is that the underlying Threshold Risk Ratio is equal to one for all the states, which is mathematically the same

as saying that the underlying Demographic Ratio is equal to one for all the states, which in turn is the same as the null hypothesis that the location (within or not within 3 km of a facility) and demographic group are statistically independent for each and every state. The statistical test is mathematically identical to the Kendall test if there is only one state that has a facility.

Using the same notation as above, the test statistic is:

$$\chi^2 = \sum \{a - (a+b)(a+c)/n\}^2 / \sum \{(a+b)(a+c)(b+d)(c+d)/(n^3 - n^2)\}$$

The sum is over all the state tables. The p-value is the probability that a chi-square distribution with 1 degree of freedom exceeds χ^2 .

References

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Kendall, M.G. and A. Stuart. 1973. *The advanced theory of statistics, Third Edition*. Griffin. London.

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Attachment C. Acronyms and Abbreviations

A

AFS	Air Facility System
AIAN	American Indian/Alaska Native

B

BR	Biennial Report
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C

CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CESQG	Conditionally Exempt Small Quantity
CWA	Clean Water Act

D

DNA	Deoxyribonucleic acid
DOT	Department of Transportation
DR	Demographic Ratio
DSW	Definition of Solid Waste

E

EAF	Electric arc furnace
EHS	Extremely Hazardous Substance
EJ	Environmental Justice
EJ SEAT	Environmental Justice Smart Enforcement Assessment Tool

EJ Toolkit	Toolkit for Assessing Potential Allegations of Environmental Justices
EPA	Please see U.S. EPA
EPCRA	Emergency Planning and Community Right-to-Know Act
F	
FR	Federal Register
FRS	Facility Registry System
G	
GCE	Generator-Controlled Exclusion
GIS	Geographic Information Systems
GM	Waste Generation and Management
H	
HAP	Hazardous Air Pollutant
HAZWOPER	Hazardous Waste Operations and Emergency Response
HazCom	Hazard Communication Standard
HMR	Hazardous Materials Regulations
HMTA	Hazardous Materials Transportation Act
HSM	Hazardous Secondary Material
HTMR	High Temperature Metals Recovery
HWR	Hazardous Waste Regulation
I	
IARC	International Agency for Research on Cancer
IRIS	Integrated Risk Information System
K	
K061	Electric arc furnace dust

L

LDR Land Disposal Restrictions

LQG Large quantity generator

N

NAAQS National Ambient Air Quality Standards

NAICS North American Industry Classification System

NATA National-Scale Air Toxics Assessment

NBR National Biennial Report

NESHAP National Emissions Standards for Hazardous Air Pollutants

NPDES National Pollutant Discharge Elimination System

NPL National Priorities List

NPM National Program Manager

NRC National Response Center

NRHM Non-Radioactive Hazardous Materials

NSPS New Source Performance Standards

O

OECA Office of Enforcement and Compliance

ORCR Office of Resource Conservation and Recovery

OSHA Occupational Safety and Health Administration

OSH Act Occupational Safety and Health Act

OSWER Office of Solid Waste and Emergency Response

P

PBE Petition-Based Exclusion

PC Priority Chemical

PERC Tetrachloroethylene

POTW	Publicly Owned Treatment Works
ppm	Parts per million
ppmw	Parts per million by weight
PR	Population ratio
PSM	Process Safety Management
R	
RCRA	Resource Conservation and Recovery Act
RCRAInfo	Resource Conservation and Recovery Act Information
RIA	Regulatory Impact Analysis
RMP	Risk Management Plan
RQ	Reportable Quantities
S	
SD	Standard Deviation
SF	Summary File
Site ID	Site Identification
SOCMI	Synthetic Organic Chemical Manufacturing Industry
SPCC	Spill Prevention, Control, and Countermeasure
SQG	Small quantity generators
T	
TBE	Transfer-Based Exclusion
TPY	Tons per Year
APR	Affected Population Ratio
TSDF	Treatment, Storage, or Disposal Facility
U	
U.S.	United States

U.S. EPA United States Environmental Protection Agency

V

VOC Volatile Organic Compound

W

WR Waste Received from Offsite

Attachment D. Glossary

A

Air Facility System

Contains compliance and permit data for stationary sources regulated by EPA, state and local air pollution agencies

American Indian Alaska Native

A Census Bureau term that refers to these entity types: American Indian reservation, American Indian off-reservation trust land, Oklahoma tribal statistical area, joint use area, American Indian tribal subdivision, tribal designated statistical area, state designated American Indian statistical area, Alaska Native Regional Corporation, Alaska Native village, Alaska Native village statistical area.

B

Biennial Report

All generators and treatment, storage, and disposal (TSD) facilities who handle hazardous waste are required to report to the EPA Administrator at least once every two years. The data collected is used to create the National Biennial Resource Conservation and Recovery Act (RCRA) Hazardous Waste Report. This data is processed within the RCRA Information (RCRAInfo) database.

Block group

A statistical subdivision of a census tract. A block group (BG) consists of all tabulation blocks whose numbers begin with the same digit in a census tract; for example, for Census 2010, BG 3 within a census tract includes all blocks numbered between 3000 and 3999. The block group is the lowest-level geographic entity for which the Census Bureau tabulates sample data from the decennial census.

C

Census Block	An area bounded by visible and/or invisible features shown on Census Bureau maps. A block is the smallest geographic entity for which the Census Bureau collects and tabulates 100-percent decennial census data.
Clean Air Act	Comprehensive federal law that regulates air emissions from stationary and mobile sources.
Clean Water Act	Establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters
Comprehensive Environmental Response, Compensation and Liability Act	Known as CERCLA or Superfund, provides a Federal “Superfund” to clean up uncontrolled or abandoned hazardous waste sites as well as accidents, spills, and other emergency releases of pollutants and contaminants into the environment.
Comprehensive Environmental Response, Compensation and Liability Information System	CERCLIS is EPA’s inventory of abandoned, inactive, or uncontrolled hazardous waste sites regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). It records information about all aspects of hazardous waste sites from initial discovery to listing on the National Priorities List (NPL).
Conditionally Exempt Small Quantity Generator	Generate 100 kilograms or less per month of hazardous waste, or 1 kilogram or less per month of acutely hazardous waste
D	
D001	Ignitable waste
D007	Chromium waste
D008	Lead waste

Damages	The likelihood of harm or injury to property or a person resulting in loss of value or the impairment of usefulness
Damage Case Facility	Facilities that highlighted in EPA’s An Assessment of Environmental Problems Associated with Recycling of Hazardous Secondary Materials
Definition of Solid Waste	A <i>solid waste</i> is any discarded material that is not excluded under §261.4(a) or that is not excluded by a variance granted under §§260.30 and 260.31 or that is not excluded by a non-waste determination under §§260.30 and 260.34.
Definition of Solid Waste Rule	The DSW rule creates specific conditions for recycling hazardous secondary materials under the Resource Conservation and Recovery Act (RCRA).
Definition of Solid Waste Final Rule (2008)	Revision of the Definition of Solid Waste under RCRA for certain types of hazardous secondary materials being recycled
Disproportionate Impact	Impact that: (1) is predominately borne by a minority population and/or a low-income population; or (2) is appreciably more severe or greater in magnitude than the adverse effect or impact that will be suffered by a non-minority population and/or non-low-income population.
	E
EJ Toolkit	Toolkit for Assessing Potential Allegations of Environmental Justices
Emergency Planning and Community Right-to-Know Act	Establishes requirements for Federal, state and local governments, Indian Tribes, and industry regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals.
Environmental Justice	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

Environmental Justice Smart Enforcement Assessment Tool

Created by EPA’s Office of Enforcement and Compliance Assurance to serve as a consistent methodology that would enable OECA to identify communities or areas experiencing disproportionate environmental and public health burdens for the purposes of enhancing and focusing OECA’s enforcement and compliance in those areas.

F

F003

Spent non-halogenated solvents

F005

Spent non-halogenated solvents

F006

Wastewater treatment sludges

F037

Petroleum refinery primary sludges

F1_5

Mixture of F001-F005

Facility Registry System

FRS is a centrally managed database that identifies facilities, sites or places subject to environmental regulations or of environmental interest.

G

Generator-Controlled Exclusion

Materials that are generated and transferred to another company for legitimate reclamation under specific conditions

Geographic Information System

A computer system for the input, storage, processing, applications development, retrieval, and maintenance of information about the points, lines, and areas that represent the streets and roads, rivers, railroads, geographic entities, and other features on the surface of the Earth—information that previously was available only on paper maps.

H

Hazard Communication Standard	The HCS became effective in 1986. A fundamental premise of the HCS is that employees who may be exposed to hazardous chemicals in the workplace have a right to know about the hazards and how to protect themselves
Hazardous Air Pollutant	HAPs are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.
Hazardous Materials Regulations	HMRs are issued by the Pipeline and Hazardous Materials Safety Administration and govern the transportation of hazardous materials by highway, rail, vessel, and air. The HMR address hazardous materials classification, packaging, hazard communication, emergency response information and training.
Hazardous Materials Transportation Act	Its primary objective is to provide adequate protection against the risks to life and property inherent in the transportation of hazardous material in commerce by improving the regulatory and enforcement authority of the Secretary of Transportation.
Hazardous Secondary Materials	The DSW rule defines hazardous secondary materials (HSM) as those materials that would be classified as hazardous waste, if discarded. HSMs can be stored for longer periods of time than hazardous materials, but must meet various criteria such as 75% of the material must be recycled each year.
Hazardous Waste Facilities	Likely to recycle under the DWS Final Rule, including hazardous waste generators producing more than a truckload (25 tons) of recyclable hazardous secondary materials annually, and hazardous waste recyclers
Hazardous Waste Operations and Emergency Response	Refers to five types of hazardous waste operations conducted in the United States under OSHA Standard 1910.120 "Hazardous Waste Operations and Emergency Response." The standard contains the safety requirements employers must meet in order to conduct these operations.

I

Integrated Risk Information System a human health assessment program that evaluates quantitative and qualitative risk information on effects that may result from exposure to environmental contaminants

K

K061 Electric arc furnace dust

K088 Spent potliners

K171 Spent hydrotreating catalyst

KXXX Mixture of K waste code wastes

L

Land Disposal Restrictions LDR program ensures that toxic constituents present in hazardous waste are properly treated before hazardous waste is land disposed

Large quantity generator LQG generate 1,000 kilograms per month or more of hazardous waste, or more than 1 kilogram per month of acutely hazardous waste.

N

National Ambient Air Quality Standards Standards established by EPA under authority of the Clean Air Act (42 U.S.C. 7401 et seq.) that apply for outdoor air throughout the country. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

National Emissions Standards for Hazardous Air Pollutants	NESHAPS are stationary source standards for hazardous air pollutants.
National Priorities List	The list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which sites warrant further investigation.
National Response Center	The NRC is the sole federal point of contact for reporting all hazardous substances and oil spills. The NRC receives all reports of releases involving hazardous substances and oil that trigger the federal notification requirements under several laws.
National-Scale Air Toxics Assessment	U.S. EPA developed the NATA as a state-of-the-science screening tool for State/Local/Tribal Agencies to prioritize pollutants, emission sources and locations of interest for further study in order to gain a better understanding of risks.
New Source Performance Standards	Section 111 of the Clean Air Act authorized the EPA to develop technology based standards which apply to specific categories of stationary sources. These standards are found in 40 CFR Part 60. The NSPS apply to new, modified and reconstructed affected facilities in specific source categories such as manufacturers of glass, cement, rubber tires and wool fiberglass.
Non-hazardous Industrial Waste Facilities	Facilities not currently generating or managing hazardous wastes that may choose to begin reclaiming hazardous secondary materials under the 2008 DSW Final Rule
North American Industry Classification System	The standard used by Federal statistical agencies in classifying business establishments for the purpose of collecting, analyzing, and publishing statistical data related to the U.S. business economy.
Notification Facility	Facility that has notified EPA that it will be managing hazardous secondary materials under the 2008 DSW Final Rule

O**Occupational Safety and Health Act**

The primary federal law which governs occupational health and safety in the private sector and federal government in the United States.

P**Petition-Based Exclusion**

Materials that EPA or an authorized state determines to be non-wastes through a case-by-case petition process.

Process Safety Management

The major objective of process safety management (PSM) of highly hazardous chemicals is to prevent unwanted releases of hazardous chemicals especially into locations that could expose employees and others to serious hazards. An effective process safety management program requires a systematic approach to evaluating the whole chemical process.

R**Resource Conservation and Recovery Act**

The (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes.

Resource Conservation and Recovery Act Information

RCRAInfo is EPA's comprehensive information system that supports the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984 through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste. RCRAInfo allows RCRA program staff to track the notification, permit, compliance, and corrective action activities required under RCRA.

Risk Management Plan (RMP)

The RMP database stores the risk management plans reported by companies that handle, manufacture, use, or store certain flammable or toxic substances, as required under section 112(r) of the Clean Air Act (CAA).

Rural	All territory, population, and housing units located outside of urbanized areas and urban clusters.
	S
Spill Prevention, Control, and Countermeasure Plan	The Spill Prevention, Control, and Countermeasure (SPCC) rule includes requirements for oil spill prevention, preparedness, and response to prevent oil discharges to navigable waters and adjoining shorelines. The rule requires specific facilities to prepare, amend, and implement SPCC Plans. The SPCC rule is part of the Oil Pollution Prevention regulation, which also includes the Facility Response Plan (FRP) rule.
Small Quantity Generator	Small Quantity Generators (SQGs) generate more than 100 kilograms, but less than 1,000 kilograms, of hazardous waste per month.
	T
Transfer-Based Exclusion	Materials that are generated and legitimately reclaimed under the control of the generator
	U
Urban	For Census 2010, all territory, population, and housing units in urbanized areas and urban clusters.
Urban Cluster	A densely settled area that has a census population of 2,500 to 49,999.
Urbanized Area	A densely settled area that has a census population of at least 50,000.
	V
Volatile Organic Compound	VOCs are organic chemical compounds whose composition makes it possible for them to evaporate under normal indoor atmospheric conditions of temperature and pressure.

Attachment E. National and State Urban and Rural Analyses

Notification Facilities

Table 6-1 National Urban Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	0.70821708	0.807716274	N/A	N/A	0.003719767	-150.944	~0
Persons below 200% poverty	1.022017821	1.014927126	9.69E-21	9.339374085	0.003719767	9.3522191	8.58E-21
American Indians and Alaska Natives	0.68872454	0.690369402	3.47E-226	32.10742312	0.003719767	-30.34102	3.30E-202
Children under age 5	0.96289238	0.965203379	5.91E-18	8.634198023	0.003719767	- 8.5890718	8.77E-18

Table 6-2 National Rural Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	0.91244904	0.927625227	1.84974E-37	12.79062768	0.001609112	- 12.674748	8.16203E-37
Persons below 200% poverty	0.798393263	0.850944199	1.93E-294	36.67358528	0.001609112	- 36.128774	8.02E-286
American Indians and Alaska Natives	0.311101089	0.315601471	N/A	N/A	0.001609112	- 37.613355	~0
Children under age 5	1.083814844	1.078417702	6.14E-13	7.197247726	0.001609112	7.2827155	3.27E-13

Table 6-3 State Urban Demographic Comparison for Notification Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	22	12	0	7.38%	5.78%
Below 200% Poverty Level	28	6	0	14.34%	15.88%
American Indians or Alaska Natives	24	10	0	0.38%	0.18%
Children under age 5	30	4	0	2.09%	0.18%

Table 6-4 State Rural Demographic Comparison for Notification Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	22	4	0	13.57%	9.25%
Below 200% Poverty Level	26	0	0	21.64%	22.02%
American Indians or Alaska Natives	18	8	0	0.82%	0.10%
Children under age 5	26	0	0	4.33%	4.64%

Table 6-5 State Urban Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.222894989	1.145210456	~0
Persons below 200% poverty	1.26910836	1.187335614	~0
American Indians and Alaska Natives	1.272727197	1.288744365	7.22E-89
Children under age 5	1.029689055	1.029028231	1.21276E-11

Table 6-6 State Rural Demographic Comparison Analysis of Statistical Significance for Notification Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.883920185	1.760132319	~0
Persons below 200% poverty	1.328260145	1.240486806	~0
American Indians and Alaska Natives	1.203969152	1.208893649	8.23E-09
Children under age 5	1.180449912	1.175146591	1.2868E-52
	1.883920185	1.760132319	~0

Damage Case Facilities

Table 6-7 National Urban Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)
Minority (all except non-Hispanic whites)	1.97697811	1.418345381	~0	N/A	0.035501109
Persons below 200% poverty	1.595986784	1.3574736	~0	N/A	0.035501109
American Indians and Alaska Natives	1.080614335	1.082800466	4.81E-130	24.26307841	0.035501109
Children under age 5	0.964164506	0.96533024	5.56E-151	26.17185442	0.035501109

Table 6-8 National Rural Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)
Minority (all except non-Hispanic whites)	1.440430372	1.33172518	~0	N/A	0.003484304
Persons below 200% poverty	1.177947532	1.117304194	~0	N/A	0.003484304
American Indians and Alaska Natives	0.535043335	0.539775786	N/A	N/A	0.003484304
Children under age 5	1.142361129	1.133015268	6.67E-71	17.80323963	0.003484304

Table 6-9 State Urban Demographic Comparison for Damage Case Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	128	41	0	18.79%	19.43%
Below 200% Poverty Level	142	27	0	17.33%	18.60%
American Indians or Alaska Natives	113	56	0	0.31%	0.22%
Children under age 5	133	36	0	1.59%	1.55%

Table 6-10. State Rural Demographic Comparison for Damage Case Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	77	5	0	19.47%	10.07%
Below 200% Poverty Level	82	0	0	28.00%	25.55%
American Indians or Alaska Natives	58	24	0	0.96%	0.44%
Children under age 5	81	1	0	5.00%	5.08%

Table 6-11 State Urban Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.993597083	1.382311819	~0
Persons below 200% poverty	1.720405497	1.447891817	~0
American Indians and Alaska Natives	1.101169035	1.108153786	3.50E-213
Children under age 5	0.976523831	0.97656438	1.35602E-66

Table 6-12 State Rural Demographic Comparison Analysis of Statistical Significance for Damage Case Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.653242335	1.418026215	~0
Persons below 200% poverty	1.371261402	1.236323057	~0
American Indians and Alaska Natives	0.871452636	0.876359246	2.47E-15
Children under age 5	1.18862933	1.176968713	2.2475E-123

Hazardous Waste Facilities

Table6-13 National Urban Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall's Tau
Minority (all except non-Hispanic whites)	1.340072517	1.210475806	~0	N/A	0.159826638	9
Persons below poverty	1.25425977	1.196325972	~0	N/A	0.159826638	7
American Indians and Alaska Natives	0.915856581	0.90243699	N/A	N/A	0.159826638	-5
Children under age 5	1.023988452	1.026680122	~0	N/A	0.159826638	3

Table6-14 National Rural Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)
Minority (all except non-Hispanic whites)	1.173953984	1.1392171	~0	N/A	0.015625854
Persons below 200% poverty	0.991910751	0.994295062	1.87E-05	4.279797927	0.015625854
American Indians and Alaska Natives	0.535710054	0.537395417	N/A	N/A	0.015625854
Children under age 5	1.07708188	1.073249732	4.16E-96	20.80193737	0.015625854

Table 6-15 State Urban Demographic Comparison for Hazardous Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	989	350	0	14.96%	13.33%
Below 200% Poverty Level	1044	295	0	13.34%	13.29%
American Indians or Alaska Natives	831	508	0	0.34%	0.15%
Children under age 5	1151	188	0	1.99%	1.92%

Table 6-16 State Rural Demographic Comparison for Hazardous Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	699	77	0	17.82%	10.30%
Below 200% Poverty Level	765	11	0	22.77%	22.27%
American Indians or Alaska Natives	499	277	0	0.79%	0.24%
Children under age 5	761	15	0	4.44%	4.32%

Table 6-17 State Urban Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.169679077	1.091098002	~0
Persons below 200% poverty	1.091134577	1.05966551	1.7355E-204
American Indians and Alaska Natives	0.928180233	0.9280704	4.53E-06
Children under age 5	1.021002621	1.019725909	1.24E-04

Table 6-18 State Rural Demographic Comparison Analysis of Statistical Significance for Hazardous Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.133832219	1.098239859	9.13952E-19
Persons below 200% poverty	0.622146433	0.707348497	1.1341E-272
American Indians and Alaska Natives	0.203457086	0.205058948	3.96E-48
Children under age 5	1.097167441	1.090681814	2.3246E-05

Non-hazardous Industrial Waste Facilities

Table 6-19 National Urban Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)
Minority (all except non-Hispanic whites)	0.997496453	0.998553861	0.367175315	0.901777047	0.002351492
Persons below 200% poverty	1.153154734	1.099561588	~0	N/A	0.002351492
American Indians and Alaska Natives	0.624042044	0.626164339	8.89E-215	31.27943651	0.002351492
Children under age 5	1.008581189	1.008011967	1.16E-01	1.573669381	0.002351492

Table 6-20 National Rural Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	1.063760577	1.051170205	9.2918E-06	4.433029954	0.000397788	4.457651402	8.28625E-06
Persons below 200% poverty	0.618979855	0.701023515	N/A	N/A	0.000397788	-36.04832482	1.47E-284
American Indians and Alaska Natives	0.091311943	0.093164761	6.87E-222	31.79814334	0.000397788	-24.77626184	1.62E-135
Children under age 5	1.120590952	1.112427914	3.08E-07	5.118651895	0.000397788	5.194993364	2.05E-07

Table 6-21 State Urban Demographic Comparison for Non-Hazardous Industrial Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	11	6	0	9.30%	8.53%
Below 200% Poverty Level	12	5	0	9.30%	7.20%
American Indians or Alaska Natives	11	6	0	0.20%	0.13%
Children under age 5	15	2	0	1.75%	1.45%

Table 6-22 State Rural Demographic Comparison for Non-Hazardous Industrial Waste Facilities

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	7	1	0	14.99%	11.37%
Below 200% Poverty Level	6	2	0	18.66%	14.92%
American Indians or Alaska Natives	3	5	0	0.23%	-0.07%
Children under age 5	761	15	0	4.44%	4.32%

Table 6-23 State Urban Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.169679077	1.091098002	~0
Persons below 200% poverty	1.091134577	1.05966551	1.7355E-204
American Indians and Alaska Natives	0.928180233	0.9280704	4.53E-06
Children under age 5	1.021002621	1.019725909	0.000123739

Table 6-24 State Rural Demographic Comparison Analysis of Statistical Significance for Non-Hazardous Industrial Waste Facilities

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.133832219	1.098239859	9.13952E-19
Persons below 200% poverty	0.622146433	0.707348497	1.1341E-272
American Indians and Alaska Natives	0.203457086	0.205058948	3.96E-48
Children under age 5	1.097167441	1.090681814	2.3246E-05

Commercial Hazardous Waste Facilities That Do Not Recycle

Figure 6.1 Demographics for Commercial Hazardous Waste Facilities That Do Not Recycle

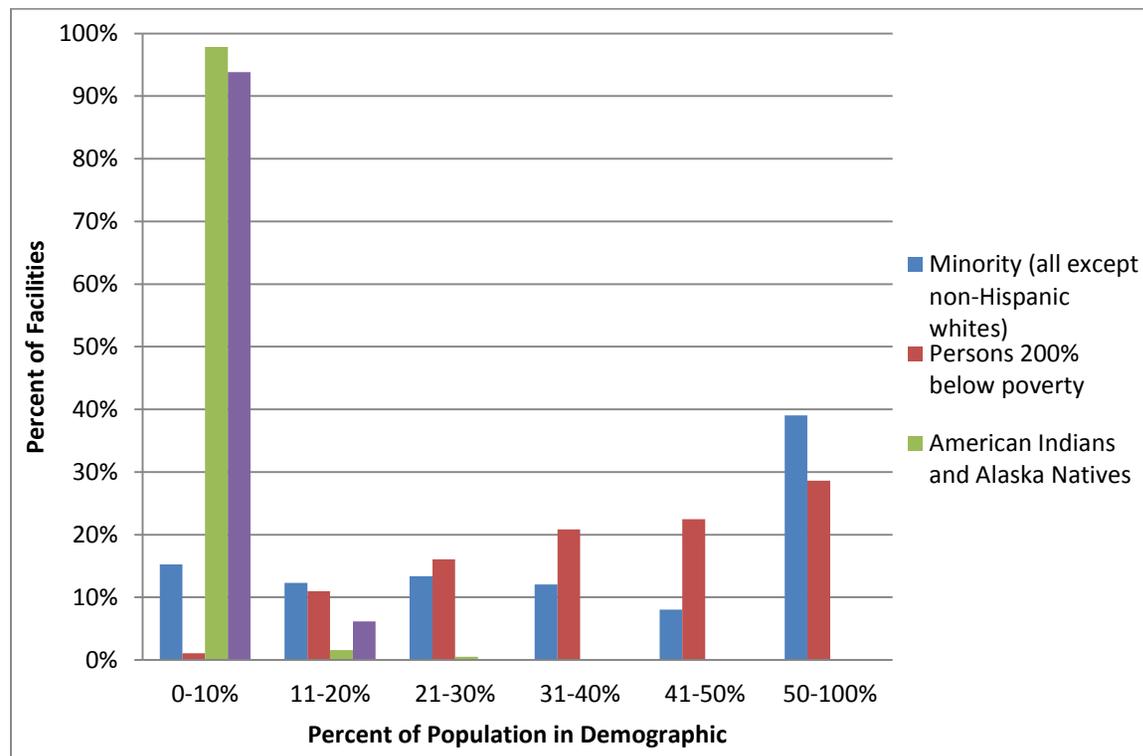


Table 6-25 National Demographic Comparison for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	195	179	0	7.50%	1.11%
Below 200% Poverty Level	255	119	0	8.20%	8.75%
American Indians or Alaska Natives	100	274	0	0.03%	-0.70%
Children under age 5	208	166	0	0.33%	0.23%

Table 6-26 State Demographic Comparison for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	219	155	0	10.57%	5.94%
Below 200% Poverty Level	252	122	0	7.17%	7.11%
American Indians or Alaska Natives	138	236	0	-0.01%	-0.24%
Children under age 5	211	163	0	0.22%	0.29%

Table 6-27 State Urban Demographic Comparison for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	158	37	0	25.65%	22.94%
Below 200% Poverty Level	165	30	0	18.90%	21.75%
American Indians or Alaska Natives	131	64	0	0.46%	0.13%
Children under age 5	183	12	0	2.43%	2.28%

Table 6-28 State Rural Demographic Comparison for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Number of Facilities with % Demographics Greater Than Area Comparison	Number of Facilities with % Demographics Less Than Area Comparison	Number of Facilities with % Demographics Equal to Area Comparison	Mean Difference	Median Difference
Minority (all except non-Hispanic whites)	166	13	0	24.68%	17.29%
Below 200% Poverty Level	175	4	0	25.51%	25.05%
American Indians or Alaska Natives	102	77	0	0.92%	0.12%
Children under age 5	176	3	0	4.27%	3.91%

Table 6-29 National Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	2.646397133	1.683429372	~0	N/A	0.020955069	1272.548665	~0
Persons below poverty	1.589051251	1.349132516	~0	N/A	0.020955069	592.5296046	~0
American Indians and Alaska Natives	0.824841894	0.823856736	N/A	N/A	0.020955069	53.44012507	~0
Children under age 5	1.127435729	1.120836528	~0	N/A	0.020955069	80.61309423	~0

Table 6-30 National Urban Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	2.127700864	1.457330272	~0	N/A	0.027738431	955.6563884	~0
Persons below poverty	1.585120102	1.348126784	~0	N/A	0.027738431	582.7875599	~0
American Indians and Alaska Natives	1.03756889	1.038226537	1.18E-23	10.02534523	0.027738431	10.08264294	6.59E-24
Children under age 5	1.098993391	1.094506278	~0	N/A	0.027738431	62.75675604	~0

Table 6-31 National Rural Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Fisher Exact Test P-value	Equivalent No. of Standard Deviations (SD)	Probability (Affected)	Kendall Test Statistic	Kendall Test P-Value
Minority (all except non-Hispanic whites)	1.371313481	1.282623826	~0	N/A	0.002397605	60.34486091	~0
Persons below poverty	1.082731832	1.056017756	5.25E-61	16.47837569	0.002397605	16.56119631	1.33E-61
American Indians and Alaska Natives	0.572912851	0.577830077	9.54E-207	30.6832035	0.002397605	28.30777462	2.77E-176
Children under age 5	1.092753255	1.08680898	2.60E-22	9.715069113	0.002397605	9.836315749	7.85E-23

Table 6-32 State Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	2.875510052	1.632878006	~0
Persons below poverty	1.661060211	1.389051189	~0
American Indians and Alaska Natives	0.929909127	0.929985531	3.26E-177
Children under age 5	1.122352268	1.116151058	~0

Table 6-33 State Urban Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	2.355590994	1.475416311	~0
Persons below poverty	1.627443251	1.380226678	~0
American Indians and Alaska Natives	1.09067331	1.093435702	3.31E-249
Children under age 5	1.093565081	1.091025263	~0

Table 6-34 State Rural Demographic Comparison Analysis of Statistical Significance for Commercial Hazardous Waste Facilities That Do Not Recycle

Demographic Group	Affected Population Ratio	Demographic Ratio	Cochran-Mantel-Haenszel P-value
Minority (all except non-Hispanic whites)	1.675633862	1.459629196	~0
Persons below poverty	1.052971495	1.035053934	8.57226E-51
American Indians and Alaska Natives	0.752862492	0.762978304	1.38E-88
Children under age 5	1.10486831	1.098427469	2.87513E-55