Summer 2018

Waste Stream and Green Purchasing Analysis at Bonneville Lock and Dam

Alexander Bienko
Portland State University

Waste Stream and Green Purchasing Analysis at Bonneville Lock and Dam

Project Lead:

Alexander Bienko

Portland State University

Environmental Science and Management

Professional Science Masters

Committee Members:

Joseph Maser

Eugene Foster

United States Army Corps of Engineers:

Kenneth Duncan

Melissa McBain

Date:

23 AUG 2018

Table of Contents

Acknowledgements:

I would like to thank my advisor Dr. Joseph Maser for his insight and support throughout this project. I would not have had the opportunity to work on this project without him.

I would like to thank my committee member Dr. Eugene Foster for his time to be on my committee and his comments in reviewing this report.

Special thanks to my supervisor at the Bonneville Project, Melissa McBain, for her support throughout the project. I could not have asked a better supervisor to work with.

I would also like to thank Kenneth Duncan who made this project possible and all the Bonneville project personnel who had to contend with me digging through their trash for the better part of the year.

A shout out to Amy, Britta, Bryn, and Dorothy for having me work in their office and the moral support they gave me to complete this project.

I would also like to thank my friends and family for all their support throughout this project. I would not have arrived at this point without them.

Executive Summary:

The United States Army Corps of Engineers, Portland District, directed the Bonneville Lock and Dam to conduct a waste stream and green purchasing analysis of their operation. The results gained from the analyses is used to find reduction strategies of non-hazardous refuse waste heading to the landfill and incorporate strategies to increase the acquisition of sustainable products. In order to find the best non-hazardous refuse waste reduction strategies, a waste audit was conducted over a period of approximately eight months to characterize the type and amount of waste being generated. The results of the waste audit for the Bonneville Project are summarized in the following table:

Table 1: Describes the summary for non-hazardous waste type and container, the designated area for waste collection, the approximate annual sum weight total of recycling waste in recycling containers and refuse waste in refuse containers per designated area, the approximate annual sum weight total for recycling or refuse material found in refuse or recycling waste respectively, the approximate annual sum for recycling waste generation, the approximate annual sum for refuse waste generation, and the approximate annual sum of overall waste generation for the entire Bonneville Project. All weights are in pounds.

Waste/Container Type	Designated Area	Annual Waste Weight Total	Annual Recycling Weight Total	Annual Refuse Weight Total
Recycling	Auditorium	767.00	757.25	9.75
Refuse		2,475.20	416.00	2,059.20
Recycling	Warehouse	3,149.25	2,955.33	193.92
Refuse		13,609.38	1,610.38	11,999.00
Recycling	Powerhouse 1	1,484.17	1,432.17	52.00
Refuse		12,119.25	1,940.25	10,179.00
Recycling	Service Building	4,383.60	4,243.20	140.40
Refuse		20,084.26	288.39	17,198.87
Recycling	Powerhouse 2	1,029.00	857.00	172.00
Refuse		2,755.24	365.02	2,390.22
Refuse	Adult Fish Facility	1,187.33	147.33	1,040.00
Recycling	Juvenile Fish Facility	703.20	685.20	18.00
Refuse		1,476.80	57.20	1,419.60
Recycling Sum	Designated Areas Combined	11,516.22		
Refuse Sum		53,707.46		
Site Total Sum		65,223.68		

This leads to the approximate waste generation at the Bonneville Project at 11,516 pounds and 53,707 pounds of non-hazardous recycling and non-hazardous refuse waste annually respectively for an approximate sum of all non-hazardous waste generation at 65,223 pounds as shown in Table 1. For recycling waste in recycling containers, the sort category Corrugated Cardboard (CCB) was the largest, making up approximately 44% or 5,012 pounds across the Bonneville Project with the sort category Recyclable Mixed paper and Newspaper (RPa) the second largest, making up approximately 35% or

4,034 pounds. These two categories made up approximately 79% of recycling waste in recycling containers for the entire Bonneville Project over the audit period. For refuse waste in refuse containers, the sort category Other (O) was the largest, making up approximately 29% or 15,490 pounds with the sort category Wood, Yard, and Natural River Waste (W) the second largest, making up approximately 20% or 10,906. These two categories made up approximately 49% of refuse waste in refuse containers for the entire Bonneville Project.

With a plan to reduce non-hazardous waste generation heading to the landfill by 50% [4], the Bonneville Project has an ambitious goal to meet. Recommendations to reach that goal such as, reducing single use non-recyclable paper products, looking into reuse or donation opportunities for wooden items and old tools, reducing the amount of non-hazardous recycling waste ending up in non-hazardous refuse waste, and investigate implementing composting services for food and grounds maintenance waste are just a few steps management can take for the Bonneville Project to reach their goal.

In an effort to increase the amount of sustainable acquisition at the Bonneville Project, there are a few opportunities that site personnel can do. With approximately 800 unique chemical products on site, the opportunity to incorporate green chemical products is potentially high. With green products becoming increasingly more common, there are ways for the Bonneville Project to incorporate ways to increase the use of such products on site. There are several ecolabels that companies can apply and certify their products for that incorporate standardized test methods and restrictions on chemical formulations such as USEPA Safer Choice, SCAQMD, GreenGuard, and USDA BioBased product. The organizations that certify green products also maintain a searchable database on the organization's website, which serves to be an efficient means to compile a list of green products by product type. Prioritizing products with these labels for purchase and use can potentially reduce the exposure of harmful chemicals on site. As a way to reduce waste and incorporate green chemical products, utilizing reusable application devices can aid in both waste reduction goals and increasing green product acquisition. Replacing conventional paints used on site with super-compliant type paints can be used to minimize VOC emissions. Some suitable green product alternatives investigated in this study were less expensive than the currently used conventional products. Many challenges lie ahead in further incorporating green products over conventional products already in use, such as resistance from Project personnel in adopting green products, but in doing so, can potentially reduce the risk of exposure of harmful chemicals to the environment and site personnel while also supporting a newer market of green goods.

The significance of the Bonneville Project lends it to be vigilant in its use of chemical products and reduction of non-hazardous waste. With the results and recommendations of this study, the Bonneville Project and the USACE will hopefully have gained significant insight into the waste stream to enable them to implement management strategies to reduce their contribution to local landfills, and to increase the use of green chemical products.

Introduction:

The United States Army Corps of Engineers (USACE), Portland District, has jurisdiction on three locks and four dams in the Columbia River basin. These sites "contribute to a water resource management system that provides flood risk management, power generation, water quality improvement, fish and wildlife habitat and recreation on the Columbia River and some of its tributaries" [6]. The Bonneville Lock and Dam (Bonneville Project) site lies on the Columbia River approximately 40 miles east from Portland, Oregon (Figure 1 and Figure 2). Portions of the site have been declared a National Historic Landmark, from its origins in President Franklin D. Roosevelt's New Deal program from the Public Works Administration project. The spillway, first powerhouse, and navigation lock were completed in 1938 with the second powerhouse completed in 1981 and a larger navigation lock completed in 1993 (Figure 2). With its location on the Columbia River, the Bonneville Project also incorporates fish passages that allow Chinook salmon, Steelhead, and other fish species access to their historical habitat in the upper Columbia River Basin [6]. The important location of the Bonneville Project, due to its proximity to Portland, Oregon and being situated on the Columbia River, lends the site to be vigilant of its use of chemicals that could negatively impact the surrounding area and the lower Columbia River.

While hazardous waste is thoroughly documented and labeled according to Bonneville Project's Waste Management Program to ensure compliance with 40 CFR Parts 260 through 279 of the Resource Conservation and Recovery Act, characterization and approximate amount produced of non-hazardous waste is not known, and is one of the major focuses of this project. In the October 2016 to September 2017 fiscal year, USACE at Bonneville Project was directed to look into reducing their non-hazardous solid waste by 50%, construction and demolition (C&D) solid waste by 60%, and expand their environmentally preferable purchasing program to increase sustainability [4]. With an emphasis on the Integrated Solid Waste Management program focusing on sustainable acquisition and incorporating a variety of diversion techniques to minimize the landfilling of solid waste, the need to understand the waste characterization and chemical use at Bonneville Project is needed. The characterization of non-hazardous waste is also needed to ensure compliance with USACE environmental compliance assessment program, which is incorporating compliance requirements from USACE Non-Hazardous Solid Waste Diversion and Materials Management Policy [4]. With the added focus on sustainable acquisition and the location of the Bonneville Project on an ecologically important area, considering and potentially incorporating chemical products that are less harmful to the surrounding environment take on an added importance.

This project has two main objectives. The first objective of this project is to analyze the waste stream of the Bonneville Project to enable management to look at possible ways to reduce their non-hazardous solid waste by 50% and to establish conformance to USACE Non-Hazardous Solid Waste Diversion and Materials Management Policy [4]. The second objective of this project is to conduct a green purchasing analysis with a focus on chemical products used at the Bonneville Project in order to potentially incorporate chemical products that are less harmful to the environment when used and to reduce the overall chemical count onsite.

Figure 1: Map of northern Oregon with the locations of Portland, Oregon and USACE Bonneville Lock and Dam highlighted.

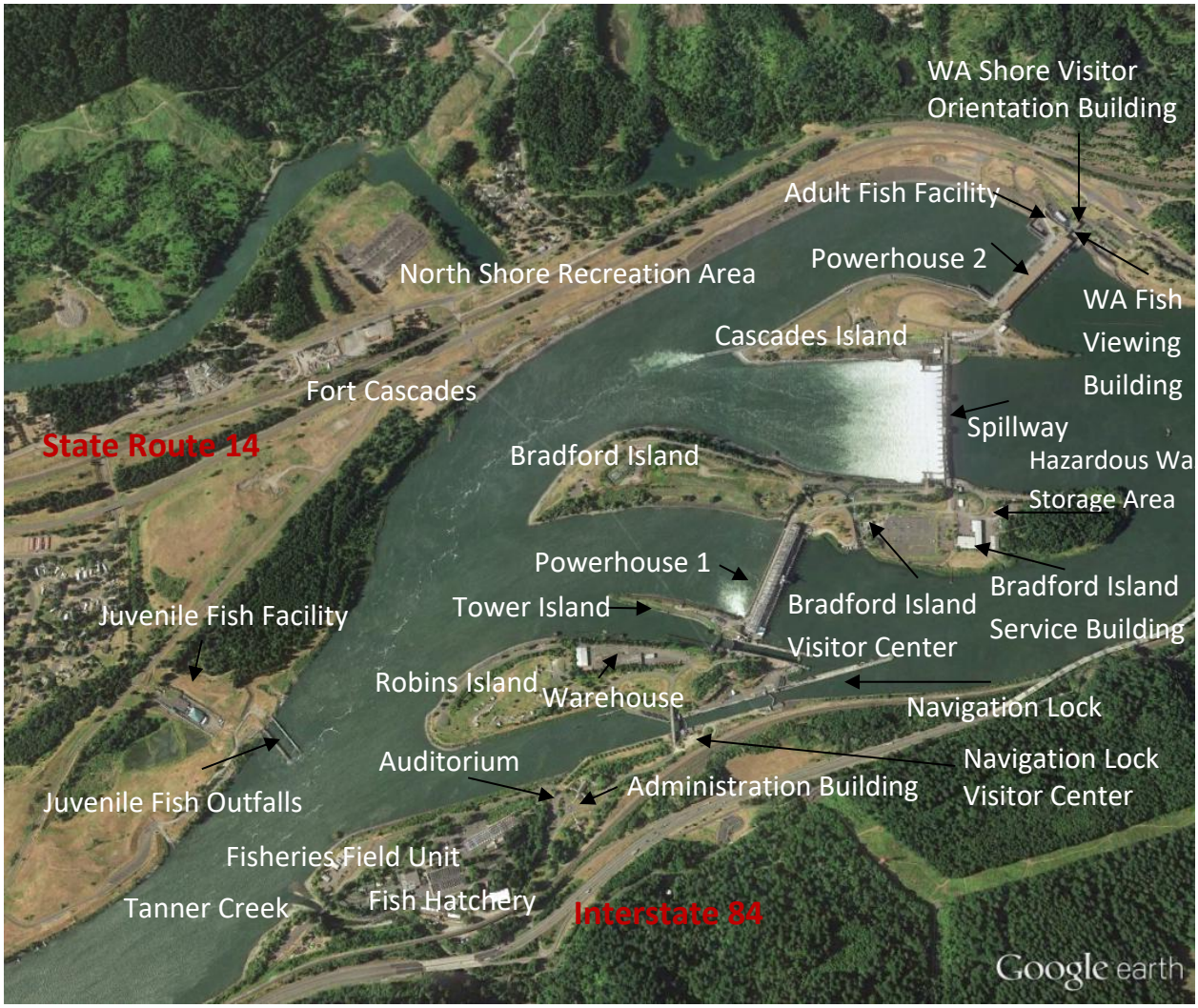


Figure 2: Map of the United States Army Corps of Engineers Bonneville Lock and Dam with labels of major facilities and points of interest.

Waste Stream Analysis

Background:

Waste stream analysis, an understanding how much waste is generated and what it is composed of, is used to help make informed decisions in waste management and possible solid waste reduction strategies. Yu and Maclaren 1994 showed that a duel approach to waste stream analysis, looking at customer surveys and conducting a waste audit, produced the most accurate results for quantification and characterization of solid waste [14]. Having an understanding about a sites solid waste characterization and weight totals allows for the implementation of more refined practices for ensuring that recyclable and non-hazardous refuse materials are ending up in the appropriate locations, and coming up with processes to potentially reduce the amount of non-hazardous materials ending up in a landfill. For the purposes of this report, when referring to recycling and refuse waste in recycling and refuse containers, the waste being mentioned is non-hazardous unless noted otherwise. It should also be noted that when recycling and refuse waste are mentioned, there may or may not be refuse material or recycling material found within the recycling or refuse waste respectively.

Methods:

The work done for this project was carried out on the Bonneville Project, straddling the Columbia River and located in both Multnomah County, OR and Skamania County, WA. Guidelines to conducting the waste audit were drawn from the Metro and Washington County's Waste Assessment Guide [5]. The Bonneville Project has a total of 11 refuse and 6 recycling containers at the designated areas seen in Figure 3 and Table 2.

Figure 3: Map of the United States Army Corps of Engineers Bonneville Lock and Dam with the designated areas for waste collection labeled with approximate locations for recycling and refuse containers.

Table 2: The number and size in volume capacity of recycling and refuse containers that were audited at each designated area at the Bonneville Project

Designated Area for Waste Pickup	Number of Recycling Containers and Size (Volume Capacity)	Number of Refuse Containers and Size (Volume Capacity)
Auditorium	1 (1.5 yard)	1 (1 yard)
Warehouse	2 (single 5 and single 6 yard)	3 (4 yard)
Powerhouse 1 (PH1)	1 (5 yard)	2 (single 2 and single 4 yard)
Service Building	1 (6 yard)	1 (20 yard)
Powerhouse 2 (PH2)	1 (4 yard)	2 (2 yard)
Adult Fish Facility (AFF)	None	1 (1 yard)
Juvenile Fish Facility (JFF)	1 (4 yard)	1 (1 yard)

There are two waste haulers that serve the Bonneville Project. Crown Point Refuse and Recycling serves all of the Bonneville Project's recycling needs and collects waste from the refuse containers at the Auditorium, Warehouse, Powerhouse 1, and Service Building designated areas. Columbia River Disposal Inc. collects waste from the refuse containers at the Powerhouse 2, Adult Fish Facility, and Juvenile Fish Facility designated areas. Waste audits were conducted one to three days before pickup, which occurred on Thursday and Fridays. Material from all audited refuse containers are hauled away on a weekly basis (approximately 52 times annually) while material from recycling containers are hauled away biweekly (approximately 26 times annually) with the exception of PH2 and JFF as they are generally hauled away monthly (approximately 12 times annually). The Bonneville Project does have several large waste containers that were not included in this study as they were outside the scope of the project and are only serviced when requested by the Bonneville Project. These include a metals container located at the Service Building and Warehouse in which debris from construction activities and broken industrial equipment (such as generators) are discarded and a debris container located on Cascades Island between the Spillway and Powerhouse 2 (Figure 2) in which large river debris and construction waste are discarded.

Depending on the volume of solid waste contained within the designated area's drop box, either the whole unit or a representative sample was audited. The audit consisted of measuring or estimating the total weight of the contents of the containers. If the contents of the containers were deemed too vast to completely weigh, a representative sample (approximately 20% to 50%) of the container was audited and weights were multiplied according to the representative sample percentage to arrive at the estimated weight of the entire container. For example, if a representative sample of approximately 20% is audited, the sample is then sorted and weighed, and then the weights would be multiplied by 5 to find the approximate total weight of contents found in the recycling or refuse container being audited. Due to the size and possible contents of the refuse container for the service building site, getting a representative sample was not always possible, and this was noted within the audit form. Each designated area was audited at least four times over the course of eight months. An initial view of the inside of each waste container was photographed before samples were pulled from the container.

The waste audits were conducted adjacent to each drop box, with a ULINE H-104 portable analog scale used for weight measurement. Garbage bag lined plastic containers were used for auditing with each weighed before waste sorting. Waste categories were drawn from Metro and Washington County's Waste Assessment Guide and the Bonneville Lock and Dam Recycling Guide. In addition, the category Soiled Cloth (SC) was derived from category Other (O) after the final waste audit was conducted, and is therefore considered a conservative quantity since not all soiled cloth was separated and weighed from other waste material during auditing. Waste items, except for Soiled Cloth (SC), were sorted and placed in garbage bag lined plastic containers by category based on the following definitions:

- **Corrugated Cardboard (CCB):** Corrugated boxes used for shipping and packaging materials.
- **Glass Bottles and Jars (G):** Containers made of glass and exhibiting a neck or threaded top; excludes light bulbs.
- **Recyclable Mixed Paper and Newspaper (RPa):** Office paper, paperboard/soft cardboard, folders, scrap paper, sticky notes, shredded paper, paper bags, magazines, newspapers, and all other non-corrugated cardboard.
- **Recyclable Plastic Bottles and Tubs (RPl):** Plastic containers with a neck, including containers for beverages and other fluids and yogurt plastic tubs. No plastic lids, clamshells/trays, food-contaminated plastics, non-recyclable plastic packaging, plastic wrappers, and residue-filled plastic containers.
- **Tin, Metal, and Aluminum Cans (MC):** Containers made of aluminum, steel, or tin, including for beverages and empty aerosol cans. Must not be food or residue contaminated.
- **Recyclable Scrap Metal (SM):** Metal that was not classified as a "container."
- **Milk Cartons and Juice Boxes (C):** Milk cartons and similar gable-top containers, and juice drink boxes.
- **Food Soiled Paper (FSP):** Paper fibers contaminated with food like coffee grinds and filters, soiled paper napkins, soiled paper bags, pizza boxes, and waxed corrugated cardboard.
- **Non-Recyclable Paper (NRPa):** Contaminated papers and non-recyclable types of paper such as tissues, paper plates, waxed papers, frozen food containers, paper packaging with metal or plastic parts. Paper based water/soda/coffee cups.
- **Block Foam (F):** Styrofoam, packing peanuts, and other foam-like materials.
- **Wood, Yard, and Natural River Waste (W):** Waste pulled from the river that includes, but not limited to, woody debris and aquatic plants. All wood-based materials like shipping pallets. Yard trimmings and plant debris.
- **Food Scraps (FS):** Vegetables, meats, dairy, grain-based, half-eaten plate scrapings, etc., and including the container the food is in if the container weight was not appreciable compared to the food inside.
- **Non-Recyclable Plastic Bags, Films, Containers, and Tubs (NRPl):** All bags (grocery, trash, and sandwich) also shrink wrap, plastic pallet wrap, and bubble wrap. Any contaminated plastic containers and tubs, such as plastic with dried paint, food wrappers, or soiled yogurt cups. All plastic trays, clamshells, utensils, lids, cups, etc. that is considered true waste (non-recyclable material).

- **Soiled Cloth (SC):** Single use textiles contaminated with residuals such as oil, lubricants, or metal shavings.
- **Other (O):** Items sorted that do not fall into the above categories and considered true waste, such as textiles, light bulbs, rubber products, and unidentifiable items considered true waste (non-recyclable material).

Sorted waste items in the garbage bag lined plastic containers were then weighed on the ULINE H-104 scale with the weight of the plastic container subtracted from the total weight upon weight recording on the audit form. The plastic containers were not lined with a garbage bag when conducting a waste audit of the recycling containers unless refuse materials were found. The waste audit form can be found in Appendix A.

Analysis of the waste audit was comprised of calculating the sum and average weight for each designated area for refuse and recycling materials found in either the recycling or refuse containers. Designated area averages were done by grouping relevant audits together based on the designated area, container type, and season. The designated areas are as follows: Auditorium, Warehouse, Powerhouse 1 (PH1), Service Building, Powerhouse 2 (PH2), Adult Fish Facility (AFF), and Juvenile Fish Facility (JFF) (Table 2 and Figure 3). Apart from the Adult Fish Facility (AFF), all designated areas contained at least one recycling and refuse container. The fall season is represented by audits conducted in August, September, and October. The winter season is represented by audits conducted in November, December, January, and February. The spring season is represented by audits conducted in March and April. Utilizing ArcMap version 10.5.1 by ESRI, the Kernel Density algorithm from the Spatial Analyst function was utilized to visualize the total non-hazardous waste weight for the Bonneville Project based on the designated areas, recycling and refuse weight totals for each designated area, and audit category weight totals for each designated area. The approximate annual waste generation for the Bonneville Project is calculated utilizing data from Tables 1 and 3 by taking the average waste generation per designated area of either recycling waste in recycling containers or refuse waste in refuse containers and then multiply by either 26 or 12 for recycling container pickup on the Oregon side and Washington Side (Powerhouse 2 and Juvenile Fish Facility) respectively, or 52 for refuse container pickup throughout the Bonneville Project (Numbers based on hauler pickup schedule).

Results:

<u>Overall Bonneville Project Site</u>

The approximate annual weight in pounds for waste covering the entire Bonneville Project and the composition results of the waste are found in Figures 5 and 6 respectively. They represent the entirety of the Bonneville Project with Figures 5A and 5B representing the approximate annual weight in pounds for recycling waste in recycling containers and refuse waste in refuse containers respectively. Figures 6A and 6B represent the composition results for the approximate annual weight in pounds for the entire Bonneville Project for recycling waste in recycling containers and refuse waste in refuse containers respectively. Figures 4, 7, and 8 represent the kernel density maps for the Bonneville Project that represent the total waste found in recycling and refuse containers per designated area, the total

recycling waste found in recycling container(s) per designated area, and the total refuse waste found in refuse container(s) per designated area respectively.

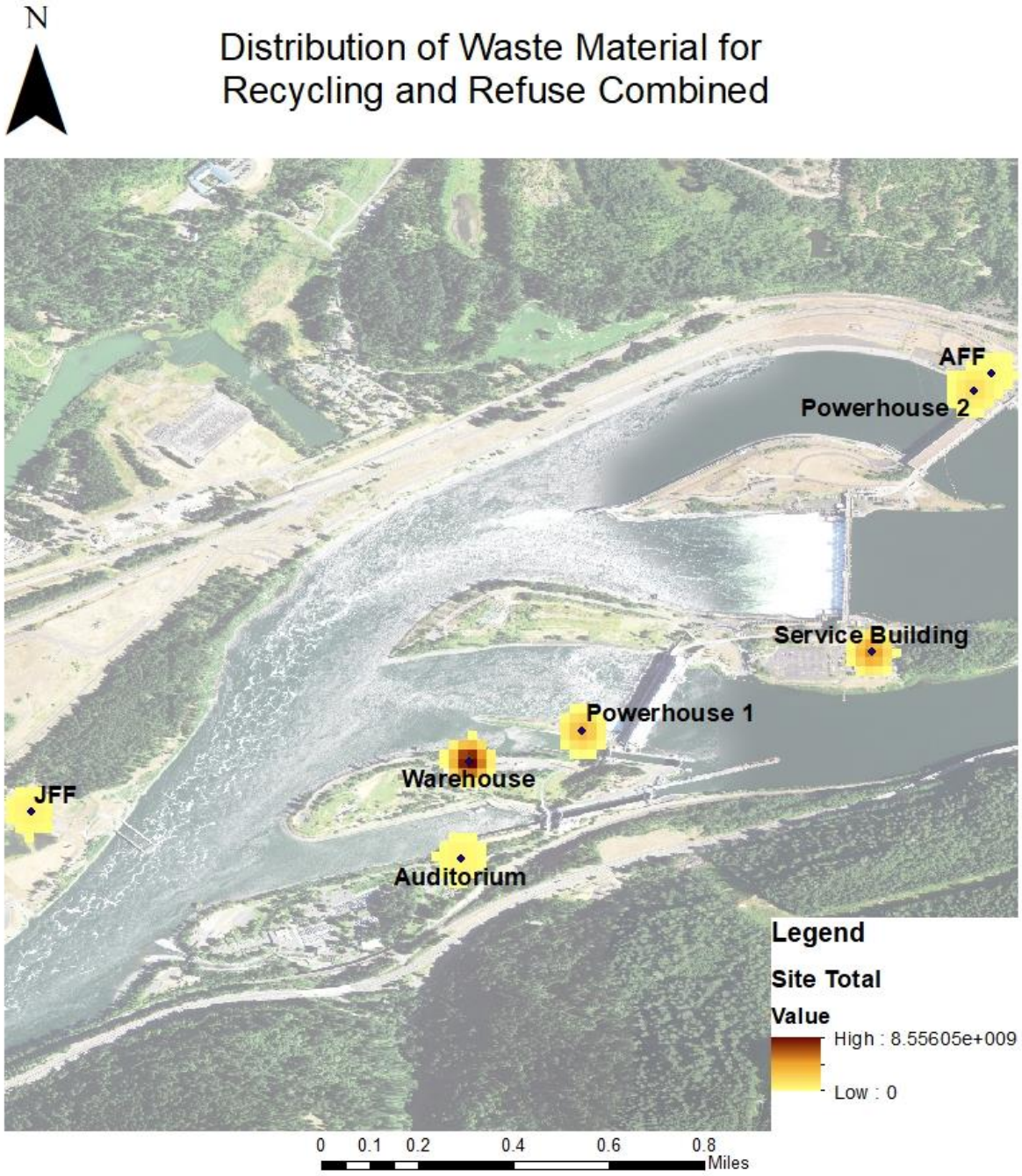


Figure 4: Kernel density map for category 'Recycling and Refuse Combined' at the Bonneville Project encompassing all designated areas. The darker the color scale is the higher amounts of weight found in all waste in recycling and refuse containers per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

From Figure 5A, with an approximate annual weight of 11,516.22 pounds for recycling waste in recycling containers, 586.07 pounds of refuse waste was found mixed with the recycling waste in the recycling containers. From Figure 5B, with an approximate annual weight of 53,707.46 pounds for refuse waste in refuse containers, 7,421.57 pounds of recycling waste was found mixed with the refuse waste in the refuse containers.

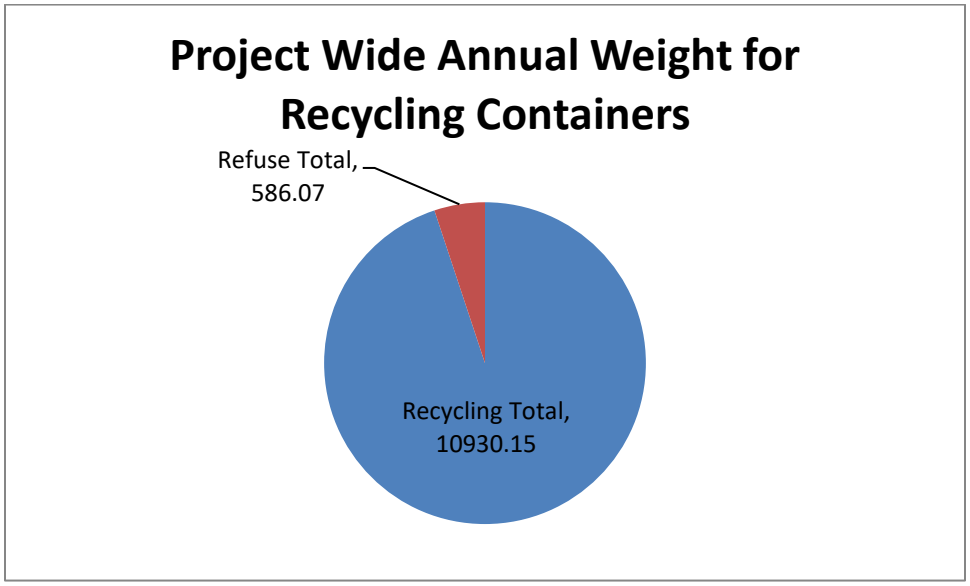


Figure 5A: The approximate annual weight in pounds for the entire Bonneville Project for recycling waste in recycling containers.

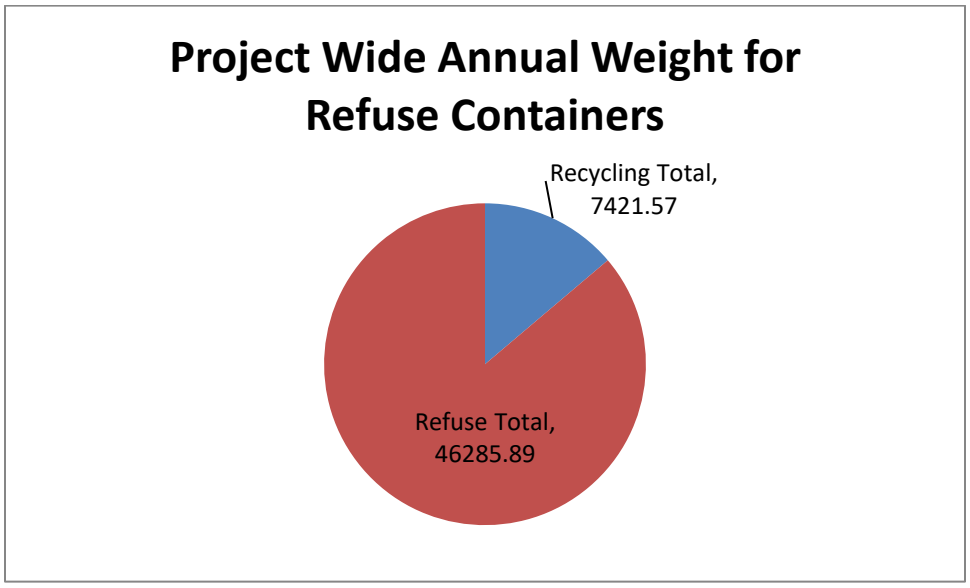


Figure 5B: The approximate annual weight in pounds for the entire Bonneville Project for refuse waste in refuse containers.

From Figure 6A, the largest sort category at the Bonneville Project for recycling waste in recycling containers was Corrugated Cardboard (CCB) at 5,012.50 pounds followed by Recyclable Mixed Paper and Newspaper (RPa) at 4,034.38 pounds. From Figure 6B, the largest sort category at the Bonneville Project for refuse waste in refuse containers was Other (O) at 15,490.05 pounds followed by Wood, Yard, and Natural River Waste (W) at 10,906.50 pounds.

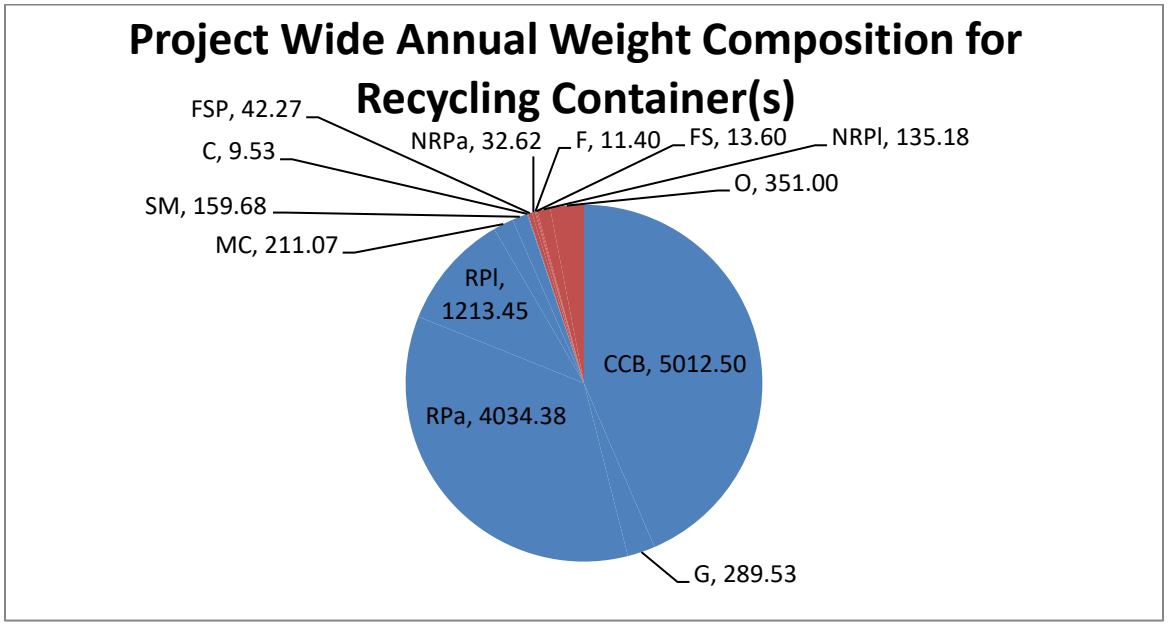


Figure 6A: The approximate annual weight in pounds for the entire Bonneville Project for recycling waste in recycling containers by composition. Blue shading is recycling, red shading is refuse.

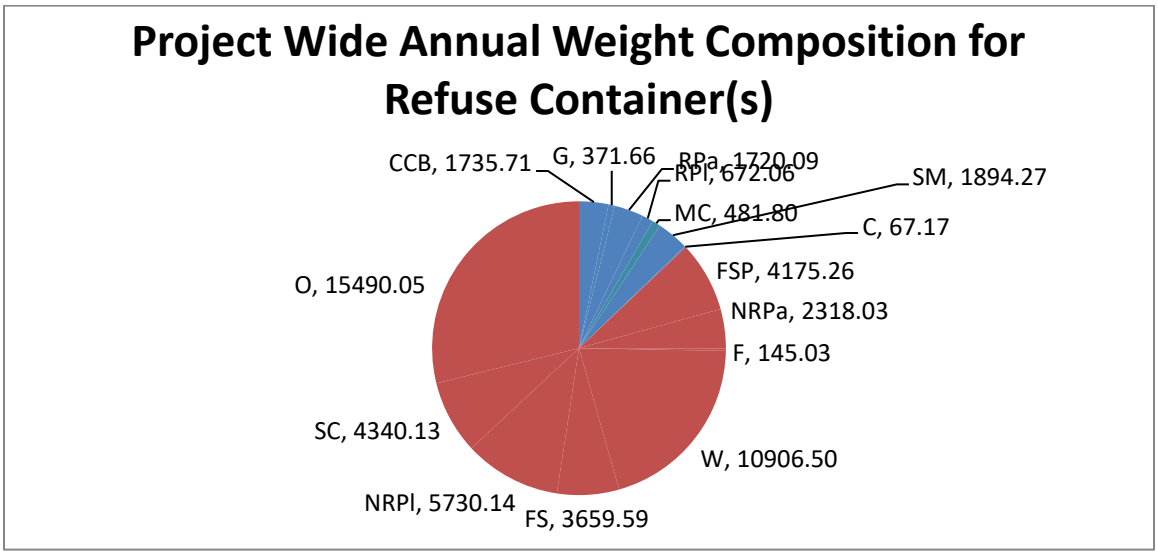


Figure 6B: The approximate annual weight in pounds for the entire Bonneville Project for refuse waste in refuse containers by composition. Blue shading is recycling, red shading is refuse.

Corrugated Cardboard (CCB); Glass Bottles and Jars (G); Recyclable Mixed Paper and Newspaper (RPa); Recyclable Plastic Bottles and Tubs (RPl); Tin, Metal, and Aluminum Cans (MC); Recyclable Scrap Metal (SM); Milk Cartons and Juice Boxes (C); Food Soiled Paper (FSP); Non-Recyclable Paper (NRPa); Block Foam (F); Wood, Yard, and Natural River Waste (W); Food Scraps (FS); Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl); Soiled Cloth (SC); Other (O).

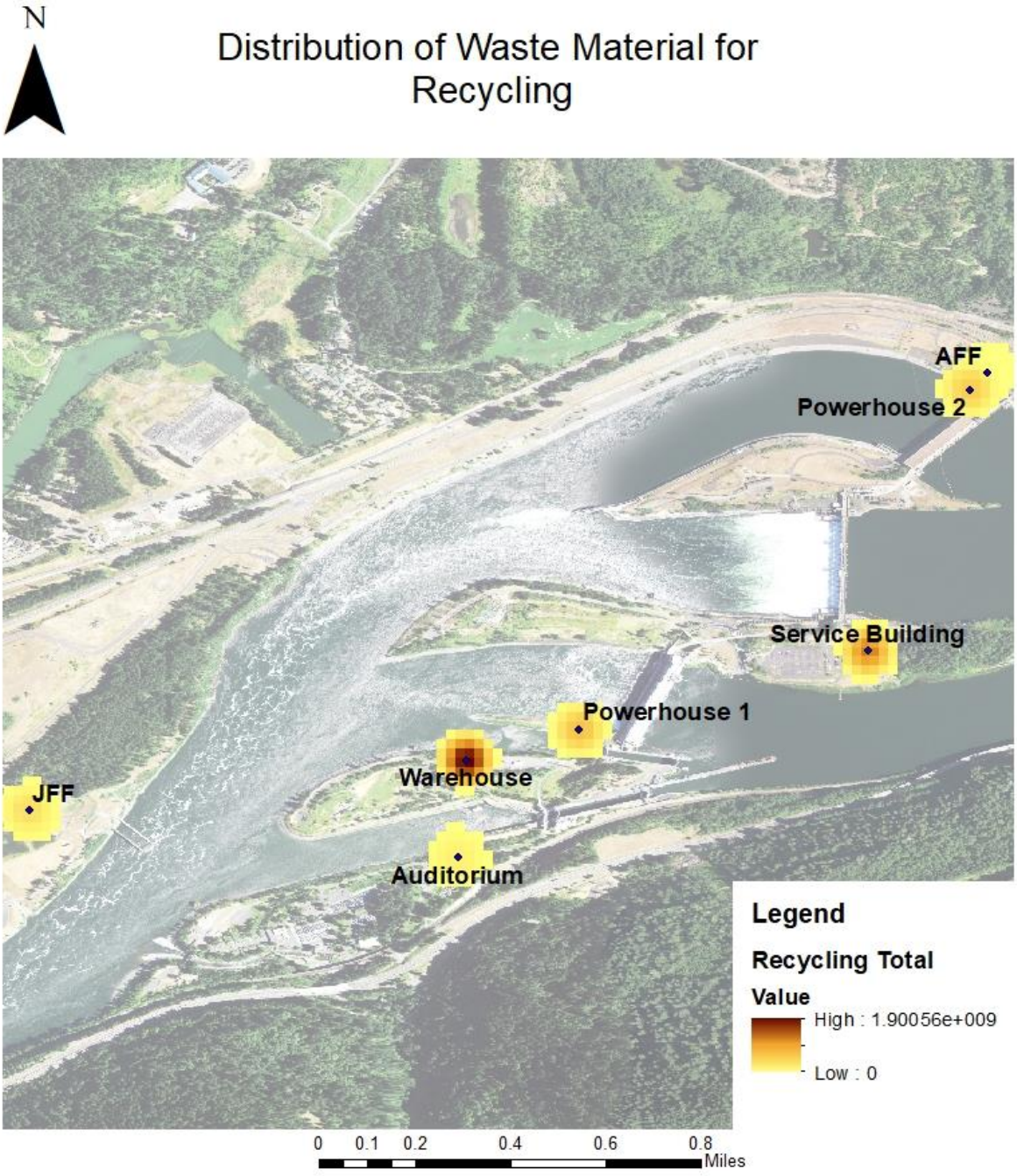


Figure 5: Kernel density map for category 'Recycling' at the Bonneville Project encompassing all designated areas. The darker the color scale is the higher amounts of weight found in all recycling waste in recycling containers per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

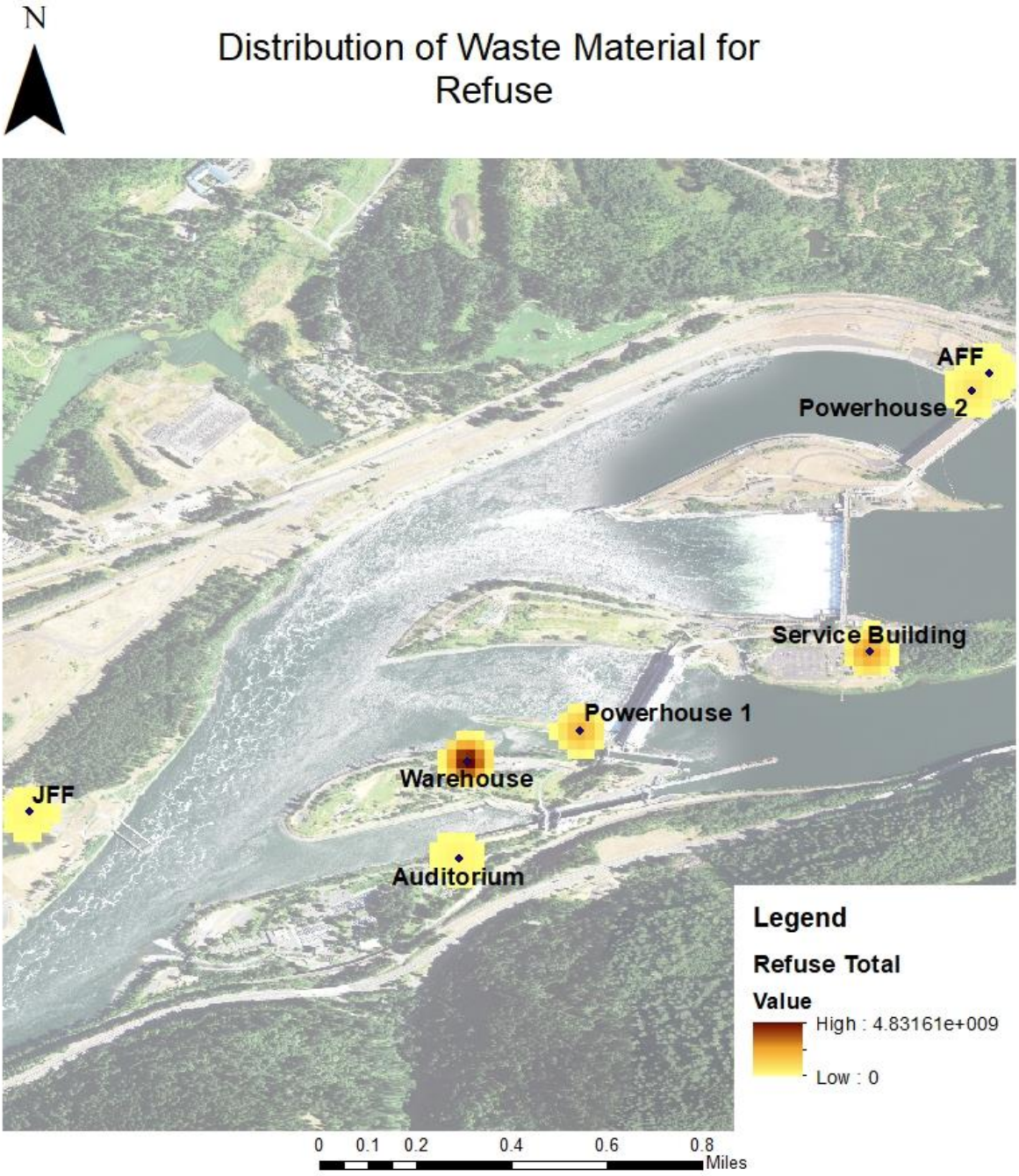


Figure 6: Kernel density map for category 'Refuse' at the Bonneville Project encompassing all designated areas. The darker the color scale is the higher amounts of weight found in all refuse waste in refuse containers per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

Designated Area:

The seasonal average weight in pounds for recycling and refuse waste per designated area is found in Figure 9, which represents the entirety of the Bonneville Project during the audit period with Figures 9A and 9B representing the average weight in pounds per designated area for recycling waste in recycling containers and refuse waste in refuse containers respectively per season.

From Figure 9A, the Fall seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), Service Building, Powerhouse 2(PH2), and Juvenile Fish Facility (JFF) designated areas for recycling waste in recycling containers are 10.00, 188.75, 31.00, 153.00, 121.75, and 83.75 pounds respectively. The Winter seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), Service Building, Powerhouse 2(PH2), and Juvenile Fish Facility (JFF) designated areas for recycling waste in recycling containers are 29.25, 96.50, 63.83, 179.00, 67.75, and 14.75 pounds respectively. The Spring seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), and Juvenile Fish Facility (JFF) designated areas for recycling waste in recycling containers are 49.50, 78.13, 60.00, and 96.00 pounds respectively. Audits for designated areas Service Building and Powerhouse 2 (PH2) were not conducted in the Spring season.

From Figure 9B, the Fall seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), Service Building, Powerhouse 2(PH2), Adult Fish Facility (AFF), and Juvenile Fish Facility (JFF) designated areas for refuse waste in refuse containers are 42.00, 249.56, 236.75, 302.14, 18.17, 72.00, and 42.17 pounds respectively. The Winter seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), Service Building, Powerhouse 2(PH2), Adult Fish Facility (AFF), and Juvenile Fish Facility (JFF) designated areas for refuse waste in refuse containers are 36.00, 344.58, 242.83, 611.00, 91.96, 3.83, and 8.00 pounds respectively. The Spring seasonal average weights for the Auditorium, Warehouse, Powerhouse 1(PH1), Service Building, Powerhouse 2(PH2), Adult Fish Facility (AFF), and Juvenile Fish Facility (JFF) designated areas for refuse waste in refuse containers are 88.00, 61.75, 189.00, 400, 48.83, 26.75, and 7.50 pounds respectively.

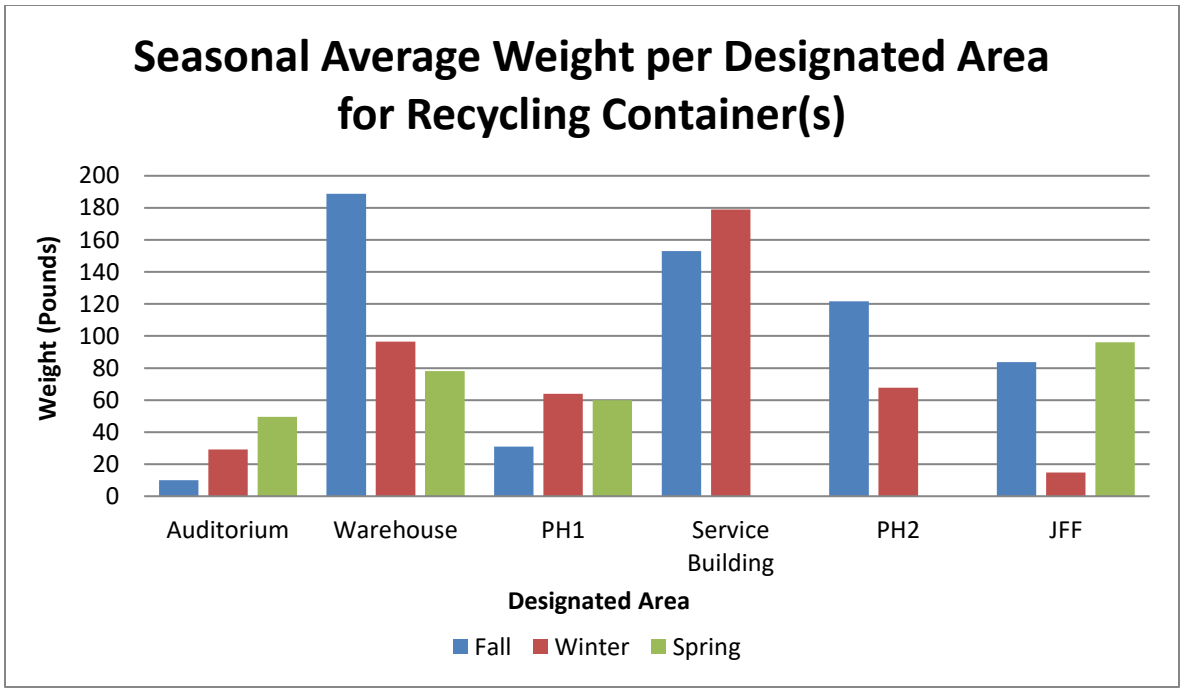


Figure 9A: The seasonal average weight in pounds per designated area at the Bonneville Project for recycling waste in recycling containers for the fall, winter, and spring seasons. PH1, PH2, and JFF indicate Powerhouse 1, Powerhouse 2, and the Juvenile Fish Facility respectively.

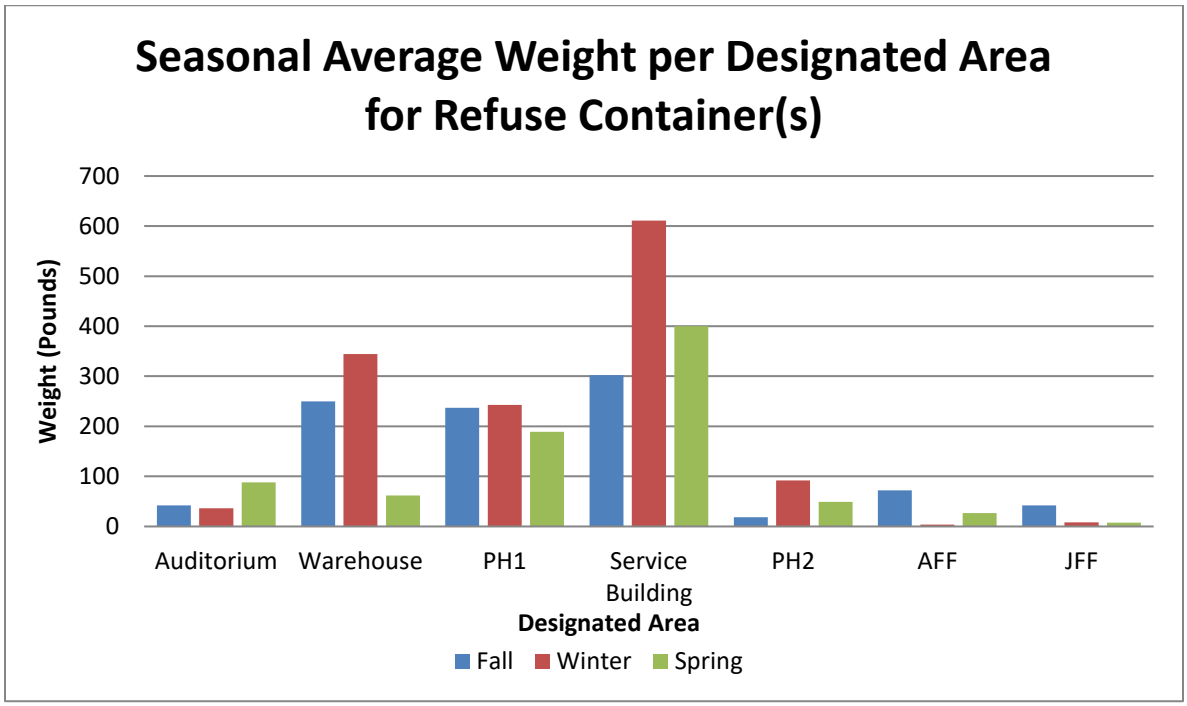


Figure 9B: The seasonal average weight in pounds per designated area at the Bonneville Project for refuse waste in refuse containers for the fall, winter, and spring seasons. PH1, PH2, AFF, and JFF indicate Powerhouse 1, Powerhouse 2, Adult Fish Facility, and the Juvenile Fish Facility respectively.

Table 3: Depicts the average weight in pounds of recycling and refuse waste at the Bonneville Project. Table columns are as follows: Waste/Container Type, Designated Area, Weight Average in pounds of waste type with the total number of audits conducted at each designated area for each waste type in parenthesis, average weight totals for recycling waste in recycling containers (Rec. Total) and refuse waste in refuse containers (Ref. Total), and the composition of the waste. Waste composition categories are as follows: Corrugated Cardboard (CCB), Glass Bottles and Jars (G), Recyclable Mixed Paper and Newspaper (RPa), Recyclable Plastic Bottles and Tubs (RPl), Tin, Metal, and Aluminum Cans (MC), Recyclable Scrap Metal (SM), Milk Cartons and Juice Boxes (C), Food Soiled Paper (FSP), Non-Recyclable Paper (NRPa), Block Foam (F), Wood, Yard, and Natural River Waste (W), Food Scraps (FS), Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl), Soiled Cloth (SC), and Other (O). The black bar is to divide the recyclable (top) and refuse (bottom) sort categories.

Waste Type	Designated Area	Weight Average	Rec. Total	CCB	G	RPa	RPl	MC	SM	C	Ref. Total
Recycling	Auditorium	29.50 (4)	29.13	6.75	3.00	8.375	7.125	1.25	2.50	0.125	0.38
Refuse	Auditorium	47.60 (5)	8.00	0.60	0.70	2.70	1.10	2.70	0	0.20	39.60
Recycling	Warehouse	121.13 (12)	113.67	70.17	2.33	28.42	11.33	1.33	0.04	0.04	7.46
Refuse	Warehouse	261.72 (16)	30.97	5.50	1.88	6.06	2.78	1.06	13.38	0.31	230.75
Recycling	PH1	57.08 (6)	55.08	32.83	1.33	11.00	9.67	0.25	0	0	2.00
Refuse	PH1	233.06 (8)	37.31	3.69	2.00	15.94	3.25	1.56	7.50	0	195.75
Recycling	Service Building	168.60 (5)	163.20	44.70	4.10	98.40	13.20	2.60	0	0.20	5.4
Refuse	Service Building	386.24 (6)	55.49	20.66	0.33	6.50	4.25	2.62	15.00	0.29	330.75
Recycling	PH2	85.75 (6)	71.42	58.17	0	10.25	2.58	0.42	0	0	14.33
Refuse	PH2	52.99 (9)	7.02	1.50	1.89	1.50	0.69	0.50	0.55	0.39	45.97
Refuse	AFF	22.83 (6)	2.83	1.33	0.25	0.08	0.75	0.42	0	0	20.00
Recycling	JFF	58.60 (5)	57.10	24.90	0.80	9.20	9.00	5.40	7.80	0	1.50
Refuse	JFF	28.40 (5)	1.10	0.10	0.10	0.30	0.10	0.40	0	0.10	27.30

FSP	NRPa	F	W	FS	NRPl	SC	O
0.125	0.125	0	0	0	0	0	0.125
9.60	6.20	0.20	0.60	5.80	7.20	0	10.00
0.21	0.08	0	0	0	1.63	0	5.54
15.25	12.13	0.50	120.41	16.97	27.94	5.75	31.81
0	0	0	0	0	0.17	0	1.83
17.13	4.94	0.81	21.63	23.75	20.75	33.38	76.75
0.60	1.00	0.40	0	0.40	3.00	0	0
24.83	14.90	1.08	66.44	11.41	45.16	40.89	131.86
0.50	0	0.08	0	0.17	0.58	0	13.00
5.94	3.66	0.11	0.33	6.26	3.89	3.44	22.33
0.75	0.25	0.08	0.33	0.58	1.67	0	16.33
1	0.10	0	0	0.10	0.30	0	0
6.80	2.50	0	0	5.60	3.60	0	8.80

The designated area average recycling waste in recycling container(s) by composition is shown in Figure 10A. All designated areas have a recycling container(s) except for Adult Fish Facility (AFF). The designated area average refuse waste in refuse container(s) by composition is shown in Figure 10B. Average weight totals for recycling waste in recycling container(s) and refuse waste in refuse container(s) for each designated area are listed in Table 3.

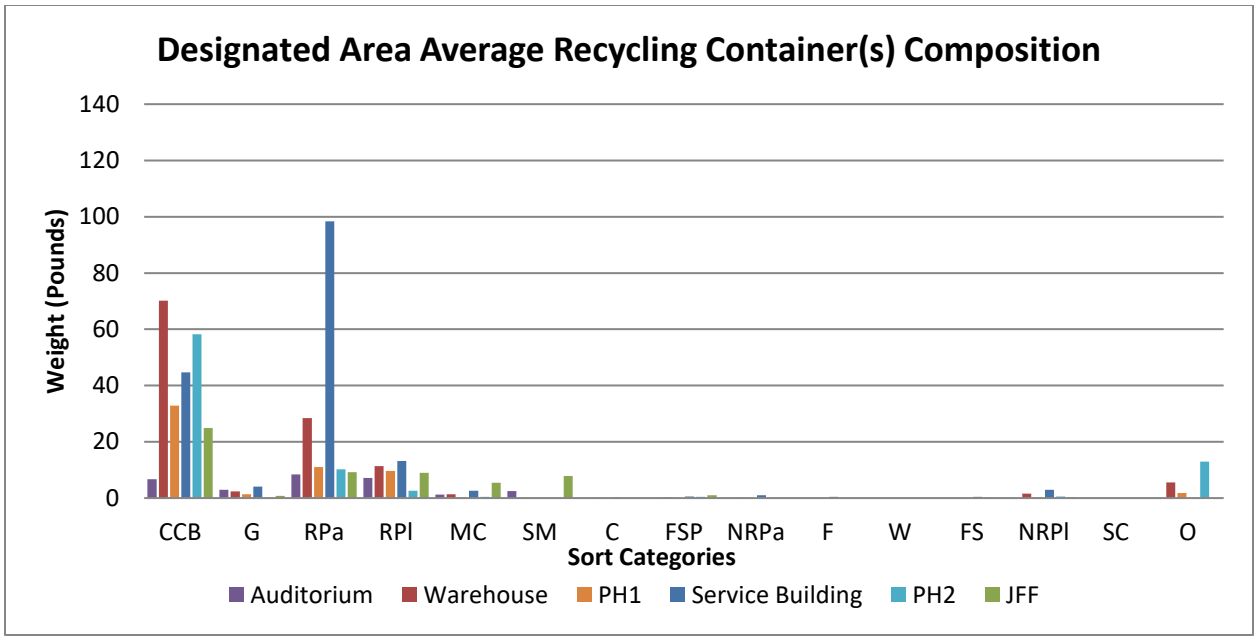


Figure 10A: The average weight in pounds per designated area for recycling waste in recycling container(s) by composition. PH1, PH2, and JFF represent Powerhouse 1, Powerhouse 2, and Juvenile Fish Facility respectively.

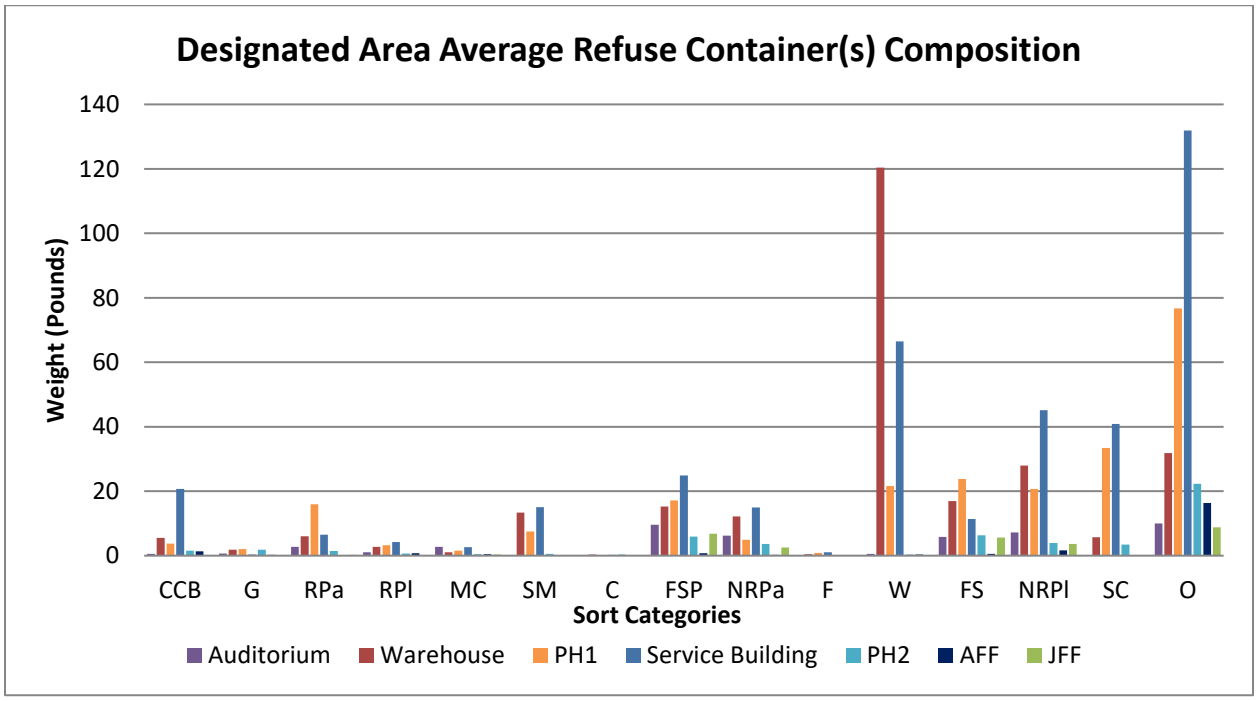


Figure 10B: The average weight in pounds per designated area for refuse waste in refuse container(s) by composition. PH1, PH2, AFF, and JFF represent Powerhouse 1, Powerhouse 2, Adult Fish Facility, and Juvenile Fish Facility respectively.

Corrugated Cardboard (CCB); Glass Bottles and Jars (G); Recyclable Mixed Paper and Newspaper (RPa); Recyclable Plastic Bottles and Tubs (RPl); Tin, Metal, and Aluminum Cans (MC); Recyclable Scrap Metal (SM); Milk Cartons and Juice Boxes (C); Food Soiled Paper (FSP); Non-Recyclable Paper (NRPa); Block Foam (F); Wood, Yard, and Natural River Waste (W); Food Scraps (FS); Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl); Soiled Cloth (SC); Other (O).

Auditorium:

From Table 3 and Figure 10A, with an average weight of 29.50 pounds for the recycling waste in the recycling container, 0.38 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Recyclable Mixed Paper and Newspaper (RPa) at 8.375 pounds followed by Recyclable Plastic Bottles and Tubs (RPl) at 7.125 pounds.

From Table 3 and Figure 10B, with an average weight of 47.60 pounds for the refuse waste in the refuse container, 8.0 pounds of recyclable materials were found on average. The largest sort category for the average refuse waste in the refuse container was Other (O) at 10.0 pounds followed by Food Soiled Paper (FSP) at 9.60 pounds.

Warehouse:

From Table 3 and Figure 10A, with an average weight of 121.13 pounds for the recycling waste in the recycling containers, 7.46 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Corrugated Cardboard (CCB) at 70.17 pounds followed by Recyclable Mixed Paper and Newspaper (RPa) at 28.42 pounds.

From Table 3 and Figure 10B, with an average weight of 261.72 pounds for the refuse waste in the refuse containers, 30.97 pounds of recycling materials were found on average. The largest sort category for the average refuse waste in the refuse containers was Wood, Yard, and Natural River Waste (W) at 120.41 pounds followed by Other (O) at 31.81 pounds.

Powerhouse 1 (PH1):

From Table 3 and Figure 10A, with an average weight of 57.08 pounds for the recycling waste in the recycling container, 2.0 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Corrugated Cardboard (CCB) at 32.83 pounds followed by Recyclable Mixed Paper and Newspaper (RPa) at 11.0 pounds.

From Table 3 and Figure 10B, with an average weight of 233.06 pounds for the refuse waste in the refuse containers, 37.31 pounds of recycling materials were found on average. The largest sort category for the average refuse waste in the refuse containers was Other (O) at 76.75 pounds followed by Soiled Cloth (SC) at 33.38 pounds.

Service Building:

From Table 3 and Figure 10A, with an average weight of 168.6 pounds for the recycling waste in the recycling container, 5.4 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Recyclable Mixed Paper and Newspaper (RPa) at 98.4 pounds followed by Corrugated Cardboard (CCB) at 44.7 pounds.

From Table 3 and Figure 10B, with an average weight of 386.24 pounds for the refuse waste in the refuse container, 55.49 pounds of recycling materials were found on average. The largest sort category

for the average refuse waste in the refuse container was Other (O) at 131.86 pounds followed by Wood, Yard, and Natural River Waste (W) at 66.44 pounds.

Powerhouse 2 (PH2):

From Table 3 and Figure 10A, with an average weight of 85.75 pounds for the recycling waste in the recycling container, 14.33 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Corrugated Cardboard (CCB) at 58.17 pounds followed by Other (O) at 13.0 pounds.

From Table 3 and Figure 10B, with an average weight of 52.99 pounds for the refuse waste in the refuse containers, 7.02 pounds of recycling materials were found on average. The largest sort category for the average refuse waste in the refuse containers was Other (O) at 22.33 pounds followed by Food Scraps (FS) at 6.26 pounds.

Adult Fish Facility (AFF):

From Table 3 and Figure 10B, with an average weight of 22.83 pounds for the refuse waste in the refuse container, 2.83 pounds of recycling materials were found on average for the refuse container. The largest sort category for the average refuse waste in the refuse container was Other (O) at 16.33 pounds followed by Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl) at 1.67 pounds.

Juvenile Fish Facility (JFF):

From Table 3 and Figure 10A, with an average weight of 58.6 pounds for the recycling waste in the recycling container, 1.5 pounds of refuse materials were found on average. The largest sort category for the average recycling waste in the recycling container was Corrugated Cardboard (CCB) at 24.9 pounds followed by Recyclable Mixed Paper and Newspaper (RPa) at 9.2 pounds

From Table 3 and Figure 10B, with an average weight of 28.4 pounds for the refuse container, 1.1 pounds of recycling materials were found on average. The largest sort category for the average refuse waste in the refuse container was Other (O) at 8.8 pounds followed by Food Soiled Paper (FSP) at 6.8 pounds.

Figure 11 illustrates the amount of miss-placed waste in recycling and refuse containers per designated area. Figure 11A shows the approximate average annual weight in percent of miss-placed refuse material found in recycling container(s) per designated area. Figure 11B shows the approximate average annual weight in percent of miss-placed recycling material found in refuse container(s) per designated area. Percentages are based on the approximate average annual weight in pounds per designated area.

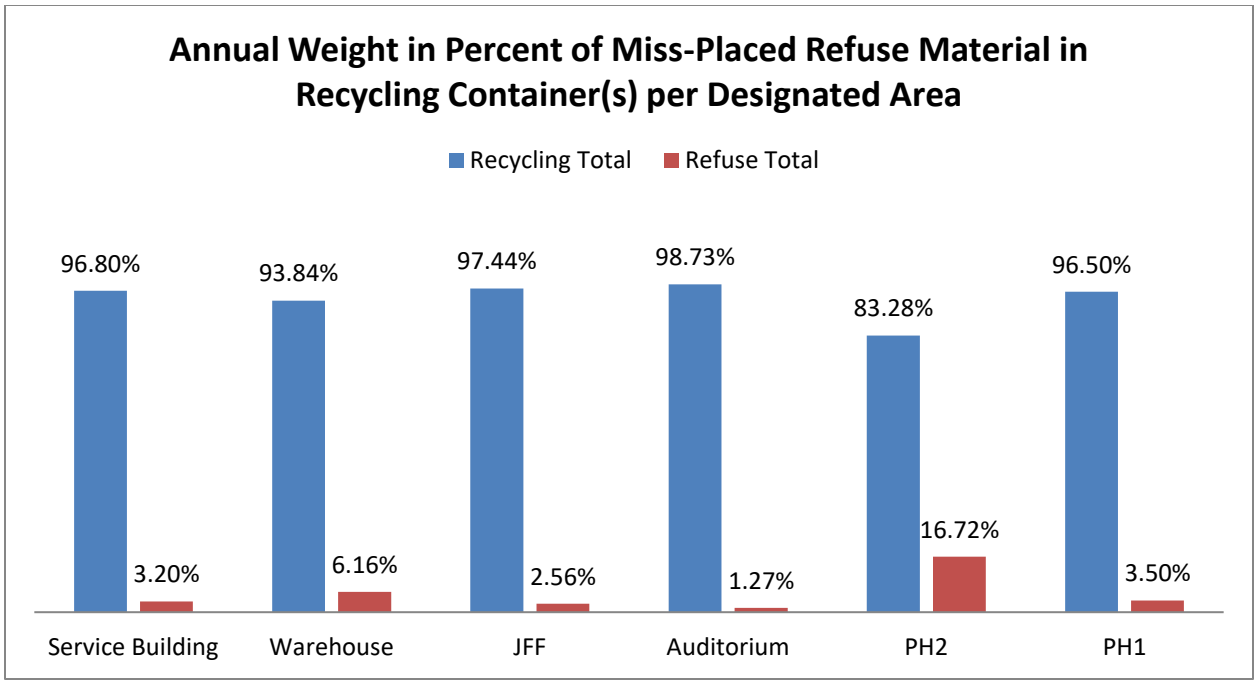


Figure 11A: The approximate average annual weight in pounds shown in percent of miss-placed refuse material found in recycling container(s) per designated area. PH1, PH2, and JFF represent Powerhouse 1, Powerhouse 2, and Juvenile Fish Facility respectively.

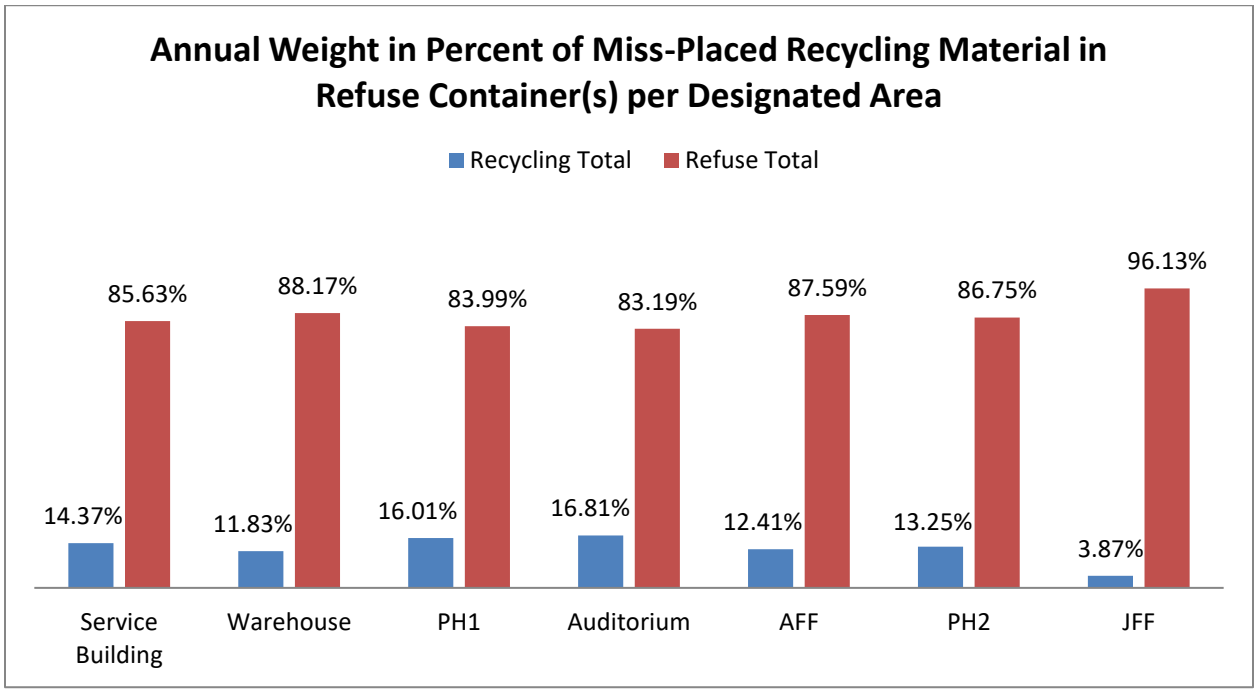


Figure 11B: The approximate average annual weight in pounds shown in percent of miss-placed recycling material found in refuse container(s) per designated area. PH1, PH2, AFF, and JFF represent Powerhouse 1, Powerhouse 2, Adult Fish Facility, and Juvenile Fish Facility respectively.

Conclusion:

Looking at the approximate annual weight of waste generation for the Bonneville Project from Figure 5, the approximate annual weight in pounds for recycling waste in recycling containers (Figure 5A) is 11,516 pounds with 5% or 586 pounds of refuse waste found in recycling containers, and the approximate annual weight in pounds for refuse waste in refuse containers (Figure 5B) is 53,707 pounds with 14% or 7,421 pounds of recycling waste found in refuse containers. This leads to the approximate waste generation at the Bonneville Project at 65,233 pounds of recycling and refuse waste annually, with recycling waste being approximately 17% of total waste annually. Figure 6 illustrates the approximate annual weight of waste generation composition for the Bonneville Project. For recycling waste in recycling containers (Figure 6A), the sort category Corrugated Cardboard (CCB) was the largest, making up approximately 44% or 5,012 pounds across the Bonneville Project with the sort category Recyclable Mixed paper and Newspaper (RPa) the second largest, making up approximately 35% or 4,034 pounds. These two categories made up approximately 79% of recycling waste in recycling containers for the entire Bonneville Project over the audit period. For refuse waste in refuse containers (Figure 6B), the sort category Other (O) was the largest, making up approximately 29% or 15,490 pounds with the sort category Wood, Yard, and Natural River Waste (W) the second largest, making up approximately 20% or 10,906. These two categories made up approximately 49% of refuse waste in refuse containers for the entire Bonneville Project.

Figures 4, 7, and 8 show the highest occurrence of waste per designated area with the top two designated areas with the highest occurrence being the Warehouse and the Service Building. This was expected as the two areas have the highest capacity to handle waste, and according to Table 3 and Figure 10, are also the two highest generators of recycling and refuse waste.

An anomaly during an audit for the Warehouse refuse containers occurred on February 07, 2018 in which all three refuse containers were filled with leftover wood, most likely from construction (Table 5 in Appendix C and Table 6 in Appendix D). This caused the Warehouse approximate annual weight of refuse waste in refuse containers composition average, Table 3 and Figure 10B, to have a larger than expected value for the Wood, Yard, and Natural River Waste (W) sort category and thus slightly influenced the Bonneville Project wide approximate annual weight of refuse waste in refuse containers composition in figure 10B. However, removing the audit anomaly does not alter the Wood, Yard, and Natural River Waste (W) sort category from being the second largest.

A disruption in the audit collection for the month of September 2017, Table 6 in Appendix D, was due to the Bonneville Project being closed to all non-essential personnel and the general public caused by a wildfire in the Columbia Gorge on the Oregon side.

Looking at the average recycling waste in recycling container(s) per designated area seasonally, Figure 9A shows that weight wise, the amount of recycling waste weighed increased at the Auditorium designated area while decreased at the Warehouse designated area based on the audits conducted during the seasons. For figure 9B, the average refuse waste in refuse container(s) per designated area seasonally, no trend is visible based on the audits that were conducted during the seasons. However,

based on table 3, Figure 10B, and Table 5 in Appendix C, the anomaly audit for sort category Wood, Yard, and Natural River Waste (W) influenced the value for the Warehouse designated area for the Winter season.

Out of the designated areas, the Auditorium, Powerhouse 1 (PH1), Service Building, and Juvenile Fish Facility (JFF) (Figure 11A) had less than 4% of refuse waste found in their recycling waste in the recycling container(s). However, all designated areas, save the Juvenile Fish Facility (JFF) at 3.87%, had at least 11% of recycling waste found in their refuse waste in the refuse container(s) (Figure 11B). The reason for the low percentage at the Juvenile Fish Facility (JFF) can be attributed to a few factors based on my observations and conversations with the personnel that work there. One of them being that the number of workers that are assigned there is low compared to the other designated areas and that they prioritize recycling their waste as much as possible. Another reason is that the personnel that work there are vigilant in what they discard to the refuse container, therefore preventing waste items that were meant for the recycling container ending up in the refuse container. From Figure 11A, Powerhouse 2's (PH2) recycling waste in the recycling container had the highest percentage of refuse waste found, but this can be mainly attributed to finding a large amount of air filters during a single audit (Table 5 in Appendix C). Removing this finding, Powerhouse 2 (PH2) would have had less than 2% of refuse waste found in its recycling waste in the recycling container. The most common sort categories for refuse waste found in recycling waste in recycling containers based on the approximate annual waste generated by the Bonneville Project were Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl), Other (O), and Food Soiled Paper (FSP). The most common sort categories for recycling waste found in refuse waste in refuse containers based on the approximate annual waste generated by the Bonneville Project were Corrugated Cardboard (CCB), Recyclable Mixed Paper and Newspaper (RPa), and Recyclable Scrap Metal (SM).

As the sort category Other (O) was for items that did not fit into the other categories neatly, the following are several examples of what was found that was put into the category: Wiring mixed with soiled cloth, air filters, light bulbs, soiled work gloves, used buckets with handles, varying kinds of rope and cable (steel and plastic), hard hats, laminated panels, soap dispensers, plastic cooler, PVC pipe, shotgun casings, quilting supplies, jump rope, playdough, carpet, types of circuit breakers, pet bed, flood lights, paint cans, face guard, rubber mats and parts, water samples, white board, rugs, absorbent pads for spills, various filters, chairs, used tools such as screwdrivers and hammers, tool cases, tool box, boots, life vests, half used sealant tubes, tarps, spare powder concrete, unknown valves and gauges, sun glasses, office supplies, gas can, tool bag, fishing gear, water hose, hair/animal feces, cat litter, biohazard box, brooms, whole fish, batteries, vacuum waste, toilet seat and cover, and light fixtures.

Overall, the approximate average annual weight in pounds and the relative percentage amount of refuse waste found in recycling waste in recycling containers is low. The refuse material items that were found can mainly be attributed to mistakenly discarding refuse waste into recycling containers. This can also be the cause for recycling waste found in refuse waste in refuse containers. However, even if a material is recyclable, further action may be required by the disposer before placing it in the recycling waste container. For example, a common item found in both the recycling and refuse containers was used yogurt cups. Some of the yogurt cups in the recycling containers were rinsed, while others were not. All

yogurt cups in the refuse containers were not rinsed. The non-rinsed yogurt cups, while a recyclable material, is not recyclable if considerable food particles are left inside. This is counted as recyclable for the purpose of this audit, but is more in line with potentially recyclable. Non-rinsed yogurt cups should then be put in the refuse container, not the recycling container due to the non-recyclable nature of the food particles. It should be noted that under the guidelines for recycling at the Bonneville Project, it is stated that this type of cleaning is needed before placing the recyclable item in the recycling container.

This study was initiated in August 2017 and due to the wildfires near the Bonneville Project, data collection was suspended for four weeks. For this reason, waste audit data specific to visitors using the Bradford Island Visitor Center was limited to one audit period (highest number of visitors occurs during the summer season). Waste audits for the recycling and refuse container that occurred on August 23, 2017 and August 29, 2017, respectively, at the Service Building designated area (Table 5 in Appendix C) was mostly comparable to data collected at other time points throughout the study. It should be noted that there was a higher amount of sort category Recyclable Mixed paper and Newspaper (RPa) and Corrugated Cardboard (CCB) in the recycling container compared to other audits. However, an audit that occurred on January 24, 2018 had similar amount totals for the two recycling sort categories. The refuse container had no discernable differences in its waste composition when compared to other audits done throughout the study period besides sort category Food Soiled Paper (FSP) being approximately 40% higher from the waste audit that was conducted on August 29, 2017.

The sort categories that have the highest chance to be composted, Wood, Yard, and Natural River Waste (W) and Food Scraps (FS), make up to a quarter of refuse waste found in refuse containers Project wide during the audit period. Since the waste audit was limited to only one audit during the summer season, the values for compostable materials found in the aforementioned sort categories, especially Food Scraps (FS), may not reflect the most accurate representation when compared to the annual weight of waste generation at the Bonneville Project.

Compared to the national percent of waste generation in 2015, there are a few similarities with the results from the waste audit at the Bonneville Project. According to the Environmental Protection Agency (EPA), Municipal Solid Waste (MSW) is composed of 25.8% recycling, 8.9% composting, and 52.5% landfill and the remainder being combusted to product energy[15]. The Bonneville Project falls short with a recycling percentage of approximately 17%, but is higher in the percent makeup of Corrugated Cardboard (CCB) and Recyclable Mixed paper and Newspaper (RPa) at 79% compared to 66.9% nationwide. Nationwide, recyclable material found in waste heading to the landfill was approximately 30% compared to 14% at the Bonneville Project. Locally, Clark County, Washington had its refuse waste stream analyzed in 2012. For commercial refuse waste, approximately 18% of recyclable material was found while in commercial compactor waste, approximately 14% of recyclable material was found [16]. The Bonneville Project, in comparison, has approximately 14% of recyclable material found in its refuse waste, which is similar to the overall commercial refuse waste generated in Clark County. Waste characterization data conducted by the Engineering, Research, and Development Center at the Construction Engineering Research Laboratory of the USACE has shown that approximately 30% of recyclable material is found within refuse waste and food scraps were approximately 33% of refuse waste at three different site locations. While these sites are not considered industrial like the Bonneville

Project, it does show that recyclable material found at the Bonneville Project is lower than at the three locations, but also has substantially lower sort category food scraps at 6%. Portland General Electric had a waste stream analysis conducted at the One World Trade Center building in downtown Portland, Oregon. Their finding was that approximately 14% of recyclable material was found in waste heading to the landfill while approximately 5% of refuse waste was found in the recycling containers. The Bonneville Project's waste stream is similar with approximately 14% of recyclable material found in refuse waste and approximately 5% of misplaced refuse waste found in the recycling containers.

Management Recommendations:

With the in-depth investigation into the waste stream at the Bonneville Project of this study, the current overall recycling effort shows that the site recycles approximately a sixth of its total waste and does a good job of keeping refuse waste out of the recycling waste in recycling containers. However, for the facility to reduce refuse waste heading to the landfill by 50% [4], further work is needed. Looking at the waste composition project wide, there are a few recommendations that can be made to the Project in order for the site to reach their refuse waste reduction goal.

- Based on the approximate annual sum amount of Food Soiled Paper (FSP) throughout the Bonneville Project, 4,217.53 pounds, investigating reduction methods for single use, non-recyclable paper products such as paper plates and paper coffee cups can help reduce up to approximately 8% of annual refuse waste.
- Based on the approximate annual sum amount of Non-Recyclable Paper (NRPa) throughout the Bonneville Project, 2,350.65 pounds, investigating options for employees to use air dryers in conjunction with paper towels in the restrooms can help reduce approximately up to 4.4% of annual refuse waste. Also, looking at revising policy to not discard partially used toilet paper rolls can aid in reducing this category of waste as well.
- Based on the approximate annual sum amount of Wood, Yard, and Natural River Waste (W) throughout the Bonneville Project, 10,906.50 pounds, investigating reduction methods such as reuse opportunities for wooden items such as scrap boards and broken pallets can help reduce up to approximately 20% of annual refuse waste.
- Based on the above recommendation and the approximate annual sum amount of Food Scraps (FS) throughout the Bonneville Project, 3,673.19 pounds, investigating the feasibility and cost of incorporating composting services for food scraps and grounds maintenance waste can help reduce up to approximately 6.8% food scraps and 20% wood waste of annual refuse waste.
- Based on the results and observations of the study, investigating ways to donate/give away items that could be reused such as old tools or office supplies can help in reduction of refuse waste efforts.
- Based on the approximate annual sum amount of recycling waste found in refuse waste in refuse containers throughout the Bonneville Project, 7,421.57 pounds, investigating reduction methods can help ensure that up to approximately 14% of annual refuse waste is reduced. For example, this can be done by ensuring that clear labeling for recycling bins are available, different bin sizes/color for refuse and recycling bins, and there are bins for recyclable metal in

appropriate locations. In addition, better signage that indicates which items are recyclable may aid in reducing the amount of recyclable materials that is disposed of in refuse containers. Besides signage, investigating the possibility of visually distinguishing refuse and recycling containers by either specific color or paint pattern can, over time, enable project personnel to become accustomed to easily recognizing which containers refer to recycling or refuse if a standard is set across the Bonneville Project.

- Based on the results of the study, emphasizing during annual training to wash or rinse recyclable materials before placing them in recycling containers can help reduce up to 5,865 or 11% of annual refuse waste of category Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl) found in all designated areas combined.
- Based on the results and observations of the study, looking at incorporating a single refuse and recycling container, no larger than 4 yards, at the Robins Island camp grounds can reduce waste found at the Warehouse and lessen the chance that unauthorized personnel access the area.
- Based on the results and observations of the study, adding recycling and refuse containers to locations that visitors to the Bonneville Project use, specifically the Robins Island camp ground and Bradford Island Visitor Center, can aid in separating recycling and refuse waste generated by visitors from daily operations. This will be necessary if a future audit at the Bonneville Project aims to look at the amount and composition of waste visitors generate.
- Based on the results and observations of the study, removing the 2 yard refuse container at Powerhouse 1 and one of the 2 yard refuse containers at Powerhouse 2 is feasible as capacity was never reached for those containers at either location for refuse waste. If the Bonneville Project losses its ability to recycle at Powerhouse 2 and the Juvenile Fish Facility due to contract changes from hauler Crown Point Refuse and Recycling, then it will be necessary to have at least one 5 yard refuse container at Powerhouse 2 and at least a 2 yard refuse container at the Juvenile Fish Facility.
- Based on the results and observations of the study, investigating the methods employed by the employees assigned to the Juvenile Fish Facility (JFF) can aid in reducing the amount of recyclable materials that is disposed of in refuse containers.
- The USACE could conduct similar waste audits at different facilities by utilizing the methods employed by this study. This could aid in the USACE figuring out their waste streams and would be useful in comparing results and looking at waste reduction strategies that can be shared between USACE facilities.

If all the recommendations listed above are implemented and the Project personnel and visitors follow the recommendations, the Bonneville Project can expect up to approximately 64% reduction of refuse waste. This will enable the Bonneville Project to reach their refuse waste reduction goal of 50%. Particular, emphasizing during annual training recycling techniques and waste reduction strategies can help in ensuring continued refuse waste reduction.

However, there are challenging factors that may limit the ability of the Bonneville Project to reach their goal of reducing non-hazardous waste generation by 50%. These factors include, but are not limited to, inability to fully realize management recommendations; ineffective refuse waste reduction training or

reception; collecting various river waste that is removed from the Columbia River as the amount and type collected can vary annually; single use cloth that is used for various maintenance activities; absorbent pads used in spills of substances that may pose a risk to the surrounding environment; broken and worn out tools and accessories; and old or outdated parts used in site operations that may have limited use outside the Bonneville Project. Tackling the challenging factors to waste reduction will be needed if the Bonneville Project aims to be a zero-waste facility.

Recommendations for Future Waste Stream Audits

With the conclusion of the waste stream audit at the Bonneville Project, any future audits that may be conducted there can be done more efficiently by incorporating the following recommendations:

- Increase the number of people conducting the waste audit. Having a team of at least three individuals would aid in the efficiency and speed at which waste audits are completed. In addition to increasing the number of audits conducted per day, full waste audits rather than representative sample audits can be done.
- In order to have comparable and complete seasonal data for a future Bonneville Project waste audit, waste audits should be conducted throughout the year with matching number of audits for each designated area's containers per season.
- Add additional sort categories for refuse waste from category Other (O) such as used industrial equipment, used spill pads, textiles, and rubber based products. This would enable future waste audits conducted at the Bonneville Project to have more detailed refuse waste composition data.
- Use a canopy during audits to reduce the potential impact that rain may have on the weight of materials being audited.

With the recommendations above, future waste audits that may be conducted at the Bonneville Project can aid management in identifying more accurately the composition of the waste stream, any changes to waste generation or composition seasonally, and reduce the chance the data collected are not compromised by factors such as rain.

Green Purchasing Analysis

Background:

Environmentally preferable purchasing is an act of purchasing products that have been tested for their environmental impact and found to be less than similar conventional products. These types of products are, for simplicity, referred to as green products [12]. However, there are currently no national standards to what constitutes a green product. A few U.S. government and state agencies, such as the USEPA (United States Environmental Protection Agency) and SCAQMD (South Coast Air Quality Management District), have developed standards for certain products to qualify as green. The number of ecolabels has increased as consumer demand for green products has increased; leading to a 'greenwashing' of environmental claims [12]. This has led to a labeling push to call attention to certified ecolabels on products so that consumers can easily pick them out and for U.S. government and state agencies to advertise their efforts in ensuring compliance with their standards. Curran 2001 evaluated the framework of environmentally preferable purchasing and its impact on sustainability to improve the life cycle assessment and increase efficiency in green product procurement [9]. This approach helps reduce the amount of solid waste sent to landfills, and increases the amount of reuse and recycling done by an organization that implements green product procurement. The push by manufactures to certify their products to gain access to available ecolabels has increased the push into green chemistry which, by design, incorporates a reduced environmental impact upon product development and use [10, 13].

However, without adequate research by the consumer on potential green products, this approach can be limited. The need for research leads to the other major focus of this project, which is to review chemical use at the Bonneville Project and look for environmentally friendly alternatives that can substitute for currently used chemicals while potentially reducing the overall chemical count on site.

Methods:

The Green Purchasing Analysis for the Bonneville Project is focused on the comprehensive list of currently used chemical products that are required by law to have a Material Safety Data Sheet (SDS). The emphasis on the currently used chemical product list is done since green purchasing is already done for items such as office supplies, and there was an opportunity to narrow the focus on chemical product use exclusively. A comprehensive chemical product list of over 800 unique chemicals was compiled by Melissa McBain, the environmental coordinator at the Bonneville Project, and several staff who thoroughly identified chemical products used and stored throughout the Project. The list has been kept up to date with any new products that are used on site and is maintained by a cloud based SDS database that is accessable to only Project personnel.

Since product use at the Bonneville Project is tracked by location within the Project, prioritizing which products to investigate was done by eliminating products that did not meet the following cirteria: listed in 3 or more areas, or found in Powerhouse 1 and Powerhouse 2; used on a regular basis (generally means that a product is used montly/seasonally and not just used once or twice a year); and is not considered a paint or motor oil product. Additional products were also investigated at the request of Melissa McBain. Unless requested, paint and motor oil products were excluded to further narrow down

the list and due to their potential to be utilized in a critical role at the Project. In addition, the USACE is currently conducting product testing on paints, oils, and lubricants considered to be environmentally friendly [11]. Products that may be affected by the outcome of the testing were avoided from being selected. Once the products to be investigated were selected from the comprehensive chemcial product list, the following information was collected:

- The quantity used for the past 3 years and cost per product unit were obtained from Melissa McBain. The cost per product unit was converted to cost per ounce.
- A general description and designated use was gathered from the manufacturer's website.
- The SDS sheet for the product was downloaded to and reviewed for any potential environmental risks the product may pose based on available active ingredients or product testing that was included.

Product alternatives were then investigated by conducting a Web based search. Alternative products that were considered have to generally meet one or both of the following criteria: certified by a program that is recognized by a reputiable 3rd party, federal, or state entity (see below); or can be considered to be multi-use to reduce the overall chemical count found at the Bonneville Project. When available, the cost for the alternative products was recorded and the cost per ounce was calculated to compare with the currently used product.

The ecolabels with certifiable third party accreditation that were utilized in this study were USEPA Safer Choice, SCAQMD, GreenGuard, and the USDA (United States Department of Agriculture) BioBased products. USEPA Safer Choice is a voluntary effort that companies can apply for. For the product to be granted the label, it must be at least as good as conventional competitive products within its category, have undergone the required standardized testing from recognized third party associations such as AATCC (American Association of Textile Chemists and Colorists), follow the recommended life-cycle considerations, and adhere to component criteria [12]. The SCAQMD ecolabel ensures that solvent cleaning (Rule 1171) and solvent degreasing (Rule 1122) products with its label are VOC compliant with federal and state of California rules, doesn't contain compounds that are classified as ozone-depleting or global warming compounds, and its reactivity level is not higher than toluene [8]. GreenGuard is an ecolabel from UL, a global safety, consulting, and certification company. The company devises its testing standards from ASTM (American Society of Textile Manufactures) D1156 and D6670, California's Department of Public Health Services, and the ISO (International Organization for Standardization) 16000 environmental testing series. The GreenGuard label is most recognized by the United States Green Building Council's LEED (Leadership in Energy and Environmental Design) green building rating system [3]. Like the USEPA Safer Choice and SCAQMD ecolabels, the testing focuses on VOC emissions for air quality. The USDA BioBased ecolabel requires companies to establish at least a certain amount of biological products in their product which is done by utilizing the ASTM D6866 test method [2].

Results:

The products selected for investigation and their suitable environmentally friendly alternative(s) are shown in Table 4.

Table 4: Table incorporating product name, company, quantity used of current product, unit size availability, unit cost per ounce in United States dollars, and certifications.

Currently Used Product Name	Company	Unit	Current Inventory	Quantity Used				Cost in U.S. $	Cost per oz in U.S. $	Product Alternative	Company	Unit	Cost in U.S. $	Cost per oz in U.S. $	Certifications
				Year to Date	2017	2016	2015								
21A058 Windshield De-Icer	Ashland Chemical Company	16 oz	28	14	20	18	5	6.14	0.38	No good alternatives for windshield de-icers					
390 Cutting Oil (Aerosol)	A. W. Chesterton Company	13 oz	5	10	8	5	23	20.74	1.60	LU208 Cutting Oil (Aerosol)	Sprayon	14 fl oz	6.75	0.48	Meets SCAQMD Requirements
										Tap-Magic Eco-Oil (Aerosol)	The Steco Corporation	12 oz	12.61	1.05	NSF H1 Food Grade
8190 Hi-Strength Adhesive	Aervoe Industries Inc.	12 oz	8	18	0	30	13	8.55	0.71	3M™ Fast Tack Water Based Adhesive 1000NF, Neutral	3M	1 gal	78.87 - 94.10	0.62 - 0.74	GreenGuard, LEED
										Super 77 Aerosol Spray Low 25% VOC	3M	24 fl oz	8.16-9.14	0.34 - 0.38	GreenGuard
Brakleen Brake Parts Cleaner - Non-Chlorinated	CRC Industries, Inc.	14 oz	103	94	106	183	392	7.88	0.56	Zero VOC Brake and Parts Cleaner	Wurth USA Inc.	14 oz	4.17	0.30	SCAQMD
Citrasolve, K&L Supply	Paige Industries	5 gal	4	0	4	9	6	150	0.23	GlobalTech® Heavy Duty Degreaser/concentrate	JNJ Industries	1 gal	162-192	1.27 - 1.50	SCAQMD
Citrasolve, K&L Supply	Paige Industries	15 oz	59	0	1	8	16	9.59	0.64	GlobalTech® Heavy Duty Degreaser/concentrate	JNJ Industries	16 oz	9.75-11.13	0.61 - 0.70	SCAQMD
Contact Cleaner 2000 Precision Cleaner	CRC Industries, Inc.	15 oz	0	44	126	98	205	23.9	1.59	ELECTRON Aerosol	EcoLink	16 oz	22	1.38	Information not found
										Positron Aerosol	EcoLink	16 oz	22	1.38	Information not found
WD-40 Aerosol by WD-40 Company	WD-40 Company	12 oz	8	33	118	81	182	9.48	0.79	Bio Penetrating Lubricant Aerosol	Renewable Lubricants, Inc.	11 oz	16	1.45	EAL VGP Compliant (EPA)
Multi-Use Product Bulk Liquid	WD-40 Company	1 Gallon	6	19	14	18	20	23.59	0.18	Biodegradable Penetrating Oil	Lubriplate	12 oz	16.15	1.35	USDA BioBased Product
Smart Straw Aerosol by WD-40 Company	WD-40 Company	12 oz	5	36	118	81	182	9.48	0.79	Biodegradable Penetrating Oil	Lubriplate	12 oz	16.15	1.35	USDA BioBased Product
Original KRUD KUTTER	Krud Kutter, Inc.	55 gal	2	0	0	1	0	825	0.12						EPA Safer Choice
Bee Bopper Wasp Killer	ARI	14 oz	50	10	88	43	97	14.51	1.04	EcoSMART Organic™ Insecticide Wasp and Hornet Killer (DR-F-039)	EcoSMART Technologies, Inc.	14 oz	9.44	0.67	Information not found

PB B'laster Lubricant	The Blaster Corporation	15 oz	12	29	35	45	71	8.95	0.60	Bio Penetrating Lubricant	Renewable Lubricants, Inc.	11 oz	16	1.45	EAL VGP Compliant (EPA)
LOCTITE 592 MEDIUM STRENGTH THREAD SEALANT known as LOCTITE 592 PST PIPE SEALAN	Henkel Corporation	2 oz	21	25	68	55	52	15.05	7.53	Dripstop 927	Hernon Manufacturing, Inc	Information not found			
Heavy Duty Degreaser ii	CRC Industries Inc.	15 oz	11	4	4	4	28	18.59	1.24	WD-40 Specialist Industrial-Strength Cleaner and Degreaser	WD-40 Company	32 oz	8.39	0.26	EPA Safer Choice
Huskey Hydrolube Grease (All NLGI grades)	Huskey Specialty Lubricants	5 gal	4	0	0	0	0	126.67	0.20						Being Tested by USACE
Huskey LVI-50 Grease (All NLGI grades)	Huskey Specialty Lubricants	5 gal	5	6	2	4	4	311.91	0.49						Being Tested by USACE
MIBK Thinner	Rodda Paint Company	55 gal	3	2	3	4	4	426.25	0.06	AcraStrip 700 Recyclable Solvent Replacement	Polychem	Information not found			
Methyl Isobutyl Ketone	Sasol Solvents a division of Sasol Chemical Industries	55 gal	3	2	3	4	4	905.5	0.13						
Techspray Blue Shower ii	Techspray	18 oz	20	0	0	1	10	29.05	1.61	ELECTRON Aerosol	EcoLink	16 oz	22	1.38	Information not found
										Positron Aerosol	EcoLink	16 oz	22	1.38	Information not found
Windex Original Glass Cleaner	S.C. Johnson and Son, Inc.	32 oz	15	16	33	48	41	9.23	0.29	ECOS Pro Glass Cleaner / Orangerine Window Cleaner Rtu (9362)	Venus Laboratories	32 oz	5.64	0.18	EPA Safer Choice, USDA BioPreferred
										Champion Sprayon® Green World N® Glass Cleaner	Chase Products Co.	14 oz	Information not found		EPA Safer Choice, SCAQMD
Zep 40	Zep Inc.	16 oz	28	14	20	18	5	6.14	0.38	ECOS Pro Glass Cleaner / Orangerine Window Cleaner Rtu (9362)	Venus Laboratories	32 oz	5.64	0.18	EPA Safer Choice, USDA BioPreferred
										Champion Sprayon® Green World N® Glass Cleaner	Chase Products Co.	14 oz	Information not found		EPA Safer Choice, SCAQMD
Zep Ice Melt	Zep Inc.	50 lbs	29	36	31	34	7	25.38	0.03	No good alternatives for windshield de-icers					
Simple Green® Industrial Cleaner & Degreaser	Sunshine Makers, Inc.	1 gallon	14	14	41	25	17	12.99	0.10						EPA Safer Choice
PB Penetrating Catalyst	The Blaster Corporation	15 oz	12	29	35	45	71	8.95	0.60	Biodegradable Penetrating Oil	Lubriplate	12 oz	16.15	1.35	USDA BioBased Product

Out of the products investigated in Table 4, currently used products Original KRUD KUTTER from Krud Kutter, Inc. and Simple Green® Industrial Cleaner & Degreaser from Sunshine Makers, Inc. already had a certification. In addition, two products that were investigated, Huskey Hydrolube Grease (All NLGI grades) and Huskey LVI-50 Grease (All NLGI grades), turned out to be a part of a study by USACE and further information was not collected regarding these products [11].

Green product alternatives, that upon investigating, had incomplete information available were: ELECTRON Aerosol and Positron Aerosol by EcoLink and EcoSMART Organic™ Insecticide Wasp and Hornet Killer (DR-F-039) by EcoSMART Technologies, Inc. for certifications; Dripstop 927 by Hernon Manufacturing, Inc. and AcraStrip 700 Recyclable Solvent Replacement by Polychem for unit size availability, unit cost per ounce, and certifications; and Champion Green® Industrial Cleaner & Degreaser by Chase Products Co. for unit cost.

Zep Ice Melt by Zep Inc. and 21A058 Windshield De-Icer by Ashland Chemical Company did not have a suitable green product alternative when investigated.

Out of the suitable green product alternatives that were investigated, the following had a lower cost per ounce than comparable currently used products: LU208 Cutting Oil (Aerosol) by Sprayon; Tap-Magic Eco-Oil (Aerosol); 3M™ Fast Tack Water Based Adhesive 1000NF, Neutral by 3M; Super 77 Aerosol Spray Low 25% VOC by 3M; Zero VOC Brake and Parts Cleaner by Wurth USA Inc.; ELECTRON Aerosol and Positron Aerosol by EcoLink; WD-40 Specialist Industrial-Strength Cleaner and Degreaser by WD-40 Company; and ECOS Pro Glass Cleaner by Venus Laboratories.

Conclusion:

The Bonneville Project currently has approximately 800 unique chemical products on site at a given time, ranging from machine lubricants to paints. According to the comprehensive chemical product list and the number of unique chemical products used at each location, the main operations using chemicals within the Bonneville Project are Powerhouse 1, Powerhouse 2, and the Paint Shop. These locations have at least 250 unique chemical products on site, representing an opportunity to increase environmentally preferable purchasing to lessen the potential impact these operations could cause to the Bonneville Project and the surrounding area. The focus on products used at multiple operational sites is a step done to look at more widely used chemical products that can have the most impact to the environment based on multiple exposure zones and quantity used.

The green products in Table 4 represent results found after conducting a web based search for alternatives to the conventional products currently used on-site. The most common attribute for a product to be considered a green chemical product was for it to have a low or no VOCs (Volatile Organic Compounds).

For some conventional products, the search was inconclusive to find a suitable green product replacement. This can be mainly attributed to a lack of demand for a green product in the conventional product category with specific properties, such as an aerosol application feature, or minimal incentive for companies to develop new formulas and get them certified as a green product [10].

There were products investigated where their suitable green alternative was less expensive per ounce. For instance, the currently used product 390 Cutting Oil (Aerosol) by A.W. Chesterton Company is $1.60 per ounce, while the two suitable green product alternatives, LU208 Cutting Oil (Aerosol) by Sprayon and Tap-Magic Eco-Oil (Aerosol), are $0.48 and $1.05 per ounce respectively. A current product, Brakeleen Brake Parts Cleaner – Non-Chlorinated by CRC Industries, Inc., goes through at least 100 units annually at a cost of $0.56 per ounce. The green product alternative, Zero VOC Brake and Parts Cleaner by Wurth USA Inc. is less than Brakeleen at $0.30 per ounce. This shows that while green product alternatives are usually associated with higher costs, this is not always the case.

A few products that were requested for product use, such as the Original KRUD KUTTER from Krud Kutter, Inc. already had an ecolabel. There were some products, such as Citrasolve, K&L Supply by Paige Industries that had not been used in over a year and as such, a comparable green product to replace it would have minimal impact on the overall sustainable goals for the Bonneville Project. Conversely, high use products such as Brakleen Brake Parts Cleaner - Non-Chlorinated by CRC Industries, Inc. and WD-40 Aerosol by WD-40 Company have a potentially larger impact on the surrounding environment. The certified green product replacements for high use products categories can have a larger positive environmental impact when used compared to conventional products that contain chemical products that can have negative bio-accumulative effects or negatively impact the aquatic environment.

Management Recommendations:

With the large number of chemicals used at the Bonneville Project for various purposes, the opportunity to incorporate green chemicals is potentially high. The use of green chemical products has the potential to reduce the exposure of harmful chemicals to the environment and site personnel. While the Bonneville Project is still in the early stages of green product use, there may be ways to reduce conventional product use without reducing the efficiency of the Project's operations. The following are recommendations for the Bonneville Project to increase their green purchasing.

- Based on the observations made during this study, prioritizing products that have been certified green over conventional products may experience resistance from Project personnel. As such, incentivizing the use of green products, as well as trial testing them may be needed for these products to be accepted by Project personnel. A short survey should be conducted during testing to document the reactions and rating of product performance from Project personnel.
- Based on the findings for this study, the Bonneville Project can prioritize the replacement of some conventional products with their suitable green product alternatives without spending more.
- Based on the research done for this study, the Bonneville Project can conduct further searches for certified green products through a certification organization's website as an efficient means to compile a list of potential green product alternatives for a specific search category, such as cleaners and degreasers.
- Based on the research done for this study and observations done during the waste stream analysis, the USACE should encourage the use of reusable application devices for green

products. Manufactures or distributers tend to sell green products in bulk and this is a way to reduce waste of single use application devices.

- Based on the research done for this study and the number of different paints used on site, prioritizing the procurement of super-compliant type paints is a good way to minimize VOC emissions. This type of product is formulated to be below limits for VOC emissions and must meet standards set by South Coast Air Quality Management District (SCAQMD).

Incorporating a larger percentage of green product use at the Bonneville Project is not without its challenges. One such challenge is the lack of suitable green product alternatives that are certified to replace conventional products [9]. The manufacturing sites for conventional products have their infrastructure setup in a way that makes changing chemical formulas to be green inherently difficult and not cost competitive. This is especially true if they do not deem there to not be enough market demand for a green chemical formula [1,9,10]. Also, companies that develop green chemical formulas might find it difficult to certify the products and or be able to scale up production in a sufficient time to meet demand as they tend to be smaller and not yet established [13]. Another challenge is convincing professionals and consumers to switch from a conventional product that works to a green product that is meant to compete with it [9,13]. This is especially more difficult if the green product is more expensive and/or the application method requires the user to adjust their habit of product use.

In conjunction with this study, USACE is also investigating several environmentally acceptable lubricants for in-water use structures and is primarily focused on greases [11]. The Bonneville Project is included in this USACE study with the final results to be released sometime in the future. As such, conventional type lubricants were excluded from being selected to prevent overlap with the USACE study unless otherwise requested. Limitations for green product alternatives also depended on the category of conventional products, such as oils or machine specific chemical products. For example, specialized equipment such as turbines, require specific products to be used for maintenance and if not used, could result in damage or voiding the warranty which is usually stated in the manufacture's maintenance and warranty manual. Other products, such as utilizing synthetic ester instead of mineral-oil for transformers, are highly specific and might require expensive retrofitting in order to utilize green alternatives. As such, The Bonneville Project's current design of transformers uses Exxon Mobile Corporation's UNIVOLT N 61 B transformer oil. If the Project decided to switch to synthetic ester instead of mineral oil, as is the case with the Siemen designed transformers that utilize synthetic ester instead of mineral-oil, then the current setup would most likely be incompatible[7]. Green product recommendations for specialized equipment will require USACE to conduct lengthy studies, such as the one for environmentally acceptable lubricants. Due to this constraint, those recommendations should be limited to applications that use conventional products that come into contact with sensitive environments regularly.

Incorporating green product alternatives across the Bonneville Project can help reduce the potential risk to the environment that conventional products can have. In addition, there is also a potential to reduce personnel exposure from potent chemical compounds when using green products. With the ubiquitous use and ease of use of conventional chemical products, there lie many challenges to adopting green chemical products [10, 11, 13]. However, introducing green products can potentially reduce risk for the

Bonneville Project and its personnel while also being a showcase for their efficacy at a high profile location.

Study Conclusion

The results gained from the waste stream and green purchasing analysis of the Bonneville Project can help the Project in reaching their goal of reducing refuse waste by 50% and increasing the procurement of green chemical products throughout their operations. With the Bonneville Project currently recycling a sixth of their total non-hazardous waste, there is room for increasing the rate of recycling. Focusing on reducing recycling waste found in refuse waste in refuse containers and reducing refuse waste in sort categories Wood, Yard, and Natural River Waste (W), Food Scraps (FS), Non-Recyclable Paper (NRPa), Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl), and Food Soiled Paper (FSP) will enable the Bonneville Project of reaching their refuse waste reduction goal. The extent of refuse waste reduction will depend on implementation and education practices. The designated area, Juvenile Fish Facility, has the lowest rate of refuse waste found in their recycling waste in the recycling container. The steps taken by the personnel that work at that designated area can be modeled to decrease the amount of refuse waste found in the recycling waste across the Bonneville Project. Also, tackling challenging waste factors that may limit the ability of the Bonneville Project to reach their goal will help their ultimate goal of becoming a zero-waste facility.

The benefits of increasing the procurement of green chemical products can potentially outweigh the time and cost of cleanup of conventional product spills. This is especially important for the Bonneville Project due to its location on the Columbia River and proximity to Portland, Oregon. With USACE currently looking at alternatives for greases and lubricants for in-water structures, there is a need within USACE to reduce the potential for toxic spills from conventional products. However, suitable green product alternatives can be difficult to find and verify that they work at the same level or better than conventional products while not costing more. This can be countered by replacing multiple conventional products that serve similar functions with one or more green product. In addition to reducing risk to the environment and Project personnel, the high profile location grants the Bonneville Project the chance to be a notable platform for their green purchasing program to highlight the program's efficacy.

The significance of the Bonneville Project on the Lower Columbia River and its surrounding human population adds importance to the facility's wide use of chemical products and reduction of non-hazardous waste. With the results and recommendations of this study, the USACE will hopefully have gained significant insight into the Bonneville Project's waste stream to enable them to implement management strategies to reduce their contribution to the landfill and to increase their use of green chemical products.

References:

[1] Anastas, P., & Eghbali, N. (2010). Green chemistry: principles and practice. *Chemical Society Reviews*, *39*(1), 301-312.

[2] BioPreferred. (2018). Retrieved from https://biopreferred.gov/BioPreferred/faces/pages/AboutLabel.xhtml

[3] GreenGuard. (2018). Retrieved from http://www.greenguard.org/en/index.aspx

[4] DOD Instruction 4715.23. Integrated Recycling and Solid Waste Management. 24 October 2014. http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/471523_dodi_2016.pdf

[5] http://www.co.washington.or.us/HHS/SWR/upload/Waste-Assessment-Guide-Final.pdf

[6] http://www.nwp.usace.army.mil/Locations/Columbia-River/Bonneville/

[7] https://www.siemens.com/global/en/home/products/energy/high-voltage/transformers/power-transformers.html

[8] Incentives and Programs, Business (2018). Retrieved from http://yourstory.aqmd.gov/home/programs/business

[9] Mary Ann Curran, (2001),"Developing a tool for environmentally preferable purchasing", Environmental Management and Health, Vol. 12 Iss 3 pp. 244 – 253

[10] Matus, K. J., Clark, W. C., Anastas, P. T., & Zimmerman, J. B. (2012). Barriers to the implementation of green chemistry in the United States. *Environmental science & technology*, *46*(20), 10892-10899.

[11] Medina, V. F. (2015). Evaluation of Environmentally Acceptable Lubricants (EALs) for dams managed by the U.S. Army Corps of Engineers. ERDC TN-WOTS-MS-9, Vicksburg, MS: *U.S. Army Engineer Research and Development Center, [Environmental Laboratory]*.

[12] Safer Choice. (2018, May 23). Retrieved from http://www.epa.gov/saferchoice

[13] Tobiszewski, M., Mechlińska, A., & Namieśnik, J. (2010). Green analytical chemistry—theory and practice. *Chemical Society Reviews*, *39*(8), 2869-2878.

[14] Yu, C. C., & Maclaren, V. (1995). A comparison of two waste stream quantification and characterization methodologies. *Waste Management & Research*, *13*(4), 343-361.

[15] USEPA. (2018, July). Advancing Sustainable Materials Management: 2015 Fact Sheet. *Office of Land and Emergency Management (5306P)*, EPA530-F-18-004.

[16] Green Solutions (2012, December). 2012 Waste Stream Analysis for Clark County, Washington. *Green Solutions Environmental Consulting.*

Appendices:

Appendix A: *Audit Form*

Refuse/Recycling Container:		
Date of Sort:		
Individuals Involved:		
Material Type:	Weight in lbs.	Notes
Recycling:		
Corrugated Cardboard		
Glass Bottles/Jars		
Mixed Paper/Newspaper		
Plastic Bottles/Tubs		
Tin/Metal/Aluminum/Cans		
Scrap Metal		
Milk Cartons/Juice Boxes		
Refuse:		
Food-Soiled Paper		
Non-Recyclable Paper		
Block Foam		
Wood/Yard/Natural River Waste		
Food Scraps		
Plastic Bags/Film/Containers/Tubs		
Other		

Appendix B: *Kernel Density Maps for Recycling and Refuse Sort Categories*

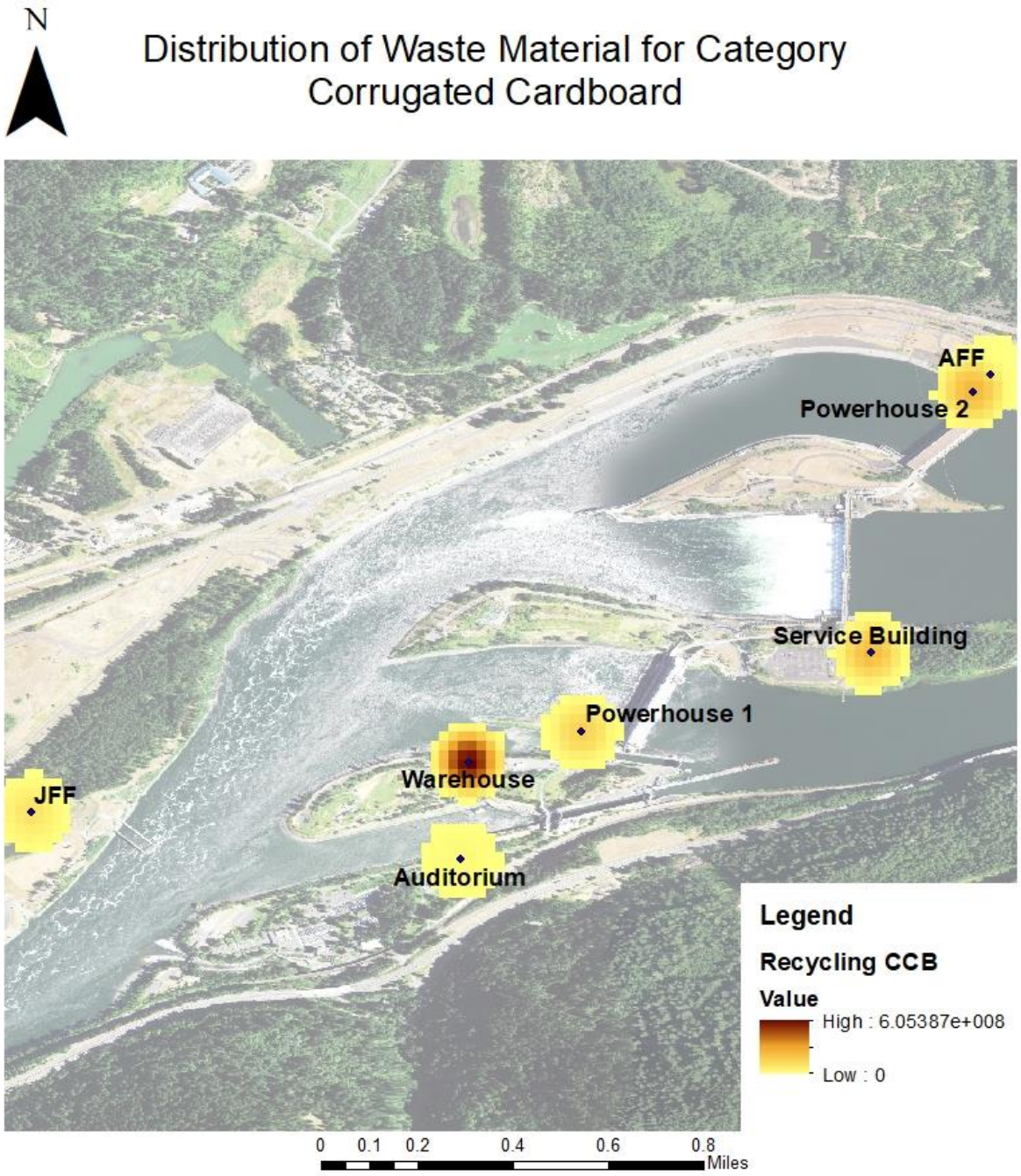


Figure 12: Kernel density map for category 'Corrugated Cardboard' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

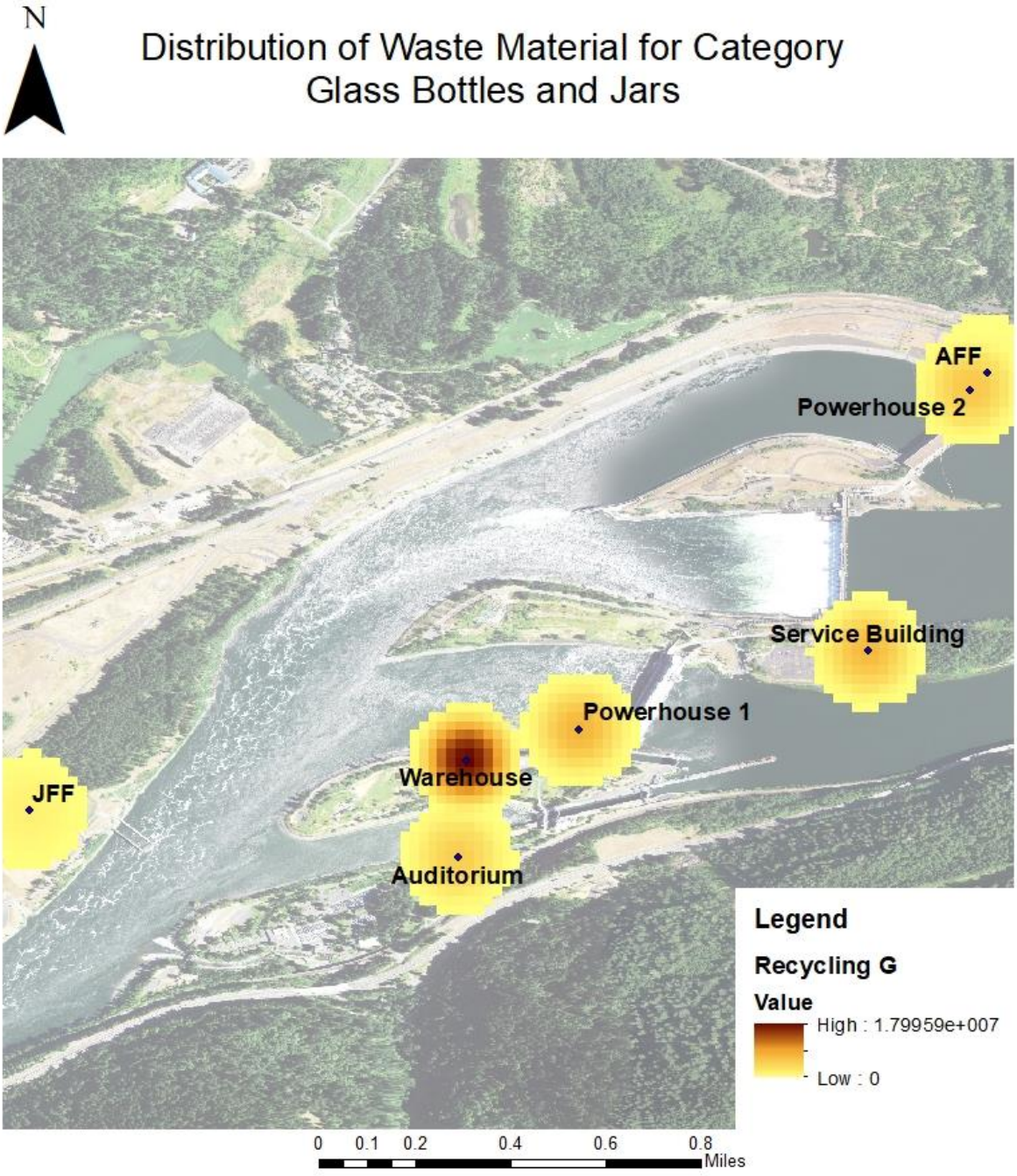


Figure 13: Kernel density map for category 'Glass Bottles and Jars' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

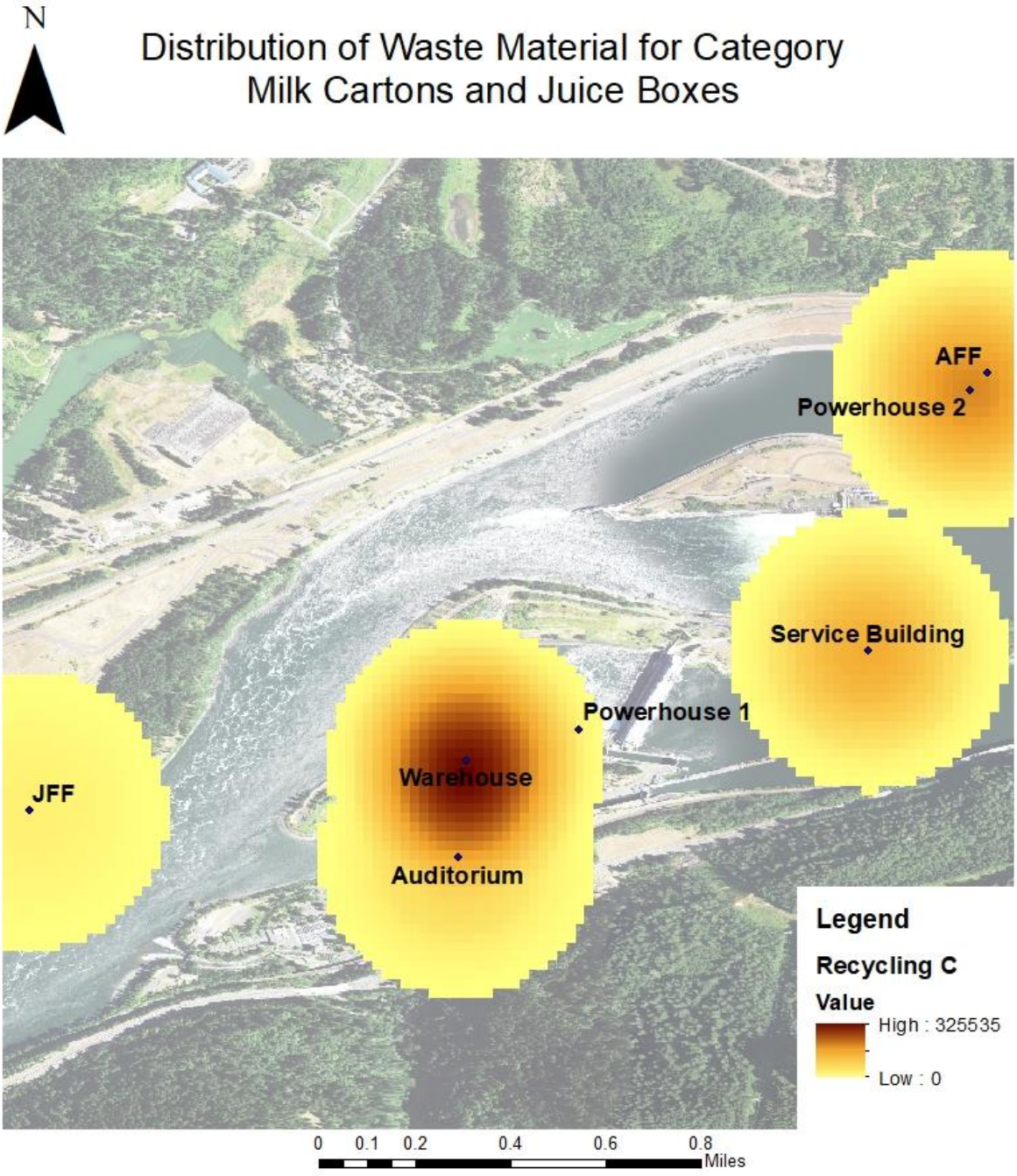


Figure 14: Kernel density map for category 'Milk Cartons and Juice Boxes' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

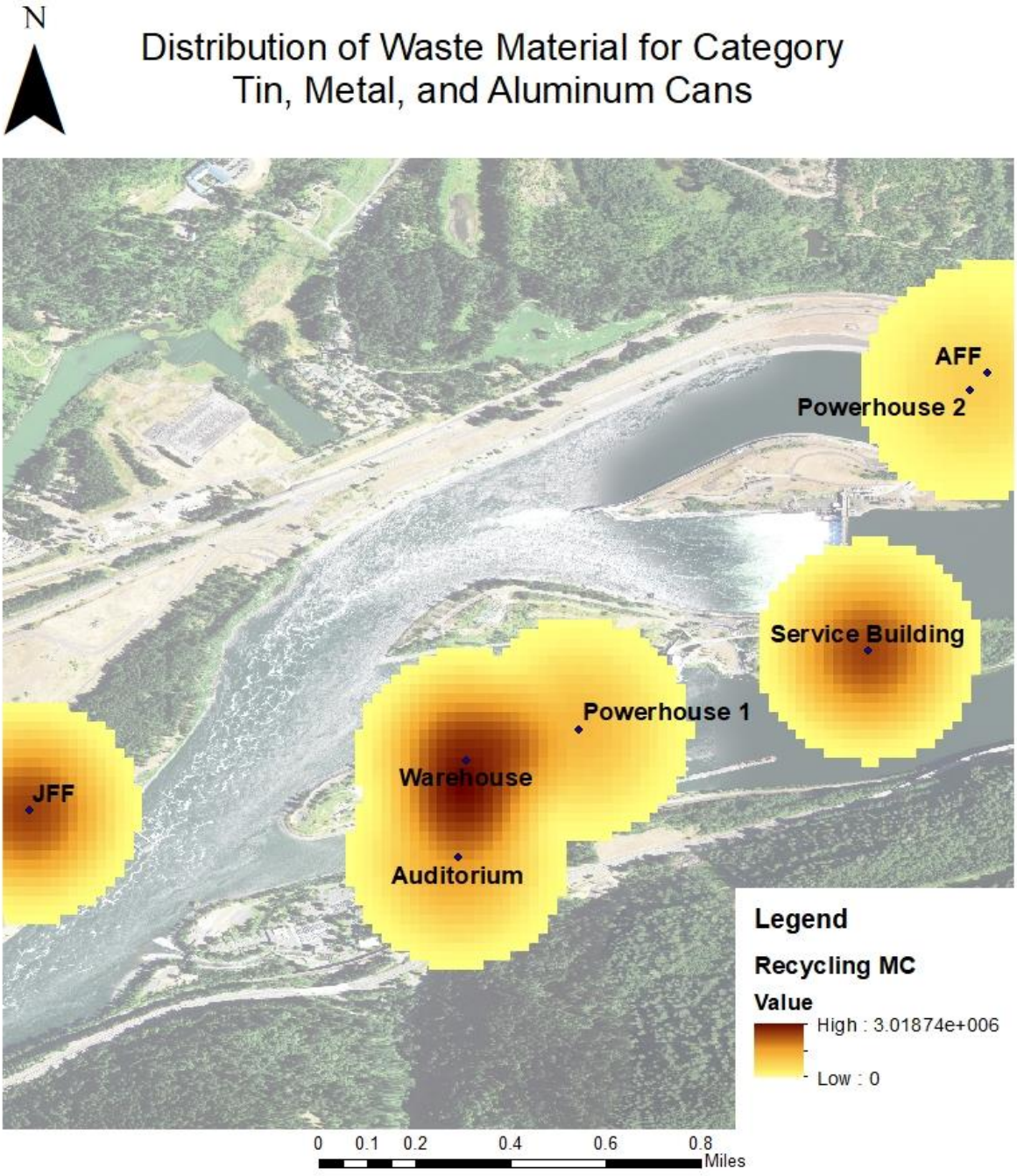


Figure 15: Kernel density map for category 'Tin, Metal, and Aluminum Cans' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

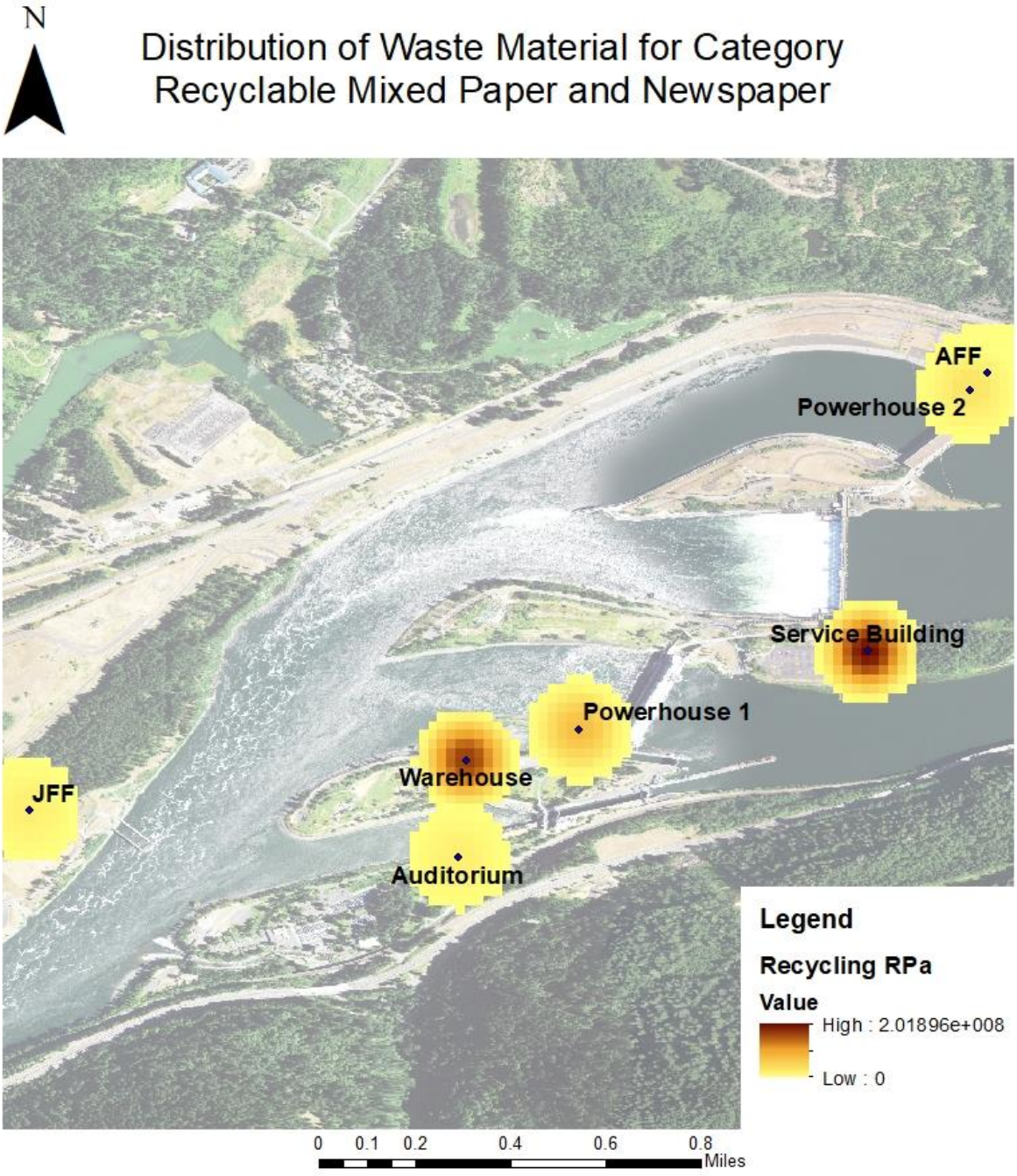


Figure 16: Kernel density map for category 'Recyclable Mixed Paper and Newspaper' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

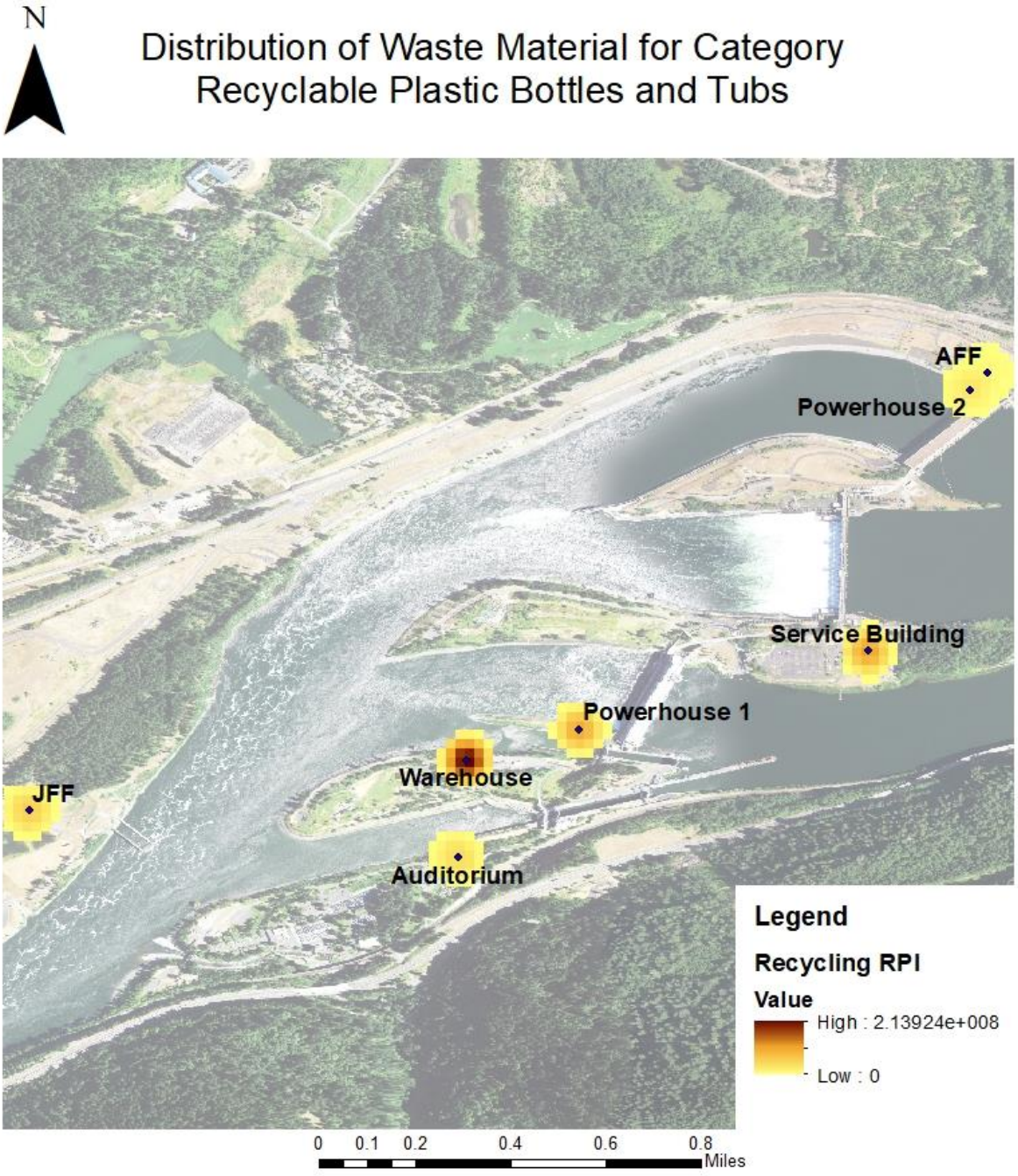


Figure 17: Kernel density map for category 'Recyclable Plastic Bottles and Tubs' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

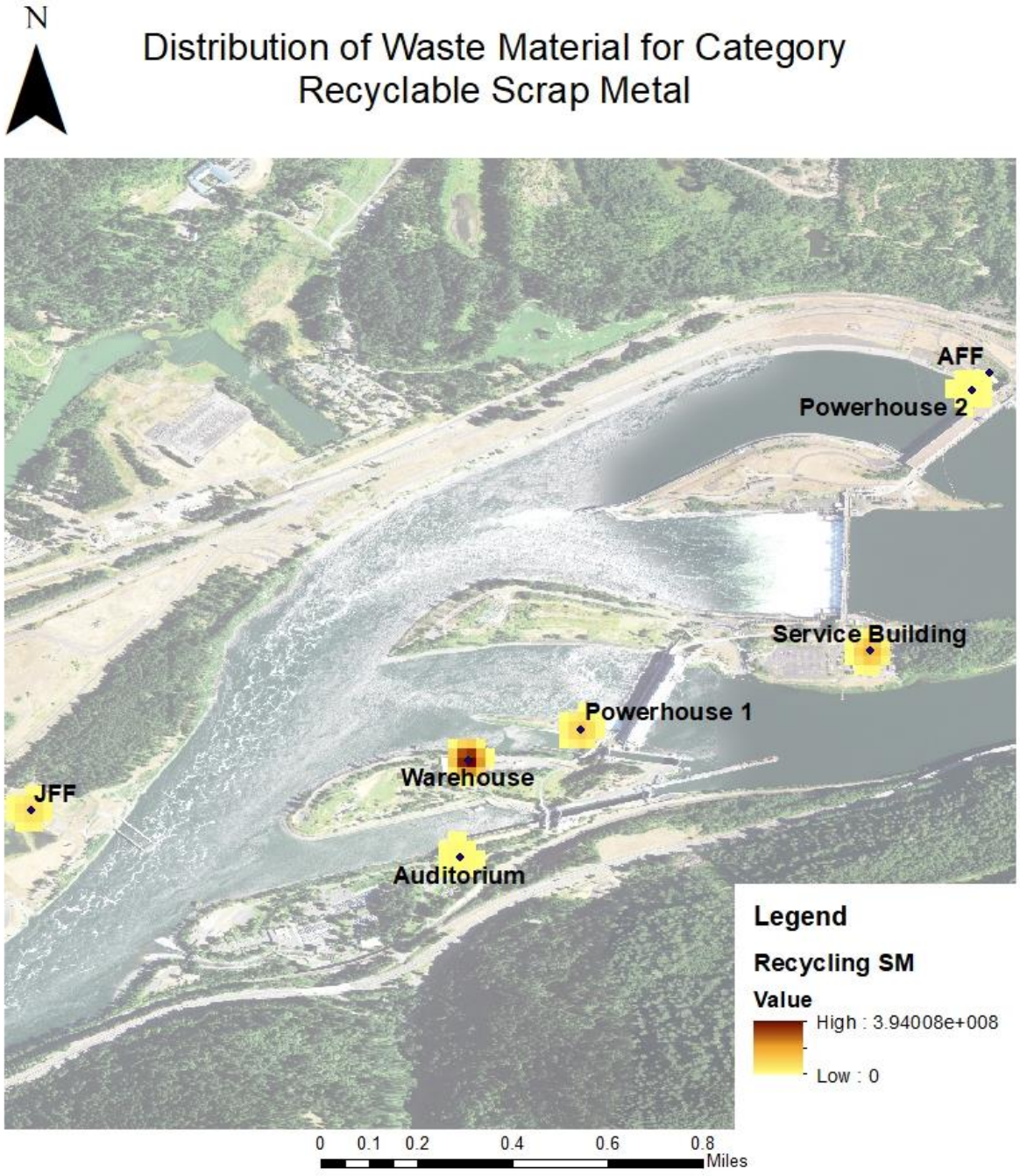


Figure 18: Kernel density map for category 'Recyclable Scrap Metal' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

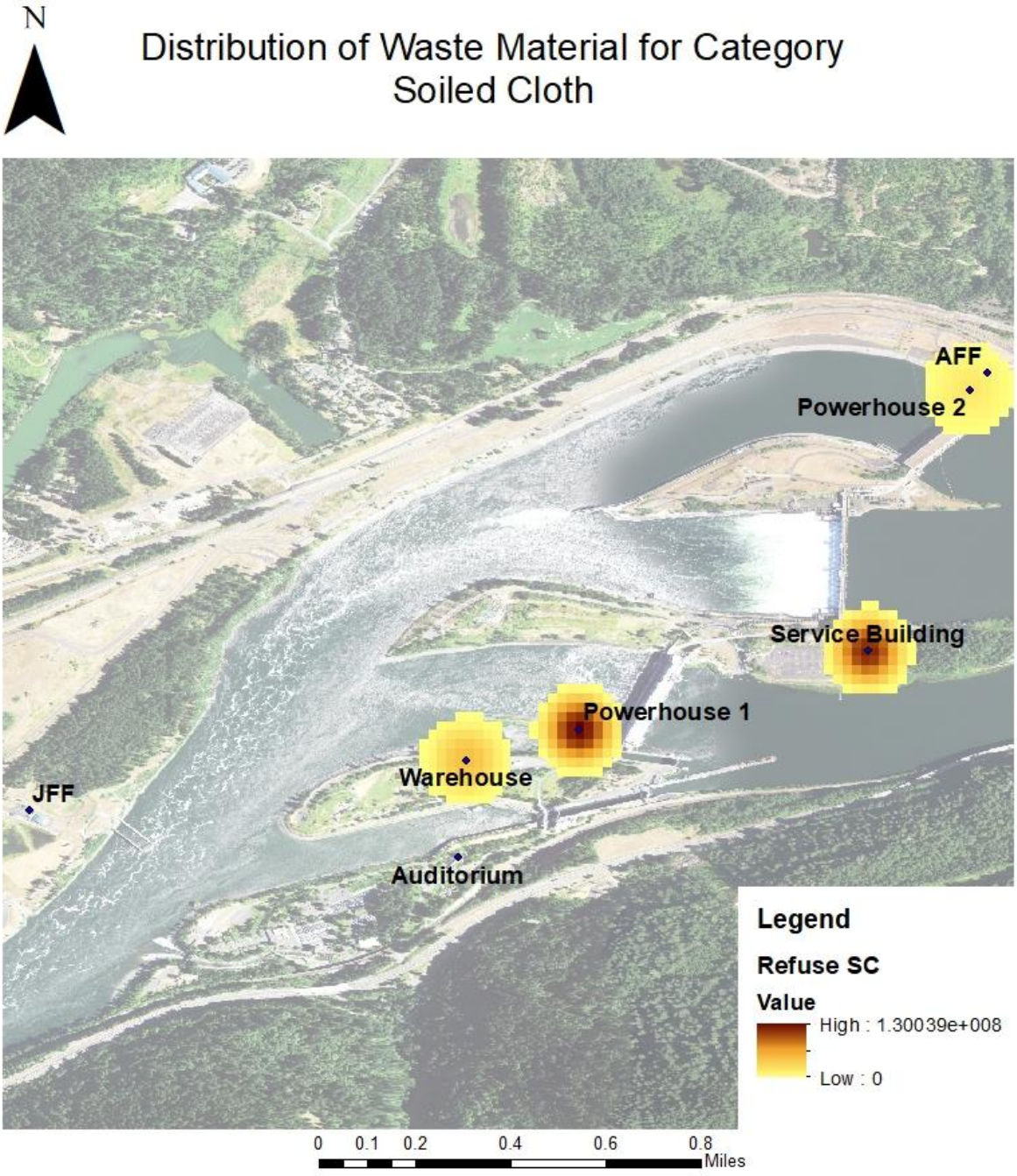


Figure 19: Kernel density map for category 'Soiled Cloth' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

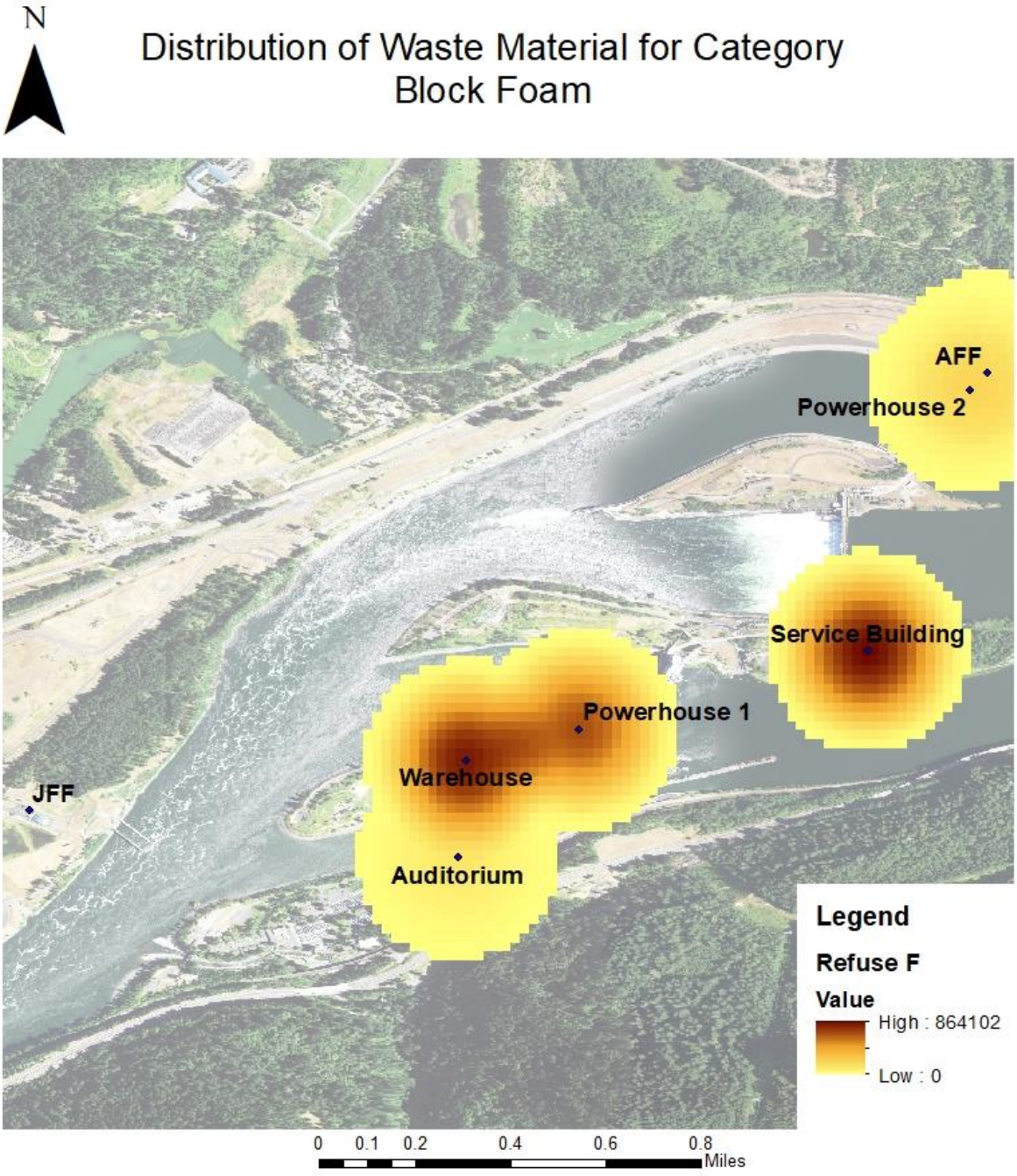


Figure 20: Kernel density map for category 'Block Foam' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

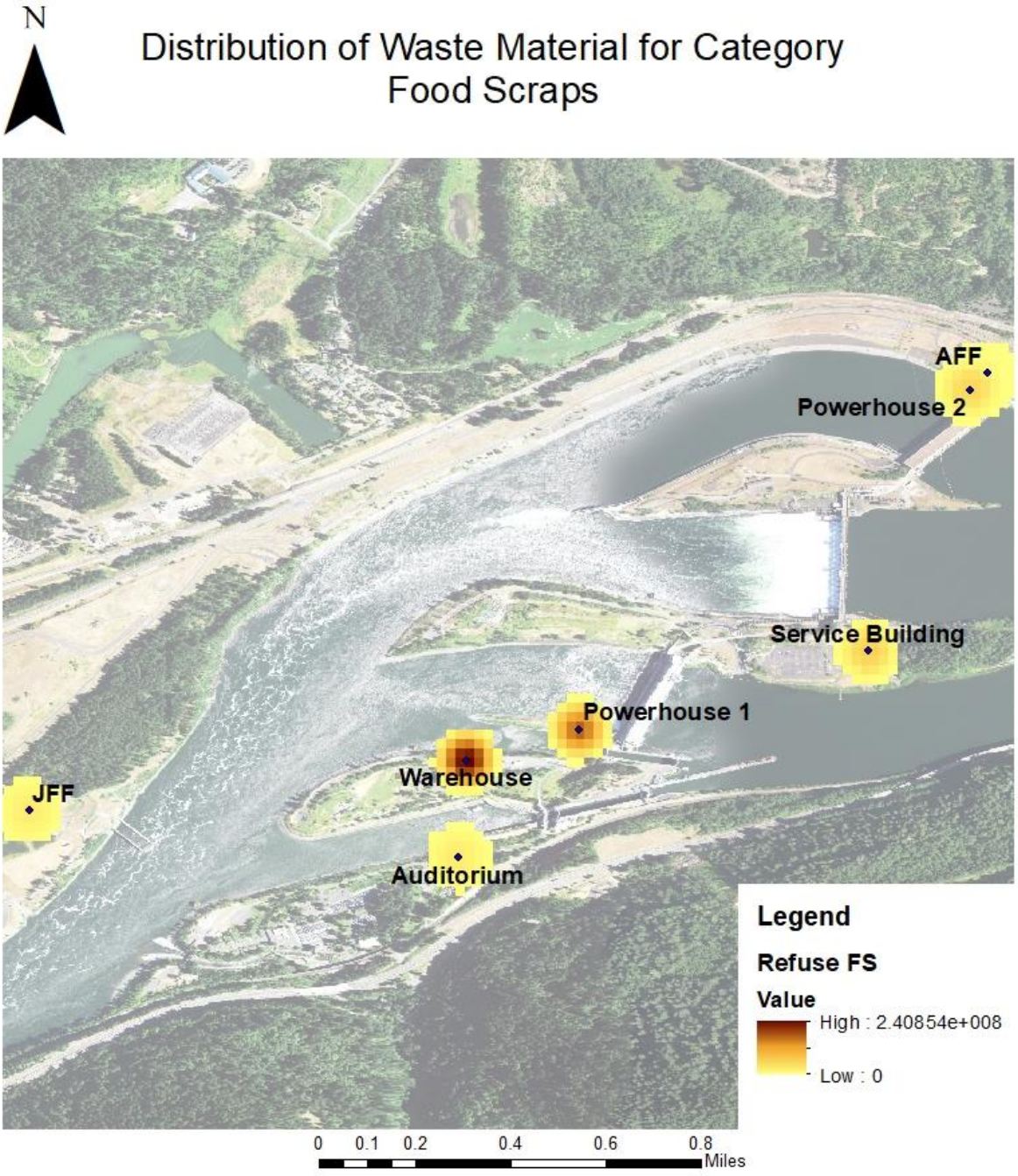


Figure 21: Kernel density map for category 'Food Scraps' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

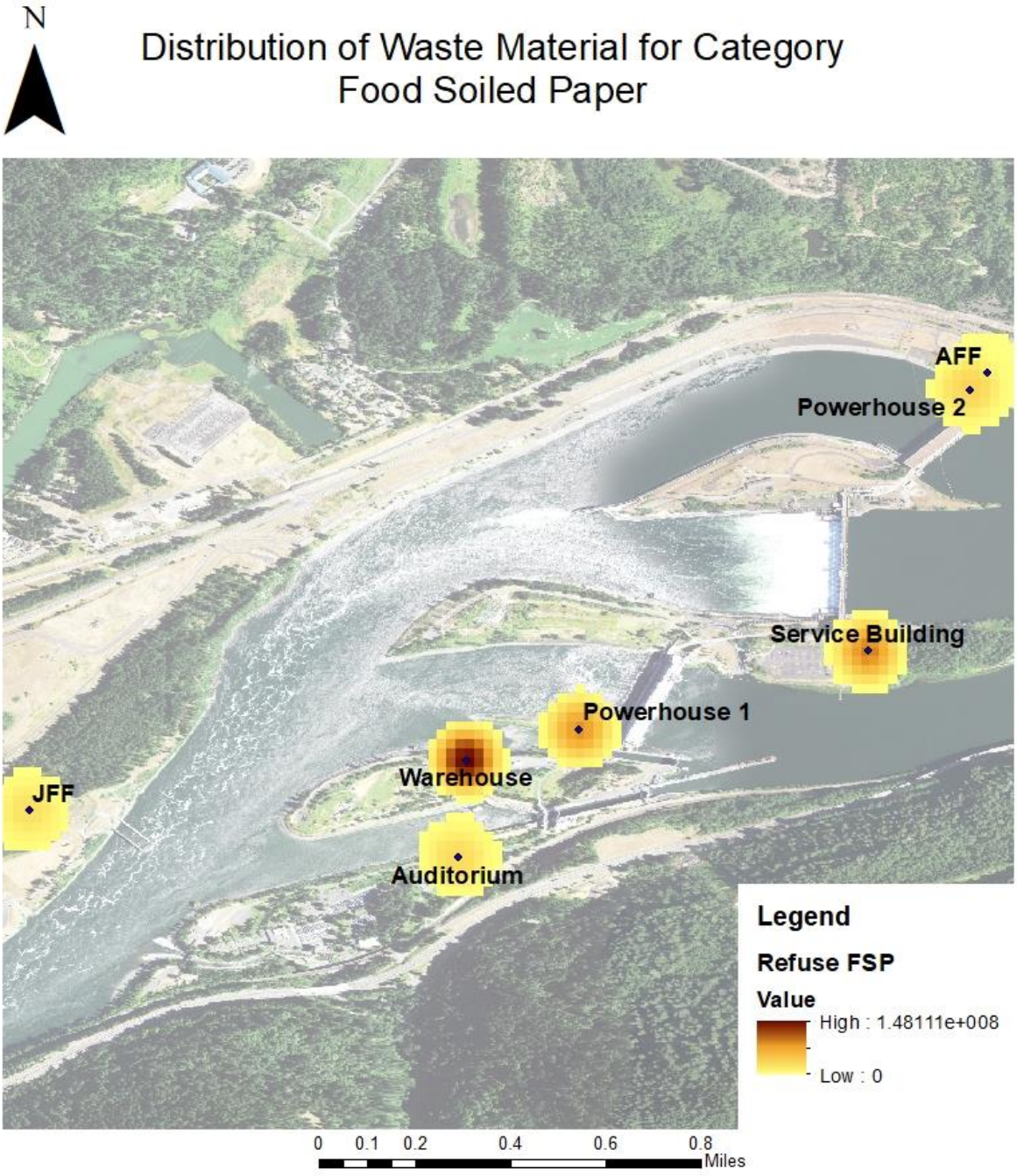


Figure 22: Kernel density map for category 'Food Soiled Paper' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

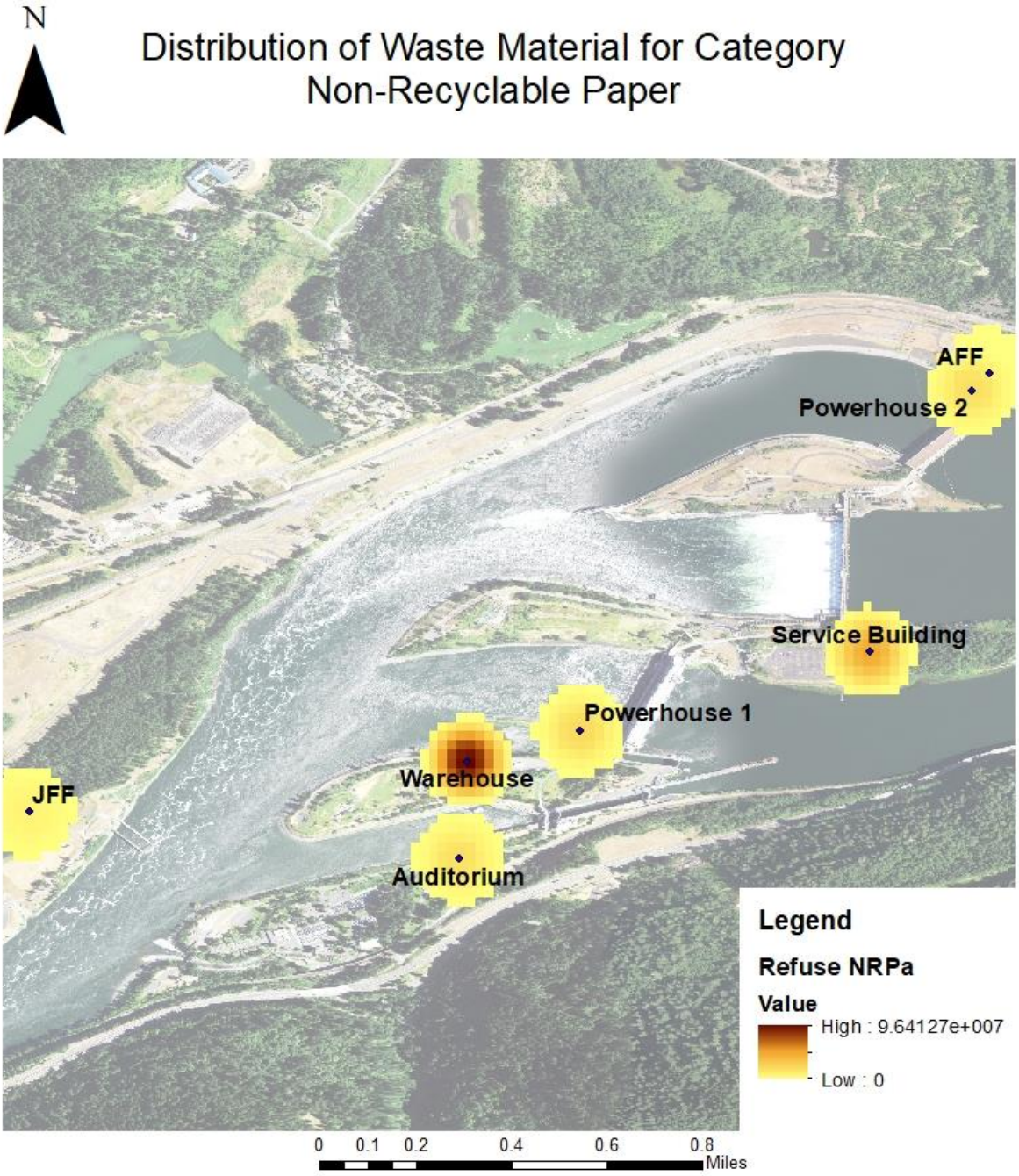


Figure 23: Kernel density map for category 'Non-Recyclable Paper' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

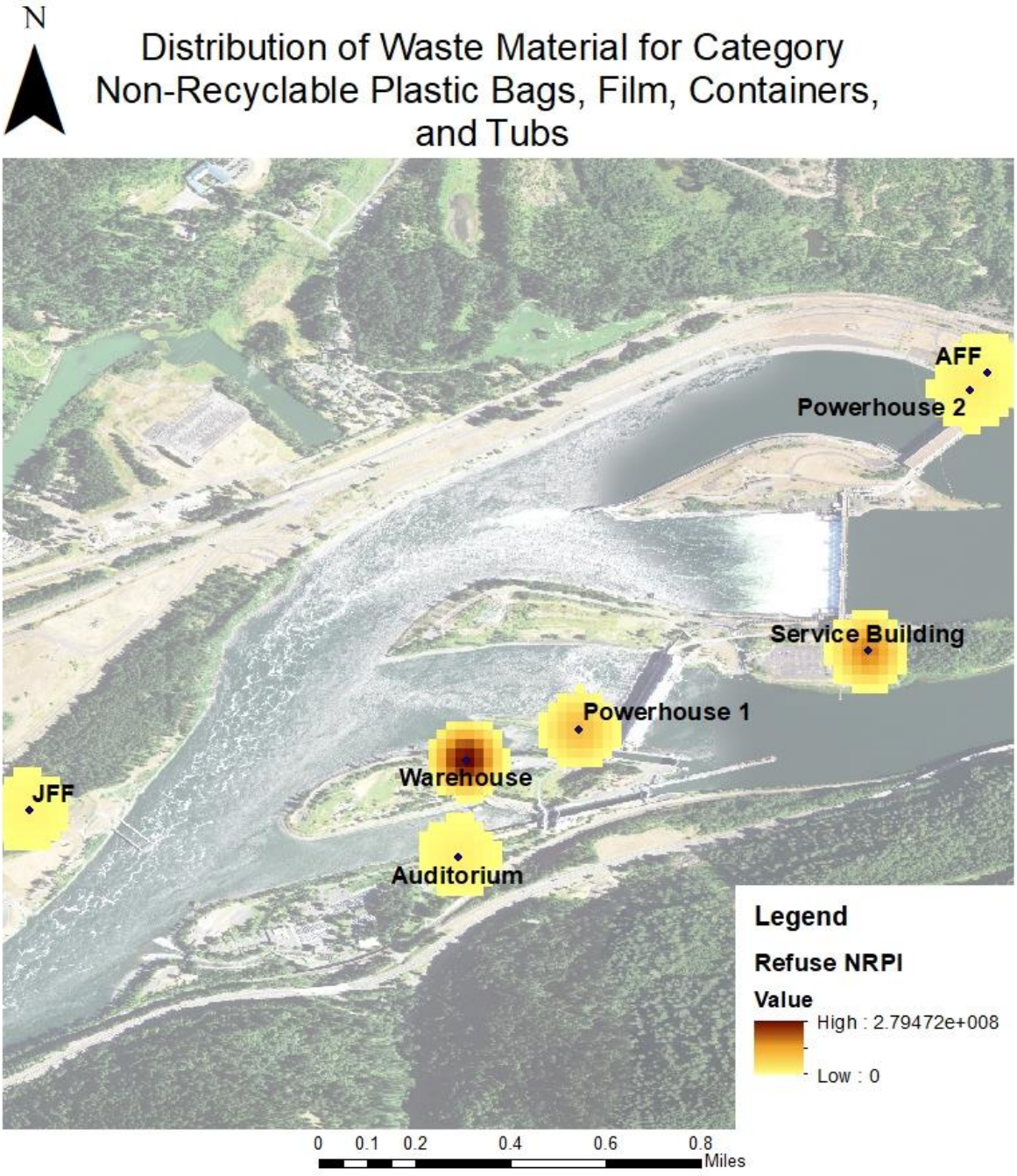


Figure 24: Kernel density map for category 'Non-Recyclable Plastic Bags, Film, Containers, and Tubs' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

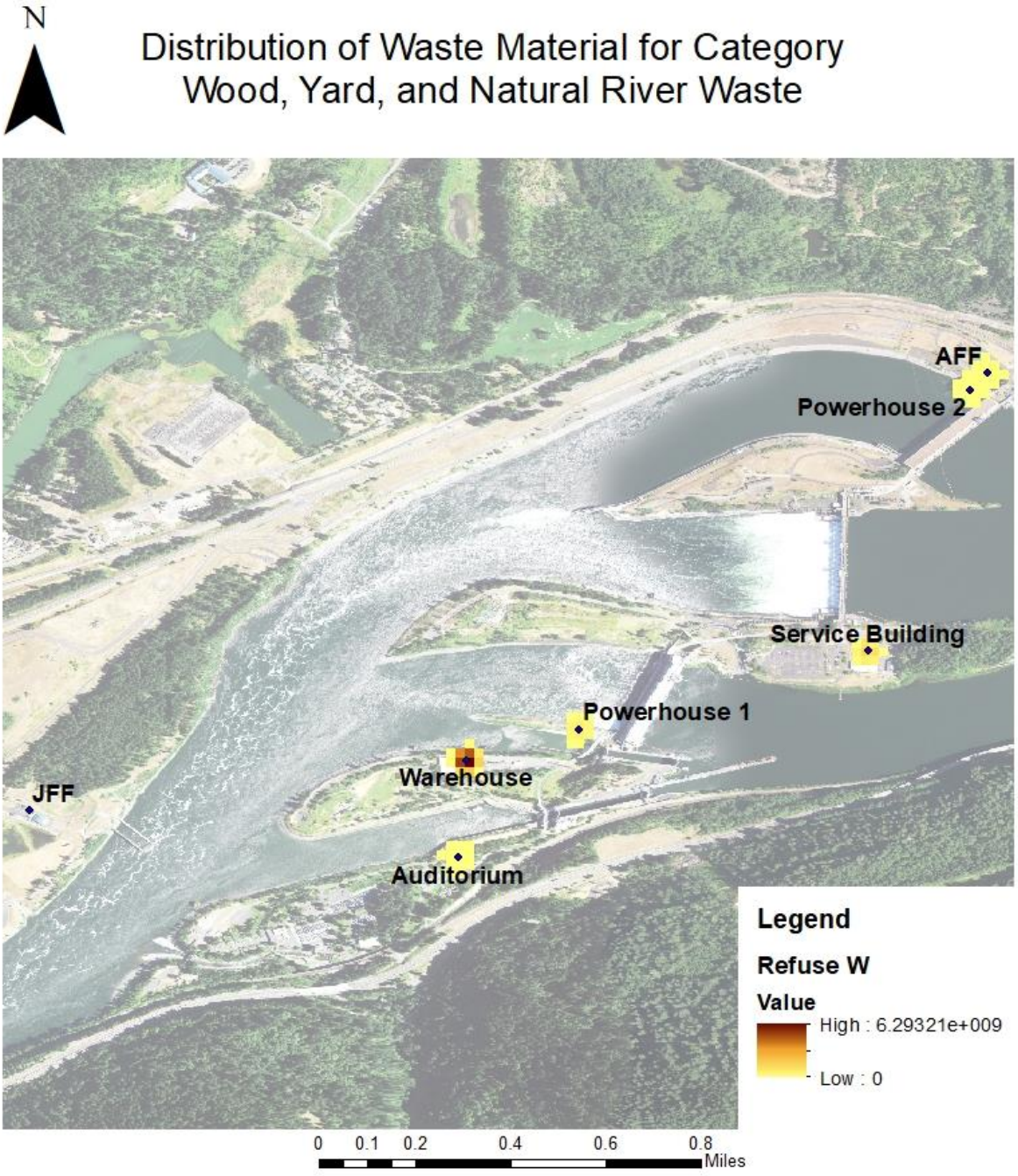


Figure 25: Kernel density map for category 'Wood, Yard, and Natural River Waste' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

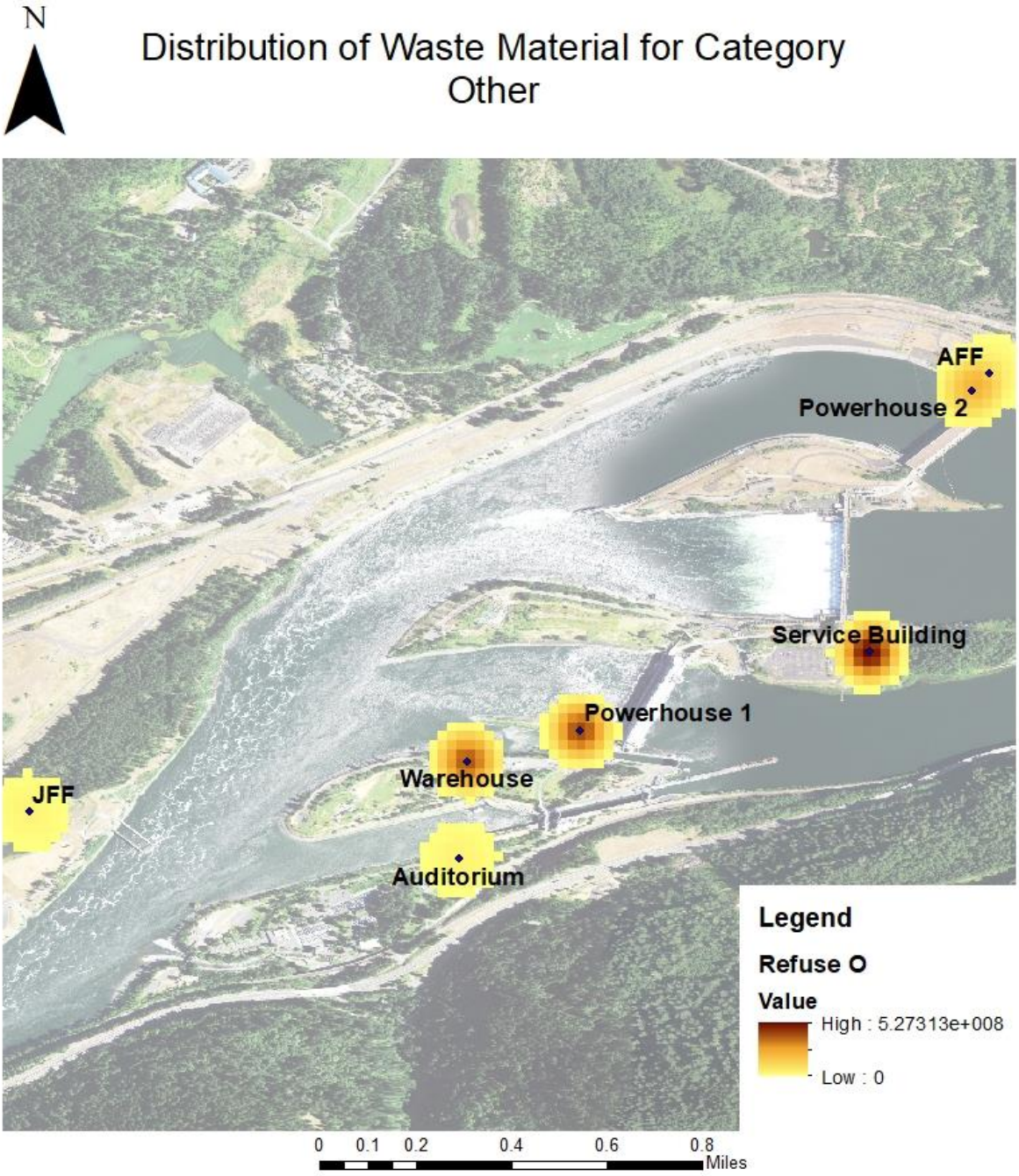


Figure 26: Kernel density map for category 'Other' at the Bonneville Project encompassing all designated areas. The darker the color scale, the higher amount of weight for the category represented per designated area. JFF and AFF indicate Juvenile Fish Facility and Adult Fish Facility respectively.

Appendix C: *Raw Data for Waste Stream Analysis*

Table 5: Raw data for waste stream analysis covering waste type, the waste total, recycling waste total in recycling container(s), refuse waste total in refuse container(s), and waste composition categories in the following order: Corrugated Cardboard (CCB), Glass Bottles and Jars (G), Recyclable Mixed Paper and Newspaper (RPa), Recyclable Plastic Bottles and Tubs (RPl), Tin, Metal, and Aluminum Cans (MC), Recyclable Scrap Metal (SM), Milk Cartons and Juice Boxes (C), Food Soiled Paper (FSP), Non-Recyclable Paper (NRPa), Block Foam (F), Wood, Yard, and Natural River Waste (W), Food Scraps (FS), Non-Recyclable Plastic Bags, Film, Containers, and Tubs (NRPl), Soiled Cloth (SC), and Other (O). All weight is in pounds. This table runs parallel to Table 6 in Appendix D.

Waste Type	Waste Total	Recycling Total	Refuse Total	CCB	G	RPa	RPl	MC	SM	C	FSP	NRPa	F	W	FS	NRPl	SC	O
Service Building Recycling	207.00	204.50	2.50	94.50	1.50	106.00	2.00	0.50	0.00	0.00	0.00	0.00	1.00	0.00	0.00	1.50	0.00	0.00
Service Building Refuse	200.00	6.00	194.00	0.00	2.00	0.00	1.00	1.00	2.00	0.00	49.00	5.00	1.00	89.00	2.00	17.00	0.00	31.00
PH1 Refuse	186.00	18.00	168.00	1.50	4.50	3.00	7.50	1.50	0.00	0.00	63.00	9.00	0.00	30.00	12.00	9.00	45.00	0.00
Warehouse Recycling	390.00	390.00	0.00	390.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse Recycling	295.00	295.00	0.00	12.00	11.00	222.00	43.00	6.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse Refuse	73.00	9.00	64.00	3.00	0.00	3.00	1.00	2.00	0.00	0.00	8.00	5.00	0.00	20.00	17.00	7.00	0.00	7.00
Warehouse Refuse	680.00	30.00	650.00	5.00	0.00	10.00	5.00	5.00	0.00	5.00	90.00	40.00	0.00	240.00	170.00	110.00	0.00	0.00
Warehouse Refuse	900.00	330.00	570.00	20.00	20.00	80.00	0.00	0.00	210.00	0.00	50.00	80.00	0.00	40.00	20.00	160.00	70.00	150.00
PH1 Refuse	482.00	44.00	438.00	8.00	4.00	0.00	4.00	4.00	24.00	0.00	8.00	8.00	2.00	124.00	124.00	8.00	116.00	48.00
Service Building Refuse	475.00	69.00	406.00	64.00	0.00	0.00	2.00	2.00	0.00	1.00	12.00	28.00	0.00	94.00	20.00	14.00	88.00	150.00
SMF Refuse	40.00	0.00	40.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	3.00	0.00	0.00	8.00	4.00	0.00	23.00
SMF Recycling	144.00	144.00	0.00	60.00	3.00	15.00	18.00	9.00	39.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PH2 Recycling	229.00	150.00	79.00	126.00	0.00	20.00	2.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	78.00
PH2 Refuse	22.00	1.00	21.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	8.00	5.00	0.00	0.00	4.00	2.00	0.00	2.00
Warehouse Refuse	103.00	3.00	100.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	22.00	4.00	0.00	28.00	12.00	22.00	0.00	12.00
Warehouse Refuse	41.50	2.00	39.50	1.00	1.00	0.00	0.00	0.00	0.00	0.00	3.00	13.00	0.00	14.00	0.50	2.00	0.00	7.00
PH1 Refuse	160.00	26.00	134.00	6.00	2.00	0.00	4.00	2.00	12.00	0.00	6.00	4.00	1.00	8.00	4.00	13.00	0.00	98.00
PH1 Refuse	119.00	119.00	0.00	1.00	0.00	118.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PH2 Refuse	22.50	20.50	2.00	2.00	15.00	2.00	1.00	0.50	0.00	0.00	0.50	0.00	0.00	0.00	0.50	1.00	0.00	0.00
SMF Refuse	33.50	1.50	32.00	0.00	0.00	0.00	0.00	1.00	0.00	0.50	10.00	2.00	0.00	0.00	8.00	8.00	0.00	4.00

Warehouse Recycling	42.00	39.50	2.50	12.00	12.00	12.00	3.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	2.00
Warehouse Recycling	28.00	28.00	0.00	28.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PH1 Recycling	31.00	31.00	0.00	24.00	0.00	4.00	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auditorium Refuse	42.00	2.00	40.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	4.00	14.00	0.00	0.00	6.00	12.00	0.00	4.00
Auditorium Recycling	10.00	10.00	0.00	3.00	0.00	4.00	2.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Building Recycling	99.00	89.00	10.00	22.00	4.00	52.00	6.00	4.00	0.00	1.00	1.00	1.00	0.00	0.00	2.00	6.00	0.00	0.00
SMF Refuse	53.00	2.00	51.00	0.00	0.00	1.00	0.50	0.50	0.00	0.00	17.00	7.00	0.00	0.00	9.00	3.00	0.00	15.00
SMF Recycling	23.50	22.00	1.50	7.00	1.00	2.00	4.00	8.00	0.00	0.00	0.50	0.50	0.00	0.00	0.50	0.00	0.00	0.00
AFF Refuse	72.00	8.00	64.00	5.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	5.00	0.00	57.00
PH2 Refuse	10.00	1.00	9.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	2.00	5.00	0.00	0.00	1.00	1.00	0.00	0.00
PH2 Recycling	14.50	14.50	0.00	12.00	0.00	1.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Building Refuse	231.42	14.93	216.49	8.96	0.00	2.99	1.49	0.75	0.00	0.75	5.97	19.41	1.49	71.66	7.47	14.93	28.37	67.19
Warehouse Refuse	63.00	30.00	33.00	15.00	9.00	0.00	6.00	0.00	0.00	0.00	6.00	0.00	0.00	0.00	6.00	3.00	0.00	18.00
Warehouse Refuse	38.00	8.00	30.00	0.00	0.00	0.00	2.00	2.00	4.00	0.00	6.00	6.00	0.00	0.00	2.00	4.00	12.00	0.00
Warehouse Refuse	98.00	14.00	84.00	2.00	0.00	2.00	10.00	0.00	0.00	0.00	20.00	8.00	0.00	0.00	8.00	2.00	0.00	46.00
PH2 Refuse	81.37	15.68	65.69	2.99	0.00	4.48	0.75	1.49	4.48	1.49	8.96	5.97	0.00	2.99	26.87	5.97	0.00	14.93
Auditorium Refuse	17.50	2.50	15.00	0.00	0.50	0.50	0.50	1.00	0.00	0.00	5.00	2.00	1.00	2.00	2.00	3.00	0.00	0.00
PH1 Refuse	190.00	30.00	160.00	2.00	2.00	2.00	1.00	1.00	22.00	0.00	10.00	4.00	2.00	8.00	10.00	20.00	20.00	86.00
PH1 Recycling	57.00	46.00	11.00	40.00	5.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.00
PH2 Recycling	35.00	35.00	0.00	33.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Building Recycling	43.00	43.00	0.00	5.00	0.00	34.00	3.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auditorium Recycling	32.50	32.50	0.00	2.00	8.00	6.00	3.00	3.00	10.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auditorium Refuse	35.00	4.00	31.00	0.00	2.00	0.00	0.00	2.00	0.00	0.00	5.00	6.00	0.00	0.00	2.00	6.00	0.00	12.00
Warehouse Recycling	34.50	26.00	8.50	7.00	5.00	5.00	7.00	2.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	4.00	0.00	3.50
Warehouse Recycling	166.50	136.50	30.00	120.00	0.00	15.00	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	30.00
Auditorium Recycling	26.00	25.00	1.00	6.00	0.00	0.50	18.50	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.50
PH1 Recycling	78.00	78.00	0.00	21.00	0.00	3.00	54.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PH2 Recycling	44.50	44.00	0.50	43.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00
AFF Refuse	3.50	2.00	1.50	0.00	0.00	0.50	0.50	1.00	0.00	0.00	0.50	0.00	0.00	0.00	1.00	0.00	0.00	0.00
PH1 Recycling	56.50	55.50	1.00	43.00	3.00	8.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00
AFF Refuse	4.00	1.00	3.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	1.00	0.50	0.00	0.00	0.50	1.00	0.00	0.00
SMF Recycling	10.50	10.50	0.00	0.50	0.00	0.00	8.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PH2 Recycling	98.50	98.00	0.50	51.00	0.00	39.00	8.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00
Warehouse Refuse	96.00	6.00	90.00	2.00	0.00	0.00	4.00	0.00	0.00	0.00	8.00	4.00	0.00	0.00	4.00	10.00	0.00	64.00
Warehouse Refuse	38.00	2.00	36.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	4.00	14.00	0.00	0.00	2.00	2.00	0.00	14.00
Warehouse Refuse	73.00	5.00	68.00	4.00	0.00	0.00	0.00	1.00	0.00	0.00	9.00	0.00	0.00	10.00	2.00	5.00	10.00	32.00
PH1 Refuse	373.50	16.50	357.00	6.00	0.00	3.00	6.00	1.50	0.00	0.00	9.00	1.50	1.50	0.00	6.00	72.00	42.00	225.00
Warehouse Recycling	94.00	94.00	0.00	13.00	0.00	3.00	77.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse Recycling	91.00	91.00	0.00	91.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Building Recycling	297.00	297.00	0.00	18.00	15.00	234.00	30.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PH2 Refuse	155.00	9.00	146.00	1.00	0.50	5.00	0.50	1.00	0.00	1.00	9.00	5.00	0.00	0.00	6.00	4.00	21.00	101.00
AFF Refuse	4.00	1.50	2.50	0.00	0.50	0.00	0.50	0.50	0.00	0.00	1.00	0.00	0.00	0.00	0.50	1.00	0.00	0.00
SMF Refuse	8.00	0.00	8.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	2.00	2.00	0.00	1.00
Service Building Refuse	611.00	129.00	482.00	10.00	0.00	24.00	7.00	5.00	48.00	0.00	35.00	10.00	2.00	60.00	25.00	65.00	15.00	305.00
Auditorium Refuse	55.50	11.50	44.00	1.00	0.00	9.00	1.00	0.50	0.00	0.00	6.00	3.00	0.00	1.00	7.00	3.00	0.00	24.00
Warehouse Refuse	164.00	9.00	155.00	6.00	0.00	1.00	1.00	1.00	0.00	0.00	1.00	8.00	2.00	68.00	0.00	8.00	0.00	68.00
Warehouse Refuse	877.50	19.50	858.00	12.00	0.00	0.00	6.00	1.50	0.00	0.00	3.00	3.00	0.00	780.00	3.00	69.00	0.00	0.00
Warehouse Refuse	819.00	12.00	807.00	6.00	0.00	0.00	4.00	2.00	0.00	0.00	4.00	2.00	2.00	721.00	6.00	24.00	0.00	48.00
PH2 Refuse	39.50	2.00	37.50	0.50	0.00	0.00	0.50	0.50	0.50	0.00	7.00	2.00	0.50	0.00	9.00	5.00	0.00	14.00
PH1 Refuse	165.00	9.00	156.00	2.00	2.00	0.00	2.00	1.00	2.00	0.00	14.00	4.00	0.00	0.00	22.00	26.00	44.00	46.00
PH2 Recycling	93.00	87.00	6.00	84.00	0.00	0.00	3.00	0.00	0.00	0.00	3.00	0.00	0.00	0.00	0.00	3.00	0.00	0.00
SMF Recycling	19.00	19.00	0.00	12.00	0.00	2.00	3.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Building Recycling	197.00	182.50	14.50	84.00	0.00	66.00	25.00	7.50	0.00	0.00	2.00	4.00	1.00	0.00	0.00	7.50	0.00	0.00
Service Building Refuse	460.00	54.00	406.00	6.00	0.00	2.00	4.00	2.00	40.00	0.00	12.00	12.00	2.00	84.00	4.00	85.00	54.00	153.00
PH2 Refuse	57.50	1.50	56.00	0.50	0.00	0.00	0.50	0.50	0.00	0.00	3.00	1.00	0.00	0.00	2.00	5.00	0.00	45.00
PH1 Refuse	189.00	36.00	153.00	3.00	1.50	1.50	1.50	1.50	0.00	0.00	27.00	9.00	0.00	3.00	12.00	18.00	0.00	111.00
SMF Recycling	96.00	90.00	6.00	45.00	0.00	27.00	12.00	6.00	0.00	0.00	4.50	0.00	0.00	0.00	0.00	1.50	0.00	0.00

PH1 Recycling	55.00	55.00	0.00	55.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse Recycling	60.00	60.00	0.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Warehouse Recycling	151.50	119.00	32.50	35.00	0.00	74.00	5.00	5.00	0.00	0.00	2.50	0.00	0.00	0.00	0.00	10.00	0.00	20.00	
Auditorium Recycling	49.50	49.00	0.50	16.00	4.00	23.00	5.00	1.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
SMF Refuse	7.50	2.00	5.50	0.50	0.50	0.50	0.00	0.50	0.00	0.00	2.00	0.50	0.00	0.00	1.00	1.00	0.00	1.00	
Warehouse Refuse	69.00	4.00	65.00	2.00	0.00	1.00	1.00	0.00	0.00	0.00	4.00	4.00	1.00	4.00	2.00	10.00	0.00	40.00	
Warehouse Refuse	54.50	12.00	42.50	9.00	0.00	0.00	1.50	1.50	0.00	0.00	6.00	3.00	3.00	1.50	17.00	9.00	0.00	3.00	
AFF Refuse	9.50	1.50	8.00	0.00	0.50	0.00	0.00	1.00	0.00	0.00	2.00	1.00	0.00	0.00	1.00	2.00	0.00	2.00	
Auditorium Refuse	88.00	20.00	68.00	2.00	1.00	4.00	2.00	10.00	0.00	1.00	28.00	6.00	0.00	0.00	12.00	12.00	0.00	10.00	
PH2 Refuse	51.50	9.00	42.50	6.00	0.00	1.00	1.00	0.00	0.00	1.00	7.00	2.00	0.50	0.00	3.00	6.00	10.00	14.00	
PH1 Recycling	65.00	65.00	0.00	14.00	0.00	51.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Warehouse Recycling	41.00	25.00	16.00	14.00	0.00	10.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.00	11.00	
Warehouse Recycling	60.00	60.00	0.00	60.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Service Building Refuse	340.00	60.00	280.00	35.00	0.00	10.00	10.00	5.00	0.00	0.00	35.00	15.00	0.00	0.00	10.00	75.00	60.00	85.00	
PH2 Refuse	37.50	3.50	34.00	0.50	1.00	1.00	0.50	0.50	0.00	0.00	8.00	7.00	0.00	0.00	4.00	5.00	0.00	10.00	
AFF Refuse	44.00	3.00	41.00	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.50	1.00	0.00	39.00	

Appendix D: *Audit Dates*

Table 6: Table depicting the designated area, container type, audit date, and approximate collection date by the appropriate waste hauler of either recycling or refuse containers for the Bonneville Project during the study audit period. The symbol '*' indicates that the container audit was done with a representative sample.

Designated Area	**Container Type**	**Audit Date**	**Collection Date**
Service Building	Recycling	23 August 2017	25 August 2017
Service Building	Refuse	29 August 2017	01 September 2017
Powerhouse 1	Refuse*	30 August 2017	01 September 2017
Warehouse	Refuse*	27 September 2017	29 September 2017
Warehouse	Refuse*	27 September 2017	29 September 2017
Warehouse	Refuse	27 September 2017	29 September 2017
Warehouse	Recycling	27 September 2017	29 September 2017
Warehouse	Recycling*	27 September 2017	29 September 2017
Service Building	Refuse*	02 October 2017	06 October 2017
Powerhouse 1	Refuse*	02 October 2017	06 October 2017
Powerhouse 2	Refuse	04 October 2017	06 October 2017
Powerhouse 2	Recycling*	04 October 2017	06 October 2017
Juvenile Fish Facility	Recycling*	04 October 2017	06 October 2017
Juvenile Fish Facility	Refuse	04 October 2017	06 October 2017
Juvenile Fish Facility	Refuse	16 October 2017	20 October 2017
Powerhouse 2	Refuse*	16 October 2017	20 October 2017
Powerhouse 1	Refuse*	16 October 2017	20 October 2017
Powerhouse 1	Refuse*	16 October 2017	20 October 2017
Warehouse	Refuse	16 October 2017	20 October 2017
Warehouse	Refuse*	16 October 2017	20 October 2017
Warehouse	Recycling	23 October 2017	20 October 2017
Warehouse	Recycling	23 October 2017	20 October 2017
Powerhouse 1	Recycling	23 October 2017	20 October 2017
Auditorium	Refuse*	23 October 2017	20 October 2017
Auditorium	Recycling	23 October 2017	20 October 2017
Service Building	Recycling*	23 October 2017	20 October 2017
Juvenile Fish Facility	Refuse	25 October 2017	27 October 2017
Juvenile Fish Facility	Recycling	25 October 2017	27 October 2017
Adult Fish Facility	Refuse	25 October 2017	27 October 2017
Powerhouse 2	Refuse	25 October 2017	27 October 2017
Powerhouse 2	Recycling	25 October 2017	27 October 2017
Warehouse	Refuse*	30 October 2017	03 November 2017
Warehouse	Refuse*	30 October 2017	03 November 2017
Warehouse	Refuse*	30 October 2017	03 November 2017
Service Building	Refuse*	30 October 2017	03 November 2017
Powerhouse 2	Refuse*	01 November 2017	03 November 2017
Auditorium	Refuse	01 November 2017	03 November 2017
Powerhouse 1	Refuse*	01 November 2017	03 November 2017

Powerhouse 1	Recycling	06 November 2017	10 November 2017
Powerhouse 2	Recycling	13 November 2017	24 November 2017
Service Building	Recycling	13 November 2017	17 November 2017
Auditorium	Recycling	13 November 2017	17 November 2017
Auditorium	Refuse	13 November 2017	17 November 2017
Warehouse	Recycling	20 November 2017	24 November 2017
Warehouse	Recycling*	20 November 2017	24 November 2017
Auditorium	Recycling	06 December 2017	08 December 2017
Powerhouse 1	Recycling	06 December 2017	08 December 2017
Powerhouse 2	Recycling	06 December 2017	08 December 2017
Adult Fish Facility	Refuse	06 December 2017	08 December 2017
Powerhouse 1	Recycling	10 January 2018	12 January 2018
Adult Fish Facility	Refuse	10 January 2018	12 January 2018
Juvenile Fish Facility	Recycling	10 January 2018	12 January 2018
Powerhouse 2	Recycling*	10 January 2018	12 January 2018
Powerhouse 1	Refuse*	17 January 2018	19 January 2018
Warehouse	Refuse	17 January 2018	19 January 2018
Warehouse	Refuse*	17 January 2018	19 January 2018
Warehouse	Refuse*	17 January 2018	19 January 2018
Service Building	Recycling*	24 January 2018	26 January 2018
Warehouse	Recycling	24 January 2018	26 January 2018
Warehouse	Recycling	24 January 2018	26 January 2018
Service Building	Refuse*	31 January 2018	02 February 2018
Juvenile Fish Facility	Refuse	31 January 2018	02 February 2018
Adult Fish Facility	Refuse	31 January 2018	02 February 2018
Powerhouse 2	Refuse	31 January 2018	02 February 2018
Warehouse	Refuse*	07 February 2018	09 February 2018
Warehouse	Refuse*	07 February 2018	09 February 2018
Warehouse	Refuse*	07 February 2018	09 February 2018
Auditorium	Refuse	07 February 2018	09 February 2018
Powerhouse 2	Refuse	14 February 2018	16 February 2018
Powerhouse 1	Refuse*	14 February 2018	16 February 2018
Service Building	Recycling*	28 February 2018	02 March 2018
Juvenile Fish Facility	Recycling	28 February 2018	02 March 2018
Powerhouse 2	Recycling*	28 February 2018	02 March 2018
Service Building	Refuse*	07 March 2018	09 March 2018
Powerhouse 2	Refuse	07 March 2018	09 March 2018
Powerhouse 1	Refuse*	07 March 2018	09 March 2018
Auditorium	Recycling	20 March 2018	23 March 2018
Warehouse	Recycling*	20 March 2018	23 March 2018
Warehouse	Recycling*	20 March 2018	23 March 2018
Powerhouse 1	Recycling*	20 March 2018	23 March 2018
Juvenile Fish Facility	Recycling*	20 March 2018	30 March 2018
Adult Fish Facility	Refuse	28 March 2018	30 March 2018
Warehouse	Refuse*	28 March 2018	30 March 2018
Warehouse	Refuse*	28 March 2018	30 March 2018

Juvenile Fish Facility	Refuse	28 March 2018	30 March 2018
Auditorium	Refuse*	04 April 2018	06 April 2018
Powerhouse 2	Refuse	04 April 2018	06 April 2018
Warehouse	Recycling*	11 April 2018	13 April 2018
Warehouse	Recycling	11 April 2018	13 April 2018
Powerhouse 1	Recycling	11 April 2018	13 April 2018
Adult Fish Facility	Refuse	18 April 2018	20 April 2018
Powerhouse 2	Refuse	18 April 2018	20 April 2018
Service Building	Refuse*	18 April 2018	20 April 2018

Appendix E: *Product Alternative Safety Data Sheets:*

Safety Data Sheet

Document Group:	31-2738-8	**Version Number:**	5.00
Issue Date:	05/08/15	**Supercedes Date:**	07/17/13

SECTION 1: Identification

1.1. Product identifier
3M™ Fast Tack Water Based Adhesive 1000NF, Neutral

Product Identification Numbers
62-4226-7530-6, 62-4226-7535-5, 62-4226-8436-5, 62-4226-8530-5, 62-4226-9530-4, 62-4226-9538-7, 62-4226-9932-2

1.2. Recommended use and restrictions on use

Recommended use
Adhesive, Industrial use

1.3. Supplier's details

MANUFACTURER:	3M
DIVISION:	Industrial Adhesives and Tapes Division
ADDRESS:	3M Center, St. Paul, MN 55144-1000, USA
Telephone:	1-888-3M HELPS (1-888-364-3577)

1.4. Emergency telephone number
1-800-364-3577 or (651) 737-6501 (24 hours)

SECTION 2: Hazard identification

2.1. Hazard classification
Not classified as hazardous according to OSHA Hazard Communication Standard, 29 CFR 1910.1200.

2.2. Label elements
Signal word
Not applicable.

Symbols
Not applicable.

Pictograms
Not applicable.

Precautionary Statements

Prevention:

Wear eye/face protection.

Response:
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
If eye irritation persists: Get medical advice/attention.

2.3. Hazards not otherwise classified
None.

SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
Acrylic Polymer	Trade Secret*	45 - 55 Trade Secret *
Water	7732-18-5	40 - 50 Trade Secret *
Benzenesulfonic Acid, dodecyl-, branched, Sodium Salt	69227-09-4	< 1 Trade Secret *

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
No need for first aid is anticipated.

Skin Contact:
No need for first aid is anticipated.

Eye Contact:
Flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. If signs/symptoms persist, get medical attention.

If Swallowed:
No need for first aid is anticipated.

4.2. Most important symptoms and effects, both acute and delayed
See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required
Not applicable

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media
Material will not burn. Use a fire fighting agent suitable for the surrounding fire.

5.2. Special hazards arising from the substance or mixture
None inherent in this product.

Hazardous Decomposition or By-Products

Substance	Condition
Aldehydes	During Combustion

Carbon monoxide	During Combustion
Carbon dioxide	During Combustion

5.3. Special protective actions for fire-fighters
No special protective actions for fire-fighters are anticipated.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

6.2. Environmental precautions
Avoid release to the environment. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water.

6.3. Methods and material for containment and cleaning up
Contain spill. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible. Place in a closed container approved for transportation by appropriate authorities. Clean up residue with detergent and water. Seal the container. Dispose of collected material as soon as possible.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
No specific handling precautions are necessary.

7.2. Conditions for safe storage including any incompatibilities
Store away from heat. Store away from strong bases.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits
No occupational exposure limit values exist for any of the components listed in Section 3 of this SDS.

8.2. Exposure controls

8.2.1. Engineering controls
Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)

Eye/face protection

Select and use eye/face protection to prevent contact based on the results of an exposure assessment. The following eye/face protection(s) are recommended:
Safety Glasses with side shields

Skin/hand protection
No chemical protective gloves are required.

Respiratory protection
None required.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General Physical Form:	Liquid
Odor, Color, Grade:	Slight acrylate white lavender
Odor threshold	*No Data Available*
pH	5 - 6
Melting point	*No Data Available*
Boiling Point	212 °F
Flash Point	No flash point
Evaporation rate	1.00 [*Ref Std:* WATER=1]
Flammability (solid, gas)	Not Applicable
Flammable Limits(LEL)	*Not Applicable*
Flammable Limits(UEL)	*Not Applicable*
Vapor Pressure	*No Data Available*
Vapor Density	*No Data Available*
Density	1 g/cm3
Specific Gravity	1 [*Ref Std:* WATER=1]
Solubility- non-water	*No Data Available*
Partition coefficient: n-octanol/ water	*No Data Available*
Autoignition temperature	*No Data Available*
Decomposition temperature	*No Data Available*
Viscosity	400 - 1,100 centipoise
Hazardous Air Pollutants	<=0 % weight [*Test Method:* Calculated]
VOC Less H2O & Exempt Solvents	0 g/l [*Test Method:* calculated SCAQMD rule 443.1]
Solids Content	45 - 55 % weight

SECTION 10: Stability and reactivity

10.1. Reactivity
This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

10.2. Chemical stability
Stable.

10.3. Possibility of hazardous reactions
Hazardous polymerization will not occur.

10.4. Conditions to avoid
Heat

10.5. Incompatible materials
Strong bases

10.6. Hazardous decomposition products

Substance	Condition

None known.

Refer to section 5.2 for hazardous decomposition products during combustion.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects

Signs and Symptoms of Exposure

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:
No known health effects.

Skin Contact:
Contact with the skin during product use is not expected to result in significant irritation.

Eye Contact:
Contact with the eyes during product use is not expected to result in significant irritation.

Ingestion:
No known health effects.

Toxicological Data
If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

Name	Route	Species	Value
Overall product	Ingestion		No data available; calculated ATE > 5,000 mg/kg

ATE = acute toxicity estimate

Skin Corrosion/Irritation
For the component/components, either no data are currently available or the data are not sufficient for classification.

Serious Eye Damage/Irritation
For the component/components, either no data are currently available or the data are not sufficient for classification.

Skin Sensitization
For the component/components, either no data are currently available or the data are not sufficient for classification.

Respiratory Sensitization
For the component/components, either no data are currently available or the data are not sufficient for classification.

Germ Cell Mutagenicity
For the component/components, either no data are currently available or the data are not sufficient for classification.

Carcinogenicity

For the component/components, either no data are currently available or the data are not sufficient for classification.

Reproductive Toxicity

Reproductive and/or Developmental Effects
For the component/components, either no data are currently available or the data are not sufficient for classification.

Target Organ(s)

Specific Target Organ Toxicity - single exposure
For the component/components, either no data are currently available or the data are not sufficient for classification.

Specific Target Organ Toxicity - repeated exposure
For the component/components, either no data are currently available or the data are not sufficient for classification.

Aspiration Hazard
For the component/components, either no data are currently available or the data are not sufficient for classification.

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

SECTION 13: Disposal considerations

13.1. Disposal methods
Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Prior to disposal, consult all applicable authorities and regulations to insure proper classification. Dispose of waste product in a permitted industrial waste facility. Empty and clean product containers may be disposed as non-hazardous waste. Consult your specific regulations and service providers to determine available options and requirements.

EPA Hazardous Waste Number (RCRA): Not regulated

SECTION 14: Transport Information

For Transport Information, please visit **http://3M.com/Transportinfo** or call 1-800-364-3577 or 651-737-6501.

SECTION 15: Regulatory information

15.1. US Federal Regulations

Contact 3M for more information.

311/312 Hazard Categories:

Fire Hazard - No Pressure Hazard - No Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - No

15.2. State Regulations
Contact 3M for more information.

15.3. Chemical Inventories
The components of this product are in compliance with the chemical notification requirements of TSCA. One or more chemical components of this material have been commercialized under the TSCA polymer exemption at 40CFR723.250. Polymers subject to this exemption are not listed on the TSCA Inventory, but are in compliance with TSCA requirements.

Contact 3M for more information.

15.4. International Regulations
Contact 3M for more information.

This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: Other information

NFPA Hazard Classification
Health: 1 **Flammability:** 0 **Instability:** 0 **Special Hazards:** None

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Document Group:	31-2738-8	**Version Number:**	5.00
Issue Date:	05/08/15	**Supercedes Date:**	07/17/13

DISCLAIMER: The information in this Safety Data Sheet (SDS) is believed to be correct as of the date issued. 3M MAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE. User is responsible for determining whether the 3M product is fit for a particular purpose and suitable for user's method of use or application. Given the variety of factors that can affect the use and application of a 3M product, some of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

3M provides information in electronic form as a service to its customers. Due to the remote possibility that electronic transfer may have resulted in errors, omissions or alterations in this information, 3M makes no representations as to its completeness or accuracy. In addition, information obtained from a database may not be as current as the information in the SDS available directly from 3M

3M USA SDSs are available at www.3M.com

Safety Data Sheet

Document Group:	29-3109-5	**Version Number:**	4.00
Issue Date:	04/25/17	**Supercedes Date:**	03/03/15

SECTION 1: Identification

1.1. Product identifier
Super 77 Aerosol Spray Low 25% VOC

Product Identification Numbers
62-4876-4930-3, 62-4876-4935-2

1.2. Recommended use and restrictions on use

Recommended use
Adhesive, Industrial use

1.3. Supplier's details

MANUFACTURER:	3M
DIVISION:	Industrial Adhesives and Tapes Division
ADDRESS:	3M Center, St. Paul, MN 55144-1000, USA
Telephone:	1-888-3M HELPS (1-888-364-3577)

1.4. Emergency telephone number
1-800-364-3577 or (651) 737-6501 (24 hours)

SECTION 2: Hazard identification

2.1. Hazard classification
Flammable Aerosol: Category 1.
Gas Under Pressure: Dissolved gas.
Serious Eye Damage/Irritation: Category 2A.
Specific Target Organ Toxicity (single exposure): Category 1.
Specific Target Organ Toxicity (single exposure): Category 3.

2.2. Label elements
Signal word
Danger

Symbols
Flame | Gas cylinder | Exclamation mark | Health Hazard |

Pictograms

Hazard Statements
Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.

Causes serious eye irritation.
May cause drowsiness or dizziness.

Causes damage to organs:
cardiovascular system |

Precautionary Statements
General:
Keep out of reach of children.

Prevention:
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Do not breathe dust/fume/gas/mist/vapors/spray.
Use only outdoors or in a well-ventilated area.
Wear eye/face protection.
Do not eat, drink or smoke when using this product.
Wash thoroughly after handling.

Response:
IF INHALED: Remove person to fresh air and keep comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do.
Continue rinsing.
If eye irritation persists: Get medical advice/attention.
IF exposed: Call a POISON CENTER or doctor/physician.
Specific treatment (see Notes to Physician on this label).

Storage:
Protect from sunlight. Do not expose to temperatures exceeding 50C/122F.
Store in a well-ventilated place. Keep container tightly closed.
Store locked up.

Disposal:
Dispose of contents/container in accordance with applicable local/regional/national/international regulations.

Notes to Physician:
Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

2.3. Hazards not otherwise classified

Supplemental Information:
Intentional misuse by deliberately concentrating and inhaling contents can be harmful or fatal.

SECTION 3: Composition/information on ingredients

Ingredient	C.A.S. No.	% by Wt
Acetone	67-64-1	35 - 45 Trade Secret *
Non-hazardous components	Trade Secret*	10 - 25 Trade Secret *
1,1-Difluoroethane	75-37-6	10 - 15 Trade Secret *
Cyclohexane	110-82-7	5 - 15 Trade Secret *
Propane	74-98-6	10 - 15 Trade Secret *

*The specific chemical identity and/or exact percentage (concentration) of this composition has been withheld as a trade secret.

SECTION 4: First aid measures

4.1. Description of first aid measures

Inhalation:
Remove person to fresh air. Get medical attention.

Skin Contact:
Wash with soap and water. If signs/symptoms develop, get medical attention.

Eye Contact:
Immediately flush with large amounts of water. Remove contact lenses if easy to do. Continue rinsing. Get medical attention.

If Swallowed:
Rinse mouth. If you feel unwell, get medical attention.

4.2. Most important symptoms and effects, both acute and delayed
See Section 11.1. Information on toxicological effects.

4.3. Indication of any immediate medical attention and special treatment required
Exposure may increase myocardial irritability. Do not administer sympathomimetic drugs unless absolutely necessary.

SECTION 5: Fire-fighting measures

5.1. Suitable extinguishing media
Use a fire fighting agent suitable for the surrounding fire.

5.2. Special hazards arising from the substance or mixture
Closed containers exposed to heat from fire may build pressure and explode.

Hazardous Decomposition or By-Products

Substance	Condition
Carbon monoxide	During Combustion
Carbon dioxide	During Combustion

5.3. Special protective actions for fire-fighters
Water may not effectively extinguish fire; however, it should be used to keep fire-exposed containers and surfaces cool and prevent explosive rupture.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures
Evacuate area. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Use only non-sparking tools. Ventilate the area with fresh air. For large spill, or spills in confined spaces, provide mechanical ventilation to disperse or exhaust vapors, in accordance with good industrial hygiene practice. Warning! A motor could be an ignition source and could cause flammable gases or vapors in the spill area to burn or explode. Refer to other sections of this SDS for information regarding physical and health hazards, respiratory protection, ventilation, and personal protective equipment.

6.2. Environmental precautions
Avoid release to the environment. For larger spills, cover drains and build dikes to prevent entry into sewer systems or bodies of water.

6.3. Methods and material for containment and cleaning up
If possible, seal leaking container. Place leaking containers in a well-ventilated area, preferably an operating exhaust hood, or if necessary outdoors on an impermeable surface until appropriate packaging for the leaking container or its contents is available. Contain spill. Cover spill area with a fire-extinguishing foam. An appropriate aqueous film forming foam (AFFF) is recommended. Working from around the edges of the spill inward, cover with bentonite, vermiculite, or commercially available inorganic absorbent material. Mix in sufficient absorbent until it appears dry. Remember, adding an absorbent material does not remove a physical, health, or environmental hazard. Collect as much of the spilled material as possible using non-sparking tools. Place in a metal container approved for transportation by appropriate authorities. Clean up residue with an appropriate solvent selected by a qualified and authorized person. Ventilate the area with fresh air. Read and follow safety precautions on the solvent label and SDS. Seal the container. Dispose of collected material as soon as possible.

SECTION 7: Handling and storage

7.1. Precautions for safe handling
Keep out of reach of children. Keep away from heat/sparks/open flames/hot surfaces. - No smoking. Do not spray on an open flame or other ignition source. Do not pierce or burn, even after use. Do not breathe dust/fume/gas/mist/vapors/spray. Do not get in eyes, on skin, or on clothing. Do not eat, drink or smoke when using this product. Wash thoroughly after handling. Avoid release to the environment. Avoid contact with oxidizing agents (eg. chlorine, chromic acid etc.)

7.2. Conditions for safe storage including any incompatibilities
Store in a well-ventilated place. Keep container tightly closed. Protect from sunlight. Do not expose to temperatures exceeding 50C/122F. Store away from heat. Store away from acids. Store away from oxidizing agents.

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

Occupational exposure limits
If a component is disclosed in section 3 but does not appear in the table below, an occupational exposure limit is not available for the component.

Ingredient	C.A.S. No.	Agency	Limit type	Additional Comments
Cyclohexane	110-82-7	ACGIH	TWA:100 ppm	
Cyclohexane	110-82-7	OSHA	TWA:1050 mg/m3(300 ppm)	
Acetone	67-64-1	OSHA	TWA:2400 mg/m3(1000 ppm)	
Acetone	67-64-1	ACGIH	TWA:250 ppm;STEL:500 ppm	A4: Not class. as human carcin
Propane	74-98-6	ACGIH	Limit value not established:	
Propane	74-98-6	OSHA	TWA:1800 mg/m3(1000 ppm)	

1,1-Difluoroethane	75-37-6	AIHA	TWA:2700 mg/m3(1000 ppm)	

ACGIH : American Conference of Governmental Industrial Hygienists
AIHA : American Industrial Hygiene Association
CMRG : Chemical Manufacturer's Recommended Guidelines
OSHA : United States Department of Labor - Occupational Safety and Health Administration
TWA: Time-Weighted-Average
STEL: Short Term Exposure Limit
CEIL: Ceiling

8.2. Exposure controls

8.2.1. Engineering controls
Use general dilution ventilation and/or local exhaust ventilation to control airborne exposures to below relevant Exposure Limits and/or control dust/fume/gas/mist/vapors/spray. If ventilation is not adequate, use respiratory protection equipment.

8.2.2. Personal protective equipment (PPE)

Eye/face protection

Select and use eye/face protection to prevent contact based on the results of an exposure assessment. The following eye/face protection(s) are recommended:
Indirect Vented Goggles

Skin/hand protection
Select and use gloves and/or protective clothing approved to relevant local standards to prevent skin contact based on the results of an exposure assessment. Selection should be based on use factors such as exposure levels, concentration of the substance or mixture, frequency and duration, physical challenges such as temperature extremes, and other use conditions. Consult with your glove and/or protective clothing manufacturer for selection of appropriate compatible gloves/protective clothing.
Gloves made from the following material(s) are recommended: Fluoroelastomer
Nitrile Rubber
Polyvinyl Alcohol (PVA)

Respiratory protection

An exposure assessment may be needed to decide if a respirator is required. If a respirator is needed, use respirators as part of a full respiratory protection program. Based on the results of the exposure assessment, select from the following respirator type(s) to reduce inhalation exposure:
Half facepiece or full facepiece air-purifying respirator suitable for organic vapors

For questions about suitability for a specific application, consult with your respirator manufacturer.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

General Physical Form:	Liquid
Specific Physical Form:	Aerosol
Odor, Color, Grade:	clear, solvent odor
Odor threshold	*No Data Available*
pH	*Not Applicable*
Melting point	*Not Applicable*
Boiling Point	-44 °F [*Details:*Acetone]
Flash Point	-156 °F [*Test Method:*Closed Cup]
Evaporation rate	> 1 [*Ref Std:*BUOAC=1]
Flammability (solid, gas)	Not Applicable
Flammable Limits(LEL)	1.3 % volume

Flammable Limits(UEL)	12.8 % volume
Vapor Pressure	<=4137 mmHg [@ 68 °F]
Vapor Density	> 1 [*Ref Std:* AIR=1]
Density	0.80 g/ml
Specific Gravity	0.80 [*Ref Std:* WATER=1]
Solubility in Water	Nil
Solubility- non-water	*No Data Available*
Partition coefficient: n-octanol/ water	*No Data Available*
Autoignition temperature	*No Data Available*
Decomposition temperature	*No Data Available*
Viscosity	<=100 centipoise [@ 73.4 °F]
Molecular weight	*No Data Available*
Percent volatile	<=80.6 % weight
VOC Less H2O & Exempt Solvents	<=25 % [*Test Method:* calculated per CARB title 2]

SECTION 10: Stability and reactivity

10.1. Reactivity
This material may be reactive with certain agents under certain conditions - see the remaining headings in this section.

10.2. Chemical stability
Stable.

10.3. Possibility of hazardous reactions
Hazardous polymerization will not occur.

10.4. Conditions to avoid
Heat
Sparks and/or flames

10.5. Incompatible materials
Not determined

10.6. Hazardous decomposition products

Substance	Condition
None known.	

Refer to section 5.2 for hazardous decomposition products during combustion.

SECTION 11: Toxicological information

The information below may not be consistent with the material classification in Section 2 if specific ingredient classifications are mandated by a competent authority. In addition, toxicological data on ingredients may not be reflected in the material classification and/or the signs and symptoms of exposure, because an ingredient may be present below the threshold for labeling, an ingredient may not be available for exposure, or the data may not be relevant to the material as a whole.

11.1. Information on Toxicological effects

Signs and Symptoms of Exposure

Based on test data and/or information on the components, this material may produce the following health effects:

Inhalation:
Intentional concentration and inhalation may be harmful or fatal.

Respiratory Tract Irritation: Signs/symptoms may include cough, sneezing, nasal discharge, headache, hoarseness, and nose and throat pain.

May cause additional health effects (see below).

Skin Contact:
Prolonged or repeated exposure may cause:
Dermal Defatting: Signs/symptoms may include localized redness, itching, drying and cracking of skin.

Eye Contact:
Severe Eye Irritation: Signs/symptoms may include significant redness, swelling, pain, tearing, cloudy appearance of the cornea, and impaired vision.

Ingestion:
Gastrointestinal Irritation: Signs/symptoms may include abdominal pain, stomach upset, nausea, vomiting and diarrhea.

May cause additional health effects (see below).

Additional Health Effects:

Single exposure may cause target organ effects:
Central Nervous System (CNS) Depression: Signs/symptoms may include headache, dizziness, drowsiness, incoordination, nausea, slowed reaction time, slurred speech, giddiness, and unconsciousness.

Single exposure, above recommended guidelines, may cause:
Cardiac Sensitization: Signs/symptoms may include irregular heartbeat (arrhythmia), faintness, chest pain, and may be fatal.

Toxicological Data
If a component is disclosed in section 3 but does not appear in a table below, either no data are available for that endpoint or the data are not sufficient for classification.

Acute Toxicity

Name	Route	Species	Value
Overall product	Dermal		No data available; calculated ATE >5,000 mg/kg
Overall product	Inhalation-Vapor(4 hr)		No data available; calculated ATE >50 mg/l
Overall product	Ingestion		No data available; calculated ATE >5,000 mg/kg
Acetone	Dermal	Rabbit	LD50 > 15,688 mg/kg
Acetone	Inhalation-Vapor (4 hours)	Rat	LC50 76 mg/l
Acetone	Ingestion	Rat	LD50 5,800 mg/kg
Propane	Inhalation-Gas (4 hours)	Rat	LC50 > 200,000 ppm
1,1-Difluoroethane	Inhalation-Gas (4 hours)	Rat	LC50 > 437,000 ppm
1,1-Difluoroethane	Ingestion	Rat	LD50 > 1,500 mg/kg
Cyclohexane	Dermal	Rat	LD50 > 2,000 mg/kg
Cyclohexane	Inhalation-Vapor (4 hours)	Rat	LC50 > 32.9 mg/l

Cyclohexane	Ingestion	Rat	LD50 6,200 mg/kg

ATE = acute toxicity estimate

Skin Corrosion/Irritation

Name	Species	Value
Acetone	Mouse	Minimal irritation
Propane	Rabbit	Minimal irritation
Cyclohexane	Rabbit	Mild irritant

Serious Eye Damage/Irritation

Name	Species	Value
Acetone	Rabbit	Severe irritant
Propane	Rabbit	Mild irritant
Cyclohexane	Rabbit	Mild irritant

Skin Sensitization

For the component/components, either no data are currently available or the data are not sufficient for classification.

Respiratory Sensitization

For the component/components, either no data are currently available or the data are not sufficient for classification.

Germ Cell Mutagenicity

Name	Route	Value
Acetone	In vivo	Not mutagenic
Acetone	In Vitro	Some positive data exist, but the data are not sufficient for classification
Propane	In Vitro	Not mutagenic
1,1-Difluoroethane	In Vitro	Some positive data exist, but the data are not sufficient for classification
1,1-Difluoroethane	In vivo	Some positive data exist, but the data are not sufficient for classification
Cyclohexane	In Vitro	Not mutagenic
Cyclohexane	In vivo	Some positive data exist, but the data are not sufficient for classification

Carcinogenicity

Name	Route	Species	Value
Acetone	Not Specified	Multiple animal species	Not carcinogenic
1,1-Difluoroethane	Inhalation	Rat	Some positive data exist, but the data are not sufficient for classification

Reproductive Toxicity

Reproductive and/or Developmental Effects

Name	Route	Value	Species	Test Result	Exposure Duration
Acetone	Ingestion	Some positive male reproductive data exist, but the data are not sufficient for classification	Rat	NOAEL 1,700 mg/kg/day	13 weeks
Acetone	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 5.2 mg/l	during organogenesis
1,1-Difluoroethane	Inhalation	Not toxic to development	Rat	NOAEL 50,000 ppm	during organogenesis
Cyclohexane	Inhalation	Not toxic to female reproduction	Rat	NOAEL 24	2 generation

				mg/l	
Cyclohexane	Inhalation	Not toxic to male reproduction	Rat	NOAEL 24 mg/l	2 generation
Cyclohexane	Inhalation	Some positive developmental data exist, but the data are not sufficient for classification	Rat	NOAEL 6.9 mg/l	2 generation

Target Organ(s)

Specific Target Organ Toxicity - single exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Acetone	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	
Acetone	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL Not available	
Acetone	Inhalation	immune system	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL 1.19 mg/l	6 hours
Acetone	Inhalation	liver	Some positive data exist, but the data are not sufficient for classification	Guinea pig	NOAEL Not available	
Acetone	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	poisoning and/or abuse
Propane	Inhalation	cardiac sensitization	Causes damage to organs	Human	NOAEL Not available	
Propane	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human	NOAEL Not available	
Propane	Inhalation	respiratory irritation	All data are negative	Human	NOAEL Not available	
1,1-Difluoroethane	Inhalation	cardiac sensitization	Causes damage to organs	Human and animal	NOAEL Not available	poisoning and/or abuse
1,1-Difluoroethane	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human and animal	NOAEL 100,000 ppm	
1,1-Difluoroethane	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification	Not available	NOAEL Not available	not available
Cyclohexane	Inhalation	central nervous system depression	May cause drowsiness or dizziness	Human and animal	NOAEL Not available	
Cyclohexane	Inhalation	respiratory irritation	Some positive data exist, but the data are not sufficient for classification	Human and animal	NOAEL Not available	
Cyclohexane	Ingestion	central nervous system depression	May cause drowsiness or dizziness	Professional judgement	NOAEL Not available	

Specific Target Organ Toxicity - repeated exposure

Name	Route	Target Organ(s)	Value	Species	Test Result	Exposure Duration
Acetone	Dermal	eyes	Some positive data exist, but the data are not sufficient for classification	Guinea pig	NOAEL Not available	3 weeks
Acetone	Inhalation	hematopoietic system	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL 3 mg/l	6 weeks
Acetone	Inhalation	immune system	Some positive data exist, but the data are not sufficient for classification	Human	NOAEL 1.19 mg/l	6 days
Acetone	Inhalation	kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Guinea pig	NOAEL 119 mg/l	not available

Acetone	Inhalation	heart | liver	All data are negative	Rat	NOAEL 45 mg/l	8 weeks
Acetone	Ingestion	kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 900 mg/kg/day	13 weeks
Acetone	Ingestion	heart	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 2,500 mg/kg/day	13 weeks
Acetone	Ingestion	hematopoietic system	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 200 mg/kg/day	13 weeks
Acetone	Ingestion	liver	Some positive data exist, but the data are not sufficient for classification	Mouse	NOAEL 3,896 mg/kg/day	14 days
Acetone	Ingestion	eyes	All data are negative	Rat	NOAEL 3,400 mg/kg/day	13 weeks
Acetone	Ingestion	respiratory system	All data are negative	Rat	NOAEL 2,500 mg/kg/day	13 weeks
Acetone	Ingestion	muscles	All data are negative	Rat	NOAEL 2,500 mg/kg	13 weeks
Acetone	Ingestion	skin | bone, teeth, nails, and/or hair	All data are negative	Mouse	NOAEL 11,298 mg/kg/day	13 weeks
1,1-Difluoroethane	Inhalation	hematopoietic system | kidney and/or bladder | respiratory system	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 25,000 ppm	2 years
Cyclohexane	Inhalation	liver	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 24 mg/l	90 days
Cyclohexane	Inhalation	auditory system	Some positive data exist, but the data are not sufficient for classification	Rat	NOAEL 1.7 mg/l	90 days
Cyclohexane	Inhalation	kidney and/or bladder	Some positive data exist, but the data are not sufficient for classification	Rabbit	NOAEL 2.7 mg/l	10 weeks
Cyclohexane	Inhalation	hematopoietic system	Some positive data exist, but the data are not sufficient for classification	Mouse	NOAEL 24 mg/l	14 weeks
Cyclohexane	Inhalation	peripheral nervous system	All data are negative	Rat	NOAEL 8.6 mg/l	30 weeks

Aspiration Hazard

Name	Value
Cyclohexane	Aspiration hazard

Please contact the address or phone number listed on the first page of the SDS for additional toxicological information on this material and/or its components.

SECTION 12: Ecological information

Ecotoxicological information

Please contact the address or phone number listed on the first page of the SDS for additional ecotoxicological information on this material and/or its components.

Chemical fate information

Please contact the address or phone number listed on the first page of the SDS for additional chemical fate information on this material and/or its components.

SECTION 13: Disposal considerations

13.1. Disposal methods
Dispose of contents/ container in accordance with the local/regional/national/international regulations.

Incinerate in a permitted waste incineration facility. Facility must be capable of handling aerosol cans. Combustion products will include halogen acid (HCl/HF/HBr). Facility must be capable of handling halogenated materials. As a disposal alternative, utilize an acceptable permitted waste disposal facility. Empty drums/barrels/containers used for transporting and handling hazardous chemicals (chemical substances/mixtures/preparations classified as Hazardous as per applicable regulations) shall be considered, stored, treated & disposed of as hazardous wastes unless otherwise defined by applicable waste regulations. Consult with the respective regulating authorities to determine the available treatment and disposal facilities.

EPA Hazardous Waste Number (RCRA): D001 (Ignitable)

SECTION 14: Transport Information

For Transport Information, please visit http://3M.com/Transportinfo or call 1-800-364-3577 or 651-737-6501.

SECTION 15: Regulatory information

15.1. US Federal Regulations
Contact 3M for more information.

311/312 Hazard Categories:

Fire Hazard - Yes Pressure Hazard - Yes Reactivity Hazard - No Immediate Hazard - Yes Delayed Hazard - No

EPCRA 311/312 Hazard Classifications (effective January 1, 2018):

Physical Hazards
Flammable (gases, aerosols, liquids, or solids)
Gas under pressure

Health Hazards
Serious eye damage or eye irritation
Specific target organ toxicity (single or repeated exposure)

Section 313 Toxic Chemicals subject to the reporting requirements of that section and 40 CFR part 372 (EPCRA):

Ingredient	C.A.S. No	% by Wt
Cyclohexane	110-82-7	Trade Secret 5 - 15

15.2. State Regulations
Contact 3M for more information.

15.3. Chemical Inventories
The components of this product are in compliance with the chemical notification requirements of TSCA.

Contact 3M for more information.

15.4. International Regulations

Contact 3M for more information.

This SDS has been prepared to meet the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200.

SECTION 16: Other information

NFPA Hazard Classification
Health: 2 **Flammability:** 4 **Instability:** 0 **Special Hazards:** None
Aerosol Storage Code: 3

National Fire Protection Association (NFPA) hazard ratings are designed for use by emergency response personnel to address the hazards that are presented by short-term, acute exposure to a material under conditions of fire, spill, or similar emergencies. Hazard ratings are primarily based on the inherent physical and toxic properties of the material but also include the toxic properties of combustion or decomposition products that are known to be generated in significant quantities.

Document Group:	29-3109-5	**Version Number:**	4.00
Issue Date:	04/25/17	**Supercedes Date:**	03/03/15

DISCLAIMER: The information in this Safety Data Sheet (SDS) is believed to be correct as of the date issued.3MMAKES NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR COURSE OF PERFORMANCE OR USAGE OF TRADE.User is responsible for determining whether the3Mproduct is fit for a particular purpose and suitable for user's method of use or application.Given the variety of factors that can affect the use and application of a3Mproduct, some of which are uniquely within the user's knowledge and control,it is essential that the user evaluate the3Mproduct to determine whether it is fit for a particular purpose and suitable for user's method of use or application.

3Mprovides information in electronic form as a service to its customers. Due to the remote possibility that electronic transfer may have resulted in errors, omissions or alterations in this information,3Mmakes no representations as to its completeness or accuracy. In addition, information obtained from a database may not be as current as the information in the SDS available directly from3M

3M USA SDSs are available at www.3M.com

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

1 Identification of the substance/mixture and of the company/undertaking

· **1.1 Product identifier**

· **Trade name:** ACRASTRIP 600 CRR

· **1.2 Relevant identified uses of the substance or mixture and uses advised against**
No further relevant information available.

· **Application of the substance / the preparation:** Cleaning agent/ Cleaner

· **1.3 Details of the supplier of the Safety Data Sheet**
· **Manufacturer/Supplier:**
U.S. Polychemical Corp
584 Chestnut Ridge Road
Chestnut Ridge, NY 10977
Phone: 845-356-5530
Toll Free: 800-431-2072

· **1.4 Emergency telephone number:**
CHEMTREC
1-800-424-9300 (US/Canada)
+01 703-527-3887 (International)

2 Hazards identification

· **2.1 Classification of the substance or mixture**
· **Classification according to Regulation (EC) No 1272/2008**
The product is not classified according to GHS regulations.
The product is not classified according to the CLP regulation.

· Classification according to Directive 67/548/EEC or Directive 1999/45/EC Not applicable.
· **Information concerning particular hazards for human and environment:**
The product does not have to be labelled due to the calculation procedure of the "General Classification guideline for preparations of the EU" in the latest valid version.
· **Classification system:**
The classification is according to the latest editions of the EU-lists, and extended by company and literature data.
The classification is in accordance with the latest editions of international substances lists, and is supplemented by information from technical literature and by information provided by the company.

· **2.2 Label elements**
· **Labelling according to Regulation (EC) No 1272/2008** N/A
· **Hazard pictograms** N/A
· **Signal word** N/A

· **Hazard-determining components of labelling:** None.
· **Hazard statements:** N/A
· **Hazard description:**
· **WHMIS-symbols:** Not hazardous under WHMIS.

(Contd. on page 2)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 1)

· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 0
Reactivity = 0

· **HMIS Long Term Health Hazard Substances**
None of the ingredients is listed.

· **2.3 Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **3.2 Mixtures**
· **Description:** Mixture of substances listed below with nonhazardous additions.

· **Dangerous components:** N/A
· **Additional information:** For the wording of the listed risk phrases refer to section 16.

4 First aid measures

· **4.1 Description of first aid measures**
· **General information:** No special measures required.
· **After inhalation:** Supply fresh air; consult doctor in case of complaints.
· **After skin contact:**
Immediately remove any clothing soiled by the product.
Rinse with warm water.
· **After eye contact:**
Remove contact lenses if worn.
Rinse opened eye for several minutes under running water. Then consult a doctor.
· **After swallowing:**
Rinse out mouth and then drink plenty of water.
Do not induce vomiting; call for medical help immediately.
· **4.2 Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **Hazards** No further relevant information available.

(Contd. on page 3)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 2)

· **4.3 Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Firefighting measures

· **5.1 Extinguishing media**
· **Suitable extinguishing agents:**
CO_2, powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** None.
· **5.2 Special hazards arising from the substance or mixture:** No further relevant information available.
· **5.3 Advice for firefighters**
· **Protective equipment:** No special measures required.
· **Additional information:** Cool endangered receptacles with water spray.

6 Accidental release measures

· **6.1 Personal precautions, protective equipment and emergency procedures** Not required.
· **6.2 Environmental precautions:**
Dilute with plenty of water.
Do not allow to enter sewers/ surface or ground water.
· **6.3 Methods and material for containment and cleaning up:**
Absorb with liquid-binding material (sand, diatomite, acid binders, universal binders, sawdust).
· **6.4 Reference to other sections**
No dangerous substances are released.
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

7 Handling and storage

· **7.1 Precautions for safe handling** No special measures required.
· **Information about fire - and explosion protection:** No special measures required.

· **7.2 Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:** No special requirements.
· **Information about storage in one common storage facility:** Store away from foodstuffs.
· **Further information about storage conditions:** Store in cool, dry conditions in well-sealed receptacles.
· **7.3 Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical facilities:** No further data; see item 7.

(Contd. on page 4)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 3)

· **8.1 Control parameters**
· **Ingredients with limit values that require monitoring at the workplace:**
The product does not contain any relevant quantities of materials with critical values that have to be monitored at the workplace.
· **DNELs** No further relevant information available.
· **PNECs** No further relevant information available.
· **Additional information:** The lists valid during the making were used as basis.

· **8.2 Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
The usual precautionary measures are to be adhered to when handling chemicals.
Wash hands before breaks and at the end of work.
Keep away from foodstuffs, beverages and feed.
Avoid contact with the eyes.
Avoid close or long term contact with the skin.
· **Respiratory protection:**
Not necessary if room is well-ventilated.
Use suitable respiratory protective device when aerosol or mist is formed.
· **Protection of hands:**


Protective gloves

The glove material has to be impermeable and resistant to the product/ the substance/ the preparation.
Selection of the glove material on consideration of the penetration times, rates of diffusion and the degradation
· **Material of gloves**
Neoprene gloves
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material cannot be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break through time has to be found out by the manufacturer of the protective gloves and has to be observed.
· **Eye protection:** Gauze goggles
· **Body protection:** Protective work clothing
· **Limitation and supervision of exposure into the environment** No special requirements.
· **Risk management measures** No special requirements.

(Contd. on page 5)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 4)

9 Physical and chemical properties

· 9.1 Information on basic physical and chemical properties	
· General Information	
· Appearance:	
Form:	Solution
Colour:	Clear
· Odour:	Mild
· Odour threshold:	Not determined.
· pH-value at 20 °C:	6,5-7,5
· Change in condition	
Melting point/Melting range:	Undetermined.
Boiling point/Boiling range:	100 °C (212 °F)
· Flash point:	Not applicable.
· Flammability (solid, gaseous):	Not applicable.
· Ignition temperature:	Not determined.
· Decomposition temperature:	Not determined.
· Self-igniting:	Product is not self-igniting.
· Danger of explosion:	Product does not present an explosion hazard.
· Explosion limits:	
Lower:	Not determined.
Upper:	Not determined.
· Vapour pressure at 20 °C:	23 hPa
· Density at 20 °C:	1.03 g/cm³
· Relative density	Not determined.
· Vapour density	Not determined.
· Evaporation rate	Not determined.
· Solubility in / Miscibility with water:	Soluble.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Solvent content:	
Organic solvents:	0.0 %
VOC (EC)	620 g/l
· 9.2 Other information	No further relevant information available.

(Contd. on page 6)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 5)

10 Stability and reactivity

· **10.1** Reactivity
· **10.2** Chemical stability
· **Thermal decomposition / conditions to be avoided:**
No decomposition if used and stored according to specifications.
· **10.3 Possibility of hazardous reactions** Reacts with strong oxidizing agents.
· **10.4 Conditions to avoid** No further relevant information available.
· **10.5 Incompatible materials:** No further relevant information available.
· **10.6 Hazardous decomposition products:** Carbon monoxide and carbon dioxide

11 Toxicological information

· **11.1 Information on toxicological effects**
· **Acute toxicity:**
· **Primary irritant effect:**
· **on the skin:** No irritant effect.
· **on the eye:** Slight irritant effect on eyes.
· **Sensitization:** No sensitizing effects known.
· **Additional toxicological information:**
The product is not subject to classification according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version.
When used and handled according to specifications, the product does not have any harmful effects to our experience and the information provided to us.

12 Ecological information

· **12.1** Toxicity
· **Aquatic toxicity:** No further relevant information available.
· **12.2 Persistence and degradability:** No further relevant information available.
· **12.3 Bioaccumulative potential:** No further relevant information available.
· **12.4 Mobility in soil:** No further relevant information available.
· **Additional ecological information:**
· **General notes:**
Water hazard class 1 (German Regulation) (Self-assessment): slightly hazardous for water
Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
· **12.5 Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **12.6 Other adverse effects** No further relevant information available.

(Contd. on page 7)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 6)

13 Disposal considerations

· **13.1 Waste treatment methods**
· **Recommendation:** Smaller quantities can be disposed of with household waste.

· **Uncleaned packaging:**
· **Recommendation:** Disposal must be made according to official regulations.
· **Recommended cleansing agents:** Water, if necessary together with cleansing agents.

14 Transport information

· **14.1 UN-Number** · **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.2 UN proper shipping name** · **DOT, ADR, ADN, IMDG, IATA**	N/A
· **14.3 Transport hazard class(es)**	
· **DOT, ADR, ADN, IMDG, IATA** · **Class**	N/A
· **14.4 Packing group** · **DOT, ADR, IMDG, IATA**	N/A
· **14.5 Environmental hazards:** · **Marine pollutant:**	No
· **14.6 Special precautions for user**	Not applicable.
· **14.7 Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code**	Not applicable.
· **UN "Model Regulation":**	-

15 Regulatory information

· **15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture**
· **United States (USA)**
· **SARA**

· **Section 355 (extremely hazardous substances):**
None of the ingredients is listed.
· **Section 313 (Specific toxic chemical listings):**
None of the ingredients is listed.
· **TSCA (Toxic Substances Control Act):**
All ingredients are listed.

(Contd. on page 8)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 7)

· **Proposition 65 (California):**

· **Chemicals known to cause cancer:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.
· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.
· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic Categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.
· **IARC (International Agency for Research on Cancer)**
None of the ingredients is listed.
· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.
· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.
· **OSHA-Ca (Occupational Safety & Health Administration)**
None of the ingredients is listed.

· **Canada**

· **Canadian Domestic Substances List (DSL)**
All ingredients are listed.
· **Canadian Ingredient Disclosure list (limit 0.1%)**
None of the ingredients is listed.
· **Canadian Ingredient Disclosure list (limit 1%)**
None of the ingredients is listed.

· **15.2 Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Abbreviations and Acronyms:**
ADR: Accord européen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
GHS: Globally Harmonized System of Classification and Labelling of Chemicals
ACGIH: American Conference of Governmental Industrial Hygienists
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)

(Contd. on page 9)

Safety Data Sheet
according to 1907/2006/EC (REACH),
1272/2008/EC (CLP), and GHS

Printing date: 11.04.2013 **Revision:** 11.04.2013

Trade Name: ACRASTRIP 600 CRR

(Contd. of page 8)

WHMIS: Workplace Hazardous Materials Information System (Canada)
DNEL: Derived No-Effect Level (REACH)
PNEC: Predicted No-Effect Concentration (REACH)

SAFETY DATA SHEET

Issue Date 15 May 2015 Revision date: 1 June 2016 Version 1.1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name: Bio-Penetrating Lubricant (BPL) (Food Grade) 11 oz. Aerosol

Other means of identification
Product code: 87002
Synonyms None

Recommended use of the chemical and restrictions on use
Recommended Use: Food Grade H1, Biobased Penetrating Lubricant, (Biodegradable), Compliant with EPA, VGP, EAL

NSF Registered H1, H2 and is acceptable as a lubricant with incidental food contact (H1) for use in and around food processing areas.

Details of the supplier of the safety data sheet
Supplier and Manufacture

Renewable Lubricants, Inc.
476 Griggy RD NE, P.O. Box 474
Hartville, Oh 44632
Phone: (330) 877-9982
Fax: (330) 877-2266
www.renewablelube.com, www.renewablelubricants.com

Emergency telephone number
Emergency Telephone **(CHEMTREC) 1-800-424-9300. Outside the U.S. (703) 527-3887**

SECTION 2 Hazards Identification

Classification
OSHA Regulatory Status
This meets 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Gases under pressure	Compressed Gas

Label elements

EMERGENCY OVERVIEW

Signal word
WARNING:
Hazard statements
Contains gas under pressure; may explode if heated

Appearance: Transparent white as sprayed **Physical state** Aerosol **Odor** No Odor

WARNING: Contains gas under pressure; may explode if heated
Storage and handling: Protect from sunlight. Store in a well-ventilated area.
Dispose of contents/container in accordance with local/regional regulations.
Hazards not otherwise classified (HNOC)

Other information

SECTION 3 –COMPOSITION/INFORMATION on INGREDIENTS

This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Components	CAS-No	Weight %	Trade Secret
Carbon Dioxide	124-38-9	1-10%	
Oil Mist	5 mg/m 3	5 mg/m 3	

SECTION 4 –FIRST AID MEASURES

Eye contact: Flush eye with water for 15 minutes. If symptoms persist, call a physician.

Skin contact: Wash off immediately with soap and plenty of water. Remove and wash contaminated clothing before re-use. If skin irritation persists, call a physician.

Inhalation: Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. If symptoms persist, call a physician.

Ingestion: Do not induce vomiting. Risk of product entering the lungs on vomiting after ingestion. If conscious, drink plenty of water. Obtain medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms No information available.

Indication of any immediate medical attention and special treatment needed

Notes to physician: Treat symptomatically.

SECTION 5 – FIRE-FIGHTING MEASURES

Suitable extinguishing media:
Use dry chemical, CO_2, water spray or "alcohol" foam.

Unsuitable extinguishing media Do not use a solid water stream as it may scatter and spread fire

Specific hazards arising from the chemical
In the event of fire, cool tanks with water spray.

Explosion data

Sensitivity to Mechanical Impact	None.
Sensitivity to Static Discharge	None.

Special protective equipment for firefighters:
In the event of fire, wear self-contained breathing apparatus.

SECTION 6 –ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions: Use personal protective equipment.

Environmental precautions
Environmental precautions: Prevent product from entering drains. Do not contaminate surface water.

Methods and material for containment and cleaning up

Methods for containment: Prevent further leakage or spillage if safe to do so.

Methods for cleaning up: Absorb spill with inert material (e.g. dry sand or earth), then place in a chemical waste

SECTION 7 –HANDLING AND STORAGE

Precautions for safe handling
Handling Keep away from heat, sparks, open flames, hot surfaces etc. No smoking. Do not spray on an open flame or other ignition source. Pressurized container: do not pierce or burn.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a cool, well-ventilated place

SECTION 8 –EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Components	ACGIH TLV	OSHA (TWA mg/m 3):	IDLH
Oil Mist	5 mg/m 3	5 mg/m 3	
Carbon Dioxide	9,000 (TWA) mg/m3 10h	9,000 mg/m3 8h	

Appropriate engineering controls

Engineering measures to reduce exposure: Use only in area provided with appropriate exhaust ventilation.

Individual protection measures, such as personal protective equipment

Respiratory protection: No personal respiratory protective equipment normally required. In case of insufficient ventilation wear suitable respiratory equipment.

Hand protection: Nitrile rubber Neoprene gloves

Eye protection: Safety glasses

Skin and body protection: Impervious clothing

General Hygiene Considerations Avoid contact with skin, eyes and clothing

SECTION 9– -PHYSICAL AND CHEMICAL PROPERTIES

Typical information on basic physical and chemical properties

Physical state	Aerosol
Appearance	Oil stream to mist as sprayed
Odor	Mild
Color	Transparent white
Odor threshold	No odor
Specific Gravity (H_2O = 1):	.88 @ 15.6°C
Flash Point (PMCC):	146°C (295°F)
Kinematic viscosity:	13 cSt @ 40°C
Pour Point:	-30°C (-22°F)
Explosive properties:	Material does not have explosive properties.
Oxidizing properties:	See Section 2, No significant hazards.
Volatile Organic Compound (VOC):	Components contain No VOC according to CARB
Melting: point/freezing point:	Not Determined
Boiling point /boiling range:	Not Determined
Flammability (solid, gas):	Not Determined
Flammability Limit in Air	Not Determined
Evaporation rate: (n-Butyl Acetate=1)	Approx. <1
Percent Volatile:	Not Determined
Boiling Point:	Not Determined
Vapor Density (Air = 1):	<1
Vapor pressure:	Not Determined
Solubility in Water:	Insoluble
Upper flammability limit:	Not Determined
Lower flammability limit:	Not Determined
Partition coefficient:	Not Determined
Autoignition temperature:	Not Determined
Decomposition temperature:	Not Determined

Other information

Softening point	No information available
Molecular weight	No information available
Bulk density	No information available

SECTION 10 -STABILITY AND REACTIVITY

Reactivity Not applicable

Chemical stability

Stability Stable under normal conditions

Possibility of Hazardous Reactions

Possibility of Hazardous Reactions	None under normal processing.
Hazardous polymerization	Hazardous polymerization does not occur.

Conditions to avoid

Conditions to avoid	Do not store at temperatures above 120°F

Hazardous Decomposition Products

Hazardous Decomposition Products	None under normal processing

Incompatible materials

Incompatible materials	Oxidizing agents

SECTION 11 – TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	Product does not present an acute toxicity hazard based on known or supplied information
Eye contact	Contact with eyes may cause irritation.
Skin contact	Substance does not generally irritate and is only mildly irritating to the skin.
Inhalation	Avoid breathing vapors or mists.
Ingestion	Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea. Potential for aspiration if swallowed. Aspiration may cause pulmonary edema and pneumonitis.

Components	Oral LD50-	Dermal LD50	Inhalation LC50

Information on toxicological effects

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization	No sensitization responses were observed.
Mutagenic effects:	Did not show mutagenic or teratogenic effects in animal experiments.
Carcinogenicity	This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.
Reproductive toxicity	This product does not contain any known or suspected reproductive hazards.
STOT - Single Exposure	None under normal use conditions.
STOT - Repeated Exposure	None under normal use conditions.
Aspiration hazard	May be fatal if swallowed and enters airways.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	16516 mg/kg
ATEmix (dermal)	6607 mg/kg

SECTION 12 –ECOLOGICAL INFORMATION

Ecotoxicity: No known hazards to the aquatic environment

Biodegradation: Based on previous biodegradability studies, the products provide Ultimate Biodegradation Pw1 >60% within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants.

Aquatic/Ecotoxicity: Based on previous studies, (OECD 201, 202, and 203) LC50/EC50 >3,000 ppm (3000 mg/L).

Bioaccumulation: No Potential to Bioconcentrate

Soil Mobility: Not Established

Persistence and degradability: Readily biodegradable >60% % after 28 days

Water Mobility: The product is insoluble and floats on water. **WGK:** 1

SECTION 13 –DISPOSAL INFORMATION

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Do not reuse container.

SECTION 14 –TRANSPORTATION INFORMATION

Aerosols (limited quantity),
Class 2.2, ERG 126, UN 1950

Air (IATA)
Aerosols (limited quantity),
Class 2.2, ERG 126, UN 1950

Vessel
Aerosol (limited quantity), Class 2.2, UN 1950

SECTION 15 –REGULATORY INFORMATION

International Inventories

TSCA: **Listed in TSCA**

TSCA - **United States Toxic Substances Control Act Section 8(b) Inventory**

Global Chemical Inventories:

USA All components of this material are on the US TSCA Inventory or are exempt.
EU All components are in compliance with the EC Seventh amendment Directive 92 /32/EEC.
Japan All components are in compliance with the Chemical Substances Control Law of Japan.
Australia All components are in compliance with chemical notification requirements in Australia.
Canada All components are in compliance with the Canadian Environmental Protection Act and are Canadian DSL/NDSL.
Switzerland All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.
China All components of this product are listed on the Inventory of Existing Chemical Substances in China
Korea All components are in compliance in Korea.
Philippines All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).
TSCA: All ingredients in this product are listed or exempt from listing on the TSCA Chemical inventory.
CEPA: All ingredients in this product are listed or exempt from listing on the Canadian DSL/NDSL.
Proposition 65: This product contains no chemicals know to the state of California to cause cancer, birth defects of other reproductive harm.

Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden release of pressure hazard	Yes
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and

Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

State Regulations (RTK):

California Proposition 65:
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations:

Components	NJRTK:	MARTK:	PARTK:

U.S. EPA Label Information
EPA Pesticide Registration Number Not applicable

SECTION 16 –OTHER INFORMATION

Read and follow all label directions and precautions before using the product.
Nfpa:
Health: 1
Flammability: 1
Instability 0
NFPA/HMIS * for Carc, Muta, Tera, Specific Organ *

HMIS health rating:
Health: 1
Flammability: 1
Physical hazards 0
Personal protection B

Revision:

Date	Revised Section
27 January 2015	new
1 June 2016	Section 9, Flash Point (PMCC)

The information presented herein has been compiled from sources considered to be dependable and is accurate to the best of Renewable Lubricants, Inc. knowledge; however, Renewable Lubricants, Inc. makes no warranty whatsoever, expressed or implied, of MERCHANTABILITY OF FITNESS FOR THE PARTICULAR PURPOSE, regarding the accuracy of such data or the results to be obtained from the use thereof. Renewable Lubricants Inc. assumes no responsibility for injury to recipient or to third persons or for any damage to any property and recipient assumes all such risks.

Safety Data Sheet

Issue date 20-Oct-2014 **Version** 1

1. Identification of the Substance/Preparation and of the Company/Undertaking

Product Identifier

Product name CHAMPION SPRAYON GREEN WORLD N GLASS CLEANER
Chemical name 7-8067

Other means of identification

Product code FG 438-5906-1
Synonyms Glass Cleaner

Recommended use of the chemical and restrictions on use

Recommended Use Cleans and shines windows, mirrors, doors, windshields, TV screens, computer monitors, and other glass, plastic and plexiglass surfaces.
Uses advised against DO NOT USE ON FLOORS

Details of the supplier of the safety data sheet

Supplier Address	**Manufacturer Address**
Chase Products Co.	Chase Products Co.
2727 Gardner Road	2727 Gardner Road
Broadview, IL 60155	Broadview, IL 60155
708-273-1121	708-273-1121

Emergency Telephone Number

Company Phone Number 708-865-1000
24 Hour Emergency Phone Number 1-800-255-3824
Emergency telephone ChemTel 1-800-255-3924

2. Hazards Identification

Classification

Gases Under Pressure	Compressed Gas

Label Elements

EMERGENCY OVERVIEW

WARNING

Contains gas under pressure; may explode if heated

Appearance clear liquid **Physical State** Aerosol **Odor** odorless

Precautionary Statements - Storage
Protect from sunlight. Store in a well-ventilated place

Hazards not otherwise classified (HNOC)
Other Information
-

3. Composition/information on Ingredients

Synonyms Glass Cleaner.
Chemical Family MIXTURES.
Formula 7-8067
Chemical nature Aqueous solution of surfactants and cleaners.

Chemical name	CAS No	weight-%	Trade secret
Water	7732-18-5	95-100	*
Nitrogen	7727-37-9	<1	*
Sodium Benzoate	532-32-1	<1	*

* The exact percentage (concentration) of composition has been withheld as a trade secret.

4. First aid measures

FIRST AID MEASURES

Eye Contact Flush from eyes with plenty of water promptly.

Skin contact Wash with soap and water.

inhalation If overcome by vapor, move person to fresh air.

INGESTION Ingestion from an aerosol product is unlikely to occur.

Most important symptoms and effects, both acute and delayed

Symptoms Acute, Deliberate inhalation of concentrated vapor or mist may cause headaches.
Prolonged and repeated contact with the eyes may cause mild irritation.

Indication of any immediate medical attention and special treatment needed

Note to physicians None needed.

5. Fire-fighting measures

Suitable extinguishing media
Dry chemical, CO2 or water spray.

Unsuitable extinguishing media Use water spray or fog; do not use straight streams.

Specific hazards arising from the chemical
Containers are under pressure. Temperatures above 120 F may cause cans to burst.

Hazardous combustion products Thermal decomposition may yield gases like nitrogen oxides, carbon monoxide and carbon dioxide.

Explosion data
Sensitivity to Mechanical Impact Contents under pressure, keep away from heat and open flame.
Sensitivity to Static Discharge Keep away from heat, sparks, flame, and other sources of ignition (i.e., pilot lights, electric motors and static electricity).

Protective equipment and precautions for firefighters
Use personal protective equipment as required.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions	CONTENTS UNDER PRESSURE. Do not puncture or incinerate cans.
Other Information	Keep out of reach of children.

Environmental Precautions

Environmental Precautions	See Section 12 for additional Ecological Information.

Methods and material for containment and cleaning up

Methods for Containment	Provide adequate ventilation to area being treated. Soak up spills with chemically inert, absorbent material.
Methods for cleaning up	Clean contaminated surface thoroughly.

7. Handling and Storage

Precautions for safe handling

Advice on safe handling	Avoid getting spray into eyes. Keep out of reach of children.

Conditions for safe storage, including any incompatibilities

Storage Conditions	Store in a cool, dry place away from heat and open flame. Avoid storing at below-freezing temperatures. **AEROSOL STORAGE LEVEL I (NFPA-30B) .**
Incompatible Materials	Temperatures above 120 F.

8. Exposure Controls/Personal Protection

Control parameters

Exposure guidelines	Not applicable.

Appropriate engineering controls

Engineering controls	Use with adequate general or local exhaust ventilation.

Individual protection measures, such as personal protective equipment

Eye/face Protection	Conventional eyeglasses to guard against splashing.
Skin and Body Protection	Household type gloves, if desired.
Respiratory protection	None required if used in a well-ventilated area .
General hygiene considerations	Wash hands with water as a precaution.

9. Physical and Chemical Properties

Information on basic physical and chemical properties

Physical State	Aerosol		
Appearance	clear liquid	**Odor**	odorless
Color	clear	**Odor threshold**	No information available

Property	Values	Remarks • Method
pH	10.42 +/- 0.6	No information available
Melting point/freezing point	NA	No information available
Boiling point/boiling range	212 °F/100 °C	No information available
Flash Point	Not Available. This is an aerosol product for which Flame Projection is 0 inches. Temperatures above 120 F may cause cans to burst.	No information available
Evaporation Rate	Faster than butyl acetate	No information available
Flammability (solid, gas)		No information available
Flammability Limits in Air		No information available
Upper flammability limits	Not available	
Lower Flammability Limit	Not available	
Vapor pressure	Not available	No information available
Vapor Density		No information available
Specific gravity	0.998 +/- 0.055 concentrate	No information available
Water solubility	completely soluble	No information available
Solubility in other solvents		No information available
Partition coefficient		No information available
Autoignition Temperature		No information available
Decomposition temperature		No information available
Kinematic viscosity		No information available
Dynamic viscosity		No information available
Explosive properties	No information available	
Oxidizing properties	No information available	

Other Information

Softening point	No information available
Molecular weight	No information available
VOC content (%)	None
Density	No information available
Bulk Density	8.31 - 8.77 lb/gal

10. Stability and Reactivity

Reactivity
Not applicable — no data available

Chemical stability
Stable.

Possibility of hazardous reactions
Temperatures above 120 F may cause cans to burst with force.

hazardous polymerization — Hazardous polymerization does not occur.

Conditions to Avoid
Temperatures above 120 F.

Incompatible Materials
Temperatures above 120 F.

Hazardous decomposition products
Thermal decomposition may yield gases like nitrogen oxides, carbon monoxide and carbon dioxide.

11. Toxicological Information

Information on likely routes of exposure

Product Information — This product has not been tested as whole. See below for information on ingredients.

inhalation no data available.

Eye Contact no data available.

Skin contact no data available.

INGESTION no data available.

Chemical name	Oral LD50	dermal LD50	Inhalation LC50
Water 7732-18-5	> 90 mL/kg (Rat)	-	-
Sodium Benzoate 532-32-1	= 2100 mg/kg (Rat)	-	-

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

sensitization No information available.
Germ Cell Mutagenicity No information available.
carcinogenicity Not known chronic effects based on available data. None of the ingredients present in excess of 0.1% are listed as carcinogenic by NTP, IARC or OSHA.

Reproductive Toxicity No information available.
STOT - single exposure No information available.
STOT - repeated exposure No information available.
Aspiration Hazard No information available.

Numerical measures of toxicity - Product Information

Unknown acute toxicity -
The following values are calculated based on chapter 3.1 of the GHS document .
ATEmix (inhalation-gas) 10000000
ATEmix (inhalation-vapor) 16447.4 mg/l

12. Ecological Information

ecotoxicity

1% of the mixture consists of components(s) of unknown hazards to the aquatic environment

Chemical name	Algae/aquatic plants	Fish	Toxicity to Microorganisms	Crustacea
Sodium Benzoate 532-32-1		420 - 558: 96 h Pimephales promelas mg/L LC50 flow-through 100: 96 h Pimephales promelas mg/L LC50 static		650: 48 h Daphnia magna mg/L EC50

Persistence and degradability
Made from biodegradable ingredients.

Bioaccumulation
No information available.

Chemical name	Partition coefficient
Sodium Benzoate 532-32-1	-2.13

Other adverse effects No information available

13. Disposal Considerations

Waste treatment methods

Disposal of wastes	Do not puncture or incinerate container. If empty: Place in trash or offer for recycling if available. If partly filled: Call your local solid waste agency for disposal instructions.
Contaminated packaging	Pressurized container: Do not pierce or burn, even after use.

14. Transport Information

DOT	Limited quantity (LQ)
Proper Shipping Name	Glass Cleaner
Hazard Class	2.2

15. Regulatory information

International Inventories

TSCA	All ingredients of this product are listed or are excluded from listing under the U.S. Toxic Subtances Control Act (TSCA) Chemical Substance Inventory.
DSL	All ingredients are listed or are excluded from listing on the DSL.

Legend:

***TSCA** - United States Toxic Substances Control Act Section 8(b) Inventory*
***DSL/NDSL** - Canadian Domestic Substances List/Non-Domestic Substances List*

US Federal Regulations

SARA 313

This product does not contain toxic chemicals (above the de minimis level) subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

SARA 311/312 Hazard Categories

Acute Health Hazard	yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Water 7732-18-5			X
Nitrogen 7727-37-9	X	X	X

U.S. EPA Label information
EPA Pesticide registration number Not applicable

16. Other information

NFPA	**Health Hazards** 1	**Flammability** 1	**Instability** 1	**Physical and chemical properties** Not applicable
HMIS	**Health Hazards** 1	**Flammability** 1	**Physical Hazards** 1	**Personal Protection** A - Eyes protection

Prepared by Regulatory Department
Issue date 20-Oct-2014
Revision note
This SDS supersedes a previous SDS dated April 17, 2014.

Disclaimer
The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

SAFETY DATA SHEET

Issuing Date No data available **Revision Date** 02-Sep-2014 **Revision Number** 2

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name **Orangerine Window Cleaner Rtu (9362)**

Other means of identification

Synonyms None

Recommended use of the chemical and restrictions on use

Recommended Use Glass Cleaner - Non-Aerosol

Uses advised against No information available

Details of the supplier of the safety data sheet

Supplier Name VENUS LABORATORIES
Supplier Address 111 S ROHLWING ROAD
ADDISO
N IL
60101
US
Supplier Phone Number Phone: 800-592-1900
Emergency telephone number **Chemtrec: 800-424-9300**

2. HAZARDS IDENTIFICATION

Classification

This chemical is not considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

GHS Label elements, including precautionary statements

Emergency Overview

The product contains no substances which at their given concentration, are considered to be hazardous to health

Appearance Clear **Physical State** Liquid **Odor** Citrus

Precautionary Statements - Prevention
Obtain special instructions before use

Precautionary Statements - Response
None

Precautionary Statements - Storage
None

Precautionary Statements - Disposal
None

Hazards not otherwise classified (HNOC)

Not applicable

Unknown Toxicity
0.3288% of the mixture consists of ingredient(s) of unknown toxicity

Other information

May cause slight eye irritation
PROLONGED OR REPEATED CONTACT MAY DRY SKIN AND CAUSE IRRITATION

Interactions with Other Chemicals
No information available.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Weight-%	Trade Secret
Ethyl alcohol	64-17-5	0.1 - 1	*

*The exact percentage (concentration) of composition has been withheld as a trade secret

4. FIRST AID MEASURES

First aid measures

Eye Contact Rinse thoroughly with plenty of water, also under the eyelids. If symptoms persist, call a physician.

Skin Contact Wash skin with soap and water. In the case of skin irritation or allergic reactions see a physician.

Inhalation Remove to fresh air. If symptoms persist, call a physician.

Ingestion Do NOT induce vomiting. Drink plenty of water. If symptoms persist, call a physician.

Most important symptoms and effects, both acute and delayed

Most Important Symptoms and Effects No information available.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable Extinguishing Media
CAUTION: Use of water spray when fighting fire may be inefficient.

Specific Hazards Arising from the Chemical
No information available.

Uniform Fire Code Sensitizer: Liquid

Hazardous Combustion Products
Carbon oxides.

Explosion Data
Sensitivity to Mechanical Impact No.

Sensitivity to Static Discharge No.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions Avoid contact with eyes.

Environmental Precautions

Environmental Precautions Refer to protective measures listed in Sections 7 and 8.

Methods and material for containment and cleaning up

Methods for Containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Dam up. Soak up with inert absorbent material. Pick up and transfer to properly labeled containers.

7. HANDLING AND STORAGE

Precautions for safe handling

Handling Handle in accordance with good industrial hygiene and safety practice. Avoid contact with eyes.

Conditions for safe storage, including any incompatibilities

Storage Keep container tightly closed.

Incompatible Products None known based on information supplied.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Ethyl alcohol 64-17-5	STEL: 1000 ppm	TWA: 1000 ppm TWA: 1900 mg/m³ (vacated) TWA: 1000 ppm (vacated) TWA: 1900 mg/m³	IDLH: 3300 ppm 10% LEL TWA: 1000 ppm TWA: 1900 mg/m³

ACGIH TLV: American Conference of Governmental Industrial Hygienists - Threshold Limit Value OSHA PEL: Occupational Safety and Health Administration - Permissible Exposure Limits NIOSH IDLH Immediately Dangerous to Life or Health

Other Exposure Guidelines Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992)

Appropriate engineering controls

Engineering Measures Showers
Eyewash stations
Ventilation systems

Individual protection measures, such as personal protective equipment

Eye/Face Protection If splashes are likely to occur, wear safety glasses with side-shields.

Skin and Body Protection No special protective equipment required.

Respiratory Protection No protective equipment is needed under normal use conditions. If exposure limits are exceeded or irritation is experienced, ventilation and evacuation may be required.

Hygiene Measures Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical and Chemical Properties

Physical State	Liquid		
Appearance	Clear	**Odor**	Citrus
Color	No information available	**Odor Threshold**	No information available

Propert	Values	Remarks/ Method
y pH	7	None known
Melting / freezing point	No data available	None known
Boiling point / boiling range	85°C	None known
Flash Point	94° C / 201° F	None known
Evaporation Rate	No data available	None known
Flammability (solid, gas)	No data available	None known
Flammability Limit in Air		
Upper flammability limit	No data available	
Lower flammability limit	No data available	
Vapor pressure	No data available	None known
Vapor density	No data available	None known
Specific Gravity	1.01-1.02	None known
Water Solubility	Soluble in water	None known
Solubility in other solvents	No data available	None known
Partition coefficient: n-octanol/water	No data available	None known
Autoignition temperature	No data available	None known
Decomposition temperature	No data available	None known
Kinematic viscosity	No data available	None known
Dynamic viscosity	No data available	None known
Explosive properties	No data available	
Oxidizing Properties	No data available	

Other Information

Softening Point	No data available
VOC Content (%)	No data available
Particle Size	No data available
Particle Size Distribution	

10. STABILITY AND REACTIVITY

Reactivity

No data available.

Chemical stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous Polymerization
Hazardous polymerization does not occur.

Conditions to avoid
None known based on information supplied.

Incompatible materials
None known based on information supplied.

Hazardous Decomposition Products
Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information Product does not present an acute toxicity hazard based on known or supplied information.

Inhalation Specific test data for the substance or mixture is not available.

Eye Contact Specific test data for the substance or mixture is not available.

Skin Contact Specific test data for the substance or mixture is not available.

Ingestion Specific test data for the substance or mixture is not available.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Ethyl alcohol 64-17-5	-	-	= 124.7 mg/L (Rat) 4 h

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.

Mutagenic Effects No information available.

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen. Ethanol has been shown to be carcinogenic in long-term studies only when consumed as alcoholic beverage.

Chemical Name	ACGIH	IARC	NTP	OSHA
Ethyl alcohol 64-17-5	A3	Group 1	Known	X

ACGIH (American Conference of Governmental Industrial Hygienists)
A3 - Animal Carcinogen
IARC (International Agency for Research on Cancer)
Group 1 - Carcinogenic to Humans
NTP (National Toxicology Program)
Known - Known Carcinogen
OSHA (Occupational Safety and Health Administration of the US Department of Labor)
X - Present

Reproductive Toxicity No information available.

STOT - single exposure No information available.

STOT - repeated exposure No information available.

Chronic Toxicity Contains a known or suspected carcinogen. Ethanol has been shown to be a reproductive toxin only when consumed as an alcoholic beverage. Ethanol has been shown to be carcinogenic in long-term studies only when consumed as alcoholic beverage.

Target Organ Effects None known.

Aspiration Hazard No information available.

Numerical measures of toxicity Product Information

The following values are calculated based on chapter 3.1 of the GHS document
Not applicable

12. ECOLOGICAL INFORMATION

Ecotoxicity
The environmental impact of this product has not been fully investigated.

Persistence and Degradability
No information available.

Bioaccumulation
No information available

Chemical Name	Log Pow
Ethyl alcohol 64-17-5	-0.32

Other adverse effects
No information available.

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated Packaging Dispose of contents/containers in accordance with local regulations.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

Chemical Name	California Hazardous Waste
Ethyl alcohol 64-17-5	Toxic Ignitable

14. TRANSPORT INFORMATION

DOT NOT REGULATED
Proper Shipping Name NON REGULATED
Hazard Class N/A

TDG Not regulated

MEX Not regulated

ICAO Not regulated

IATA Not regulated
Proper Shipping Name NON REGULATED

Hazard Class	N/A
IMDG/IMO	Not regulated
Hazard Class	N/A
RID	Not regulated
ADR	Not regulated
ADN	Not regulated

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL	All components are listed either on the DSL or NDSL.

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute Health Hazard	Yes
Chronic Health Hazard	No
Fire Hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations

California Proposition 65
This product contains the following Proposition 65 chemicals. Ethyl alcohol is only a considered a Proposition 65 developmental hazard when it is ingested as an alcoholic beverage.

Chemical Name	California Proposition 65
Ethyl alcohol - 64-17-5	Carcinogen Developmental

U.S. State Right-to-Know Regulations

.

Chemical Name	New Jersey	Massachusetts	Pennsylvania	Rhode Island	Illinois
Ethyl alcohol 64-17-5		X			

2-phenoxyethanol 122-99-6			X	X	X

International Regulations

Component	Carcinogen Status	Exposure Limits
Ethyl alcohol 64-17-5 (0.1 - 1)		Mexico: TWA 1000 ppm Mexico: TWA 1900 mg/m³

Canada
WHMIS Hazard Class
D2A - Very toxic materials
D2B - Toxic materials

16. OTHER INFORMATION

NFPA	**Health Hazards** 1	**Flammability** 0	**Instability** 0	**Physical and Chemical Hazards** -
HMIS	**Health Hazards** 1	**Flammability** 0	**Physical Hazard** 0	**Personal Protection** X

Revision Date 02-Sep-2014
Revision Note No information available

Disclaimer
The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text

End of Safety Data Sheet

MATERIAL SAFETY DATA SHEET

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard 29 CFR 1910.1200, the EU Directive, 91/155/EEC and other regulatory requirements.

1. Company and Product Identification

Product: EcoSMART Organic™ Insecticide Wasp & Hornet Killer (DR-F-039)

Manufacturer: EcoSMART Technologies, Inc.
3600 Mansell Road, Suite 150
Alpharetta, GA 30022

Emergency Telephone Number:
Info Trac Chemical Response System
(800) 535-5053 (24 hours)

For General Information:
(888) 326-SAFE (9am to 5pm EST)

2. Ingredients

Ingredient Name	% by weight	CAS #	Exposure Limits
Active Ingredients:			
Peppermint oil	1.0%	8006-90-4	None established
2-Phenethyl propionate	0.5%	122-70-3	None established
Inert Ingredients:			
Proprietary Solvent Blend	to 100%	Not Applicable	None established
Carbon dioxide (Propellant)	3.5%	-	TWA: 5000ppm

3. Hazards Identification

Potential Health Effects: .....May be harmful if swallowed or inhaled. May cause eye irritation. Avoid breathing spray mist. Avoid contact with skin, eyes or clothing.

Flammable: .....Contents under pressure. Do not use or store near heat or open flame. Do not puncture or incinerate container. Exposure to temperature above 130ºF may cause bursting.

4. First Aid Measures

CAUTION: Avoid contact with eyes.
IF IN EYES: Flush with plenty of water.
IF ON SKIN: Wash with soap and water. If irritation persists, contact physician.
IF INHALED: Move exposed person(s) to fresh air.
IF INGESTED: Rinse mouth out with water. Do not induce vomiting. Seek medical attention if necessary.

5. Fire Fighting Measures

Flashpoint:	148.9°C (300°F)
Flammable Limits:	Not tested
Extinguishing Media:	Use Foam, Carbon Dioxide, or Dry Chemical extinguishers.
Fire and Explosion Hazards:	Flammable liquid. Container contents are under pressure. Exposure to temperatures above 130°F could cause bursting.
Special Fire Fighting Procedures:	Keep containers cool to prevent bursting. Firefighters should have eye protection and wear self-contained breathing apparatus.
Hazardous Decomposition Products:	Carbon dioxide, carbon monoxide, smoke, fumes, and unburned hydrocarbons and terpenes.

6. Spill/Leak Procedures

If spilled, eliminate sources of ignition, absorb liquid with an inert absorbent material and dispose of the empty container and absorbent material in accordance with local ordinances. Components of this product are not considered EPA hazardous wastes.

7. Handling and Storage

Store in a cool, dry area away from heat, sparks or open flame. Do not smoke while using product.

Disposal: When container is empty, recycle if available. If recycling is not available, wrap and place the empty container in a trash collector. Keep out of the reach of children and animals.

8. Exposure Control/Personal Protection

Ventilation:	Local exhaust ventilation is not required.
Respiratory Protection:	Not required with adequate ventilation.
Eye Protection:	Not required. Safety glasses are recommended during volumetric treatments.
Gloves:	Not required.
Other Protective equipment:	Not required.

9. Physical Properties

Appearance:	Colorless liquid	**Specific Gravity (water =1):**	0.86 g/ml
Odor:	sweet citrus / minty scent		

10. Stability and Reactivity

Chemical Stability:	Stable	**Hazardous Polymerization:**	Will not occur

11. Toxicological Information

Rat Acute Oral: ..... Not Determined

Acute effects from Overexposure: ..... The individual components of this product are known to have low oral and dermal toxicity. This mixture is expected to have a similar toxicological profile. Prolonged contact with the skin may cause irritation, and contact with the eyes may cause eye irritation. Inhalation of the vapor may cause irritation of nasal passages and/or dizziness. Ingestion of this product could result in irritation of the gastrointestinal tract, headache or nausea.

Chronic Effects from Overexposure: ..... No data are available.

Carcinogenicity: ..... **NTP:** ..... No **OSHA:** ..... No

12. Environmental Information

While specific data regarding toxicity to fish or other aquatic organisms is not available for this product, care should always be taken to prevent insecticides from entering aquifers.

13. Disposal

The aerosol container is not refillable. When container is empty, recycle if available. If recycling is not possible, wrap the container and dispose of with ordinary trash.

14. Transportation Information

Proper Shipping Name: Consumer Commodity **DOT Hazard Class:** ORM-D

15. Regulatory Information

NFPA Ratings: Health - 1 Fire - 2 Reactivity - 0 Special - none

TSCA: All ingredients in this product are either listed or excluded from the TSCA Inventory.

SARA Title III: This product does not contain any ingredients subject to Section 313 (40 CFR 372) reporting requirements.

16. Other Information

NFPA 30B Aerosol Classification: Class 3

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 5/30/2015

1 Identification

· **Trade name: ELECTRON Aerosol**
· **Product description**
Environmentally Preferred Dielectric Solvent

Product Name	Part No.	Packaging	National Stock No.
ELECTRON (A)	365-1	12 x 16 oz net Aerosol	6850-01-371-8048

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Ecolink
2177 Flintstone Dr., Ste. A
Tucker, GA 30084
www.ecolink.com email: info@ecolink.com
800-886-8240 or 770-621-8240 (8-5 EST)
· **Emergency telephone number:** Infotrac: 1-800-535-5053, 1-352-326-2510

2 Hazard(s) identification

· **Classification of the substance or mixture**


GHS02 Flame

Flam. Aerosol 2 H223-229 Flammable aerosol. Pressurized container: May burst if heated.


GHS08 Health hazard

Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.


GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Skin Sens. 1 H317 May cause an allergic skin reaction.

· **Label elements**

· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).

(Contd. on page 2)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 5/30/2015

Trade name: ELECTRON Aerosol

(Contd. of page 1)

· **Hazard pictograms**

GHS02 GHS07 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
Naphtha (petroleum), hydrotreated heavy
Citrus Terpene

· **Hazard statements**

H223+H229	Flammable aerosol. Pressurized container: May burst if heated.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H304	May be fatal if swallowed and enters airways.

· **Precautionary statements**

Precautionary statements

P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P251	Pressurized container: Do not pierce or burn, even after use. Do not spray on an open flame or other ignition sources.
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P405	Store locked up.
P410+P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.
P501	Dispose of contents/container in accordance with local/national/international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 2
Reactivity = 1

· **HMIS-ratings (scale 0 - 4)**

Health = *1
Fire = 2
Reactivity = 1

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.

(Contd. on page 3)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 5/30/2015

Trade name: ELECTRON Aerosol

(Contd. of page 2)

· **Dangerous components:**

64742-48-9	Naphtha (petroleum), hydrotreated heavy Asp. Tox. 1, H304; H227	60-90%
68647-72-3	Citrus Terpene Flam. Liq. 3, H226; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; Skin Sens. 1, H317	25-50%
124-38-9	Carbon dioxide Press. Gas, H280	2-12%

4 First-aid measures

· **Description of first aid measures**
· **After inhalation:**
Supply fresh air and to be sure call for a doctor.
In case of unconsciousness, place patient securely in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:** Rinse opened eye for several minutes under running water.
· **After swallowing:** Give large amounts of water. If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:** CO_2, sand, extinguishing powder. Do not use water.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Wear protective equipment. Keep unprotected persons away.
· **Environmental precautions:**
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers, surface or ground water.
· **Methods and material for containment and cleaning up:**
Dispose contaminated material as waste according to section 13.
Ensure adequate ventilation.
Do not flush with water or aqueous cleansing agents
· **Reference to other sections**
See Section 7 for information on safe handling.

(Contd. on page 4)

(Contd. of page 3)

See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

*
7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation/exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:**
Do not spray on a naked flame or any incandescent material.
Keep ignition sources away - Do not smoke.
Protect from heat.
Protect against electrostatic charges.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C, i.e. electric lights. Do not pierce or burn, even after use.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Store in a cool location.
Observe official regulations on storing packagings with pressurized containers.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Do not gas tight seal receptacle.
Store in cool, dry conditions in well sealed receptacles.
Protect from heat and direct sunlight.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see section 7.

· **Control parameters**
· **Components with limit values that require monitoring at the workplace:**
124-38-9 Carbon dioxide
PEL Long-term value: 9,000 mg/m³, 5,000 ppm
REL Short-term value: 54,000 mg/m³, 30,000 ppm
Long-term value: 9,000 mg/m³, 5,000 ppm
TLV Short-term value: 54,000 mg/m³, 30,000 ppm
Long-term value: 9,000 mg/m³, 5,000 ppm
· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:**
Keep away from foodstuffs, beverages and feed.

(Contd. on page 5)

(Contd. of page 4)

Immediately remove all soiled and contaminated clothing.
Wash hands before breaks and at the end of work.
Avoid contact with the skin.
Avoid contact with the eyes and skin.

· **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure, use respiratory protective device that is independent of circulating air.

· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product. Due to missing tests no recommendation to the glove material can be given for the product.
Select glove material based on penetration times, rates of diffusion and degradation.

· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

· **Penetration time of glove material**
The exact break-through time has to be determined and observed by the manufacturer of the protective gloves.

· **Eye protection:** Tightly sealed goggles or safety glasses with side shields

9 Physical and chemical properties

· **Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	Liquid
Color:	Colorless
· **Odor:**	Mild citrus terpene
· **Odor threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	160 °C (320 °F)
· **Flash point:**	43 °C (109 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	240 °C (464 °F)
· **Decomposition temperature:**	Not determined.

(Contd. on page 6)

(Contd. of page 5)

· Auto igniting:	Product is not self-igniting.
· Danger of explosion:	Product is not explosive. However, formation of explosive air/ vapor mixtures are possible.
· Explosion limits:	
Lower:	0.6 Vol %
Upper:	7.0 Vol %
· Vapor pressure @ 20 °C (68 °F):	1 hPa (1 mm Hg)
· Density @ 20 °C (68 °F):	0.784 g/cm³ (6.542 lbs/gal)
· Relative density @ 20 °C (68 °F)	6.54 lbs/gal
· Vapor density	>1.0 (air = 1).
· Evaporation rate	Not applicable.
· Solubility in / Miscibility with	
Water:	Not miscible or difficult to mix.
· Partition coefficient (n-octanol/water):	Not determined.
· Viscosity:	
Dynamic:	Not determined.
Kinematic:	Not determined.
· Solvent content:	
Organic solvents:	95 %
· Other information	No further relevant information available.

10 Stability and reactivity

· Reactivity No further relevant information available.
· Chemical stability
· Thermal decomposition / conditions to be avoided:
No decomposition if used according to specifications.
· Possibility of hazardous reactions No dangerous reactions known.
· Conditions to avoid No further relevant information available.
· Incompatible materials: Strong oxidizing agents.
· Hazardous decomposition products: Oxides of carbon.

11 Toxicological information

· Information on toxicological effects
· Acute toxicity:
· LD/LC50 values that are relevant for classification:
64742-48-9 Naphtha (petroleum), hydrotreated heavy
Oral LD50 >5,000 mg/kg (rat)
Dermal LD50 >3,000 mg/kg (rabbit)

(Contd. on page 7)

(Contd. of page 6)

· **Primary irritant effect:**
· **on the skin:** Irritant to skin and mucous membranes.
· **on the eye:** No irritating effect.
· **Sensitization:** Sensitization possible through skin contact.
· **Additional toxicological information:**
The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant

· **Carcinogenic categories**

· **IARC (International Agency for Research on Cancer)**

None of the ingredients is listed.

· **NTP (National Toxicology Program)**

None of the ingredients is listed.

12 Ecological information

· **Toxicity**
· **Aquatic toxicity:** No further relevant information available.
· **Persistence and degradability** No further relevant information available.
· **Behavior in environmental systems:**
· **Bioaccumulative potential** No further relevant information available.
· **Mobility in soil** No further relevant information available.
· **Ecotoxical effects:**
· **Remark:** Very toxic for fish
· **Additional ecological information:**
· **General notes:**
Water hazard class 3 (Self-assessment): extremely hazardous for water
Do not allow product to reach ground water, water course or sewage system, even in small quantities.
Danger to drinking water if even extremely small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Very toxic for aquatic organisms
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.
· **Other adverse effects** No further relevant information available.

13 Disposal considerations

· **Waste treatment methods**
· **Recommendation:**
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

(Contd. on page 8)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS
Rev03.

Reviewed on 5/30/2015

Trade name: ELECTRON Aerosol

(Contd. of page 7)

· **Uncleaned packagings:**
· **Recommendation:** Disposal must be made according to official regulations.

*

14 Transport information

· **UN-Number**	
· **DOT, ADR, /MDG, /ATA**	UN1950
· **UN proper shipping name**	
· **DOT**	Aerosols, flammable
· **ADR**	UN1950 Aerosols, ENVIRONMENTALLY HAZARDOUS
· **/MDG**	AEROSOLS (Citrus Terpene), MARINE POLLUTANT
· **/ATA**	AEROSOLS, flammable
· **Transport hazard class(es)**	
· **DOT**	
	
· **Class**	2.1
· **Label**	2.1
· **ADR**	
	
· **Class**	2 5F Gases
· **Label**	2.1
· **/MDG**	
	
· **Class**	2.1
· **Label**	2.1
· **/ATA**	
	
· **Class**	2.1
· **Label**	2.1

(Contd. on page 9)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 5/30/2015

Trade name: ELECTRON Aerosol

(Contd. of page 8)

· Packing group · DOT, ADR, IMDG, IATA	Non-Regulated Material
· Environmental hazards: · Marine pollutant: · Special marking (ADR):	Product contains environmentally hazardous substances: Citrus Terpene Yes Symbol (fish and tree) Symbol (fish and tree)
· Special precautions tor user · Danger code (Kemler): · EMS Number:	Warning: Gases - F-D,S-U
· Transport in bulk according to Annex II ot MARPOL73/78 and the IBC Code	Not applicable.
· Transport/Additional intormation: · DOT · Remarks:	 ORM-D Limited QTY Item
· UN "Model Regulation":	UN1950, Aerosols, ENVIRONMENTALLY HAZARDOUS, 2.1

15 Regulatory intormation

· Safety, health and environmental regulations/legislation specific tor the substance or mixture
· Sara
· Section 355 (extremely hazardous substances):
None of the ingredients is listed.
· Section 313 (Specific toxic chemical listings):
None of the ingredients is listed.
· TSCA (Toxic Substances Control Act):
All ingredients are listed.
· Proposition 65
· Chemicals known to cause cancer:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity tor females:
None of the ingredients is listed.
· Chemicals known to cause reproductive toxicity tor males:
None of the ingredients is listed.
· Chemicals known to cause developmental toxicity:
None of the ingredients is listed.

(Contd. on page 10)

(Contd. of page 9)

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**

None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**

None of the ingredients is listed.

· **NIOSH-Ca (National Institute tor Occupational Satety and Health)**

None of the ingredients is listed.

· **OSHA-Ca (Occupational Satety & Health Administration)**

Corrosive to eyes

· **GHS label elements**

The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

GHS02 GHS07 GHS08

· **Signal word Danger**

· **Hazard-determining components ot labeling:**

Naphtha (petroleum), hydrotreated heavy
Citrus Terpene

· **Hazard statements**

H223+H229 Flammable aerosol. Pressurized container: May burst if heated.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H304 May be fatal if swallowed and enters airways.

· **Precautionary statements**

Precautionary statements
P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P251 Pressurized container: Do not pierce or burn, even after use.
Do not spray on an open flame or other ignition sources.
P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P405 Store locked up.
P410+P412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F.
P501 Dispose of contents/container in accordance with local/national/international regulations.

· **National regulations:**

The product is subject to be labeled according with the prevailing version of the regulations on hazardous substances.

· **State Right to Know**

64742-48-9 Naphtha (petroleum), hydrotreated heavy 60-90%
Asp. Tox. 1, H304; H227

(Contd. on page 11)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 5/30/2015

Trade name: ELECTRON Aerosol

(Contd. of page 10)

68647-72-3 Citrus Terpene 25-50%
Flam. Liq. 3, H226; Asp. Tox. 1, H304; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; Skin Sens. 1, H317

124-38-9 Carbon dioxide 2-12%
Press. Gas, H280

None of the ingredients is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Date of preparation / last revision** 5/30/2015

· **Abbreviations and acronyms:**
ADR: Accord europeen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

SDS Created by MSDS Authoring Services (www.MSDSAuthoring.com)

USA

HERNON®
MANUFACTURING, INC.

SAFETY DATA SHEET

Issue Date 25-Mar-2015 **Revision Date** 12-Jul-2017 **Version** 1

1. IDENTIFICATION

Product identifier

Product Name Dripstop 927

Other means of identification

Product Code MS-927
UN/ID no. None
Synonyms None

Recommended use of the chemical and restrictions on use

Recommended Use Anaerobic Sealant.
Uses advised against None known

Details of the supplier of the safety data sheet

Manufacturer Address
Hernon Manufacturing Inc.
121 Tech Drive
Sanford, FL 32771
800-527-0004

Emergency telephone number

Company Phone Number 407-322-4000
Emergency Telephone Chemtel 800-255-3924

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This chemical is considered hazardous by the 2012 OSHA Hazard Communication Standard (29 CFR 1910.1200)

Acute toxicity - Dermal	Category 4
Acute toxicity - Inhalation (Dusts/Mists)	Category 3
Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 2A
Skin sensitization	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Specific target organ toxicity (repeated exposure)	Category 2

Label elements

Emergency Overview

Danger

Hazard statements
Harmful in contact with skin
Toxic if inhaled
Causes skin irritation
Causes serious eye irritation
May cause an allergic skin reaction
Suspected of causing cancer

May cause respiratory irritation
May cause damage to organs through prolonged or repeated exposure

Appearance No information available **Physical state** Paste **Odor** Mild

Precautionary Statements - Prevention
Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Wear protective gloves/protective clothing/eye protection/face protection
Use only outdoors or in a well-ventilated area
Wash face, hands and any exposed skin thoroughly after handling
Contaminated work clothing must not be allowed out of the workplace
Do not breathe dust/fume/gas/mist/vapors/spray

Precautionary Statements - Response
IF exposed or concerned: Get medical advice/attention
Specific treatment (see supplemental first aid instructions on this label)
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention
IF ON SKIN: Wash with plenty of water and soap
Call a POISON CENTER or doctor if you feel unwell
Take off contaminated clothing and wash it before reuse
If skin irritation or rash occurs: Get medical advice/attention
IF INHALED: Remove person to fresh air and keep comfortable for breathing
Call a POISON CENTER or doctor

Precautionary Statements - Storage
Store locked up
Store in a well-ventilated place. Keep container tightly closed

Precautionary Statements - Disposal
Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)
Not applicable

Other Information
May be harmful if swallowed
Toxic to aquatic life with long lasting effects
Toxic to aquatic life

3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance

Chemical Name	CAS No.	Weight-%	Trade Secret
POLYETHYLENE GLYCOL DIMETHACRYLATE	25852-47-5	10 - 30	*
TITANIUM DIOXIDE	13463-67-7	1 - 5	*
Cumene Hydroperoxide	80-15-9	1 - 5	*
Epoxy Resin/Bisphenyl A epoxy resin	25068-38-6	0.1 - 1	*
METHANOL	67-56-1	0.1 - 1	*

*The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES

Description of first aid measures

Eye contact Rinse thoroughly with plenty of water for at least 15 minutes, lifting lower and upper eyelids. Consult a physician.

Skin contact Wash with soap and water. Flush skin with water for several minutes. Remove contaminated clothing and shoes. If irritation develops, seek medical attention. Wash clothing before reuse.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Ingestion Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Call a POISON CENTER or doctor/physician if you feel unwell.

Most important symptoms and effects, both acute and delayed

Symptoms None known.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Carbon dioxide (CO2). Foam. Dry chemical.

Unsuitable extinguishing media None.

Specific hazards arising from the chemical
No information available.

Hazardous combustion products Carbon oxides. Irritating organic vapors.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Use personal protective equipment as required. Ensure adequate ventilation, especially in confined areas.

For emergency responders Use personal protection recommended in Section 8.

Environmental precautions

Environmental precautions Do not allow into any sewer, on the ground or into any body of water. See Section 12 for

additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Soak up with inert absorbent material. Store in a closed container until ready for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Avoid contact with skin, eyes or clothing. Avoid breathing vapors or mists. Wash thoroughly after handling. Ensure adequate ventilation, especially in confined areas.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep at temperatures between 7 and 29 °C.

Incompatible materials Strong oxidizers.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
TITANIUM DIOXIDE 13463-67-7	TWA: 10 mg/m^3	TWA: 15 mg/m^3 total dust (vacated) TWA: 10 mg/m^3 total dust	IDLH: 5000 mg/m^3
METHANOL 67-56-1	STEL: 250 ppm TWA: 200 ppm S*	TWA: 200 ppm TWA: 260 mg/m^3 (vacated) TWA: 200 ppm (vacated) TWA: 260 mg/m^3 (vacated) STEL: 250 ppm (vacated) STEL: 325 mg/m^3 (vacated) S*	IDLH: 6000 ppm TWA: 200 ppm TWA: 260 mg/m^3 STEL: 250 ppm STEL: 325 mg/m^3

Appropriate engineering controls

Engineering Controls Showers
Eyewash stations
Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing. Use rubber or plastic gloves.

Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Paste		
Appearance	No information available	**Odor**	Mild
Color	White	**Odor threshold**	No information available

Property	**Values**	**Remarks • Method**
pH	Does not apply	
Melting point / freezing point	No information available	
Boiling point / boiling range	> 149 °C / 300 °F	
Flash point	> 93 °C / 200 °F	
Evaporation rate	No information available	
Flammability (solid, gas)	No information available	
Flammability Limit in Air		
Upper flammability limit:	No information available	
Lower flammability limit:	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Relative density	1.15	
Water solubility	Slightly soluble	
Solubility in other solvents	No information available	
Partition coefficient	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

Other Information

Softening point	No information available
Molecular weight	No information available
VOC Content (%)	No information available
Density	No information available
Bulk density	No information available

10. STABILITY AND REACTIVITY

Reactivity
No data available

Chemical stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Conditions to avoid
Incompatible materials.

Incompatible materials
Strong oxidizers.

Hazardous Decomposition Products
Carbon oxides. Irritating organic vapors.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information No data available

Inhalation No data available.

Eye contact No data available.

Skin contact No data available.

Ingestion No data available.

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
TITANIUM DIOXIDE 13463-67-7	> 10000 mg/kg (Rat)	-	-
Cumene Hydroperoxide 80-15-9	= 382 mg/kg (Rat)	= 0.126 mL/kg (Rabbit)	= 220 ppm (Rat) 4 h
Epoxy Resin/Bisphenyl A epoxy resin 25068-38-6	= 11400 mg/kg (Rat)	-	-
METHANOL 67-56-1	= 6200 mg/kg (Rat)	= 15800 mg/kg (Rabbit)	= 22500 ppm (Rat) 8 h = 64000 ppm (Rat) 4 h

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization No information available.
Germ cell mutagenicity No information available.

Carcinogenicity

Chemical Name	ACGIH	IARC	NTP	OSHA
TITANIUM DIOXIDE 13463-67-7	-	Group 2B	-	X

Reproductive toxicity No information available.
STOT - single exposure No information available.
STOT - repeated exposure No information available.
Aspiration hazard No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document.

ATEmix (oral) 2,328.00 mg/kg
ATEmix (dermal) 1,955.00 mg/kg
ATEmix (inhalation-dust/mist) 0.89 mg/l

12. ECOLOGICAL INFORMATION

Ecotoxicity

Toxic to aquatic life with long lasting effects

Chemical Name	Algae/aquatic plants	Fish	Crustacea
Insoluble Saccharin 81-07-2	-	18300: 96 h Pimephales promelas mg/L LC50	-

Cumene Hydroperoxide 80-15-9	-	3.9: 96 h Oncorhynchus mykiss mg/L LC50 static	7: 24 h Daphnia magna mg/L EC50
METHANOL 67-56-1	-	13500 - 17600: 96 h Lepomis macrochirus mg/L LC50 flow-through 18 - 20: 96 h Oncorhynchus mykiss mL/L LC50 static 19500 - 20700: 96 h Oncorhynchus mykiss mg/L LC50 flow-through 28200: 96 h Pimephales promelas mg/L LC50 flow-through 100: 96 h Pimephales promelas mg/L LC50 static	-

Persistence and degradability
No information available.

Bioaccumulation

Chemical Name	Partition coefficient
METHANOL 67-56-1	-0.77

Other adverse effects No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging Do not reuse container.

Chemical Name	RCRA	RCRA - Basis for Listing	RCRA - D Series Wastes	RCRA - U Series Wastes
Cumene Hydroperoxide 80-15-9	-	-	-	U096
METHANOL 67-56-1	-	Included in waste stream: F039	-	U154

Chemical Name	California Hazardous Waste Status
Cumene Hydroperoxide 80-15-9	Toxic Ignitable
METHANOL 67-56-1	Toxic Ignitable

14. TRANSPORT INFORMATION

DOT Not regulated
- **UN/ID no.** None
- **Proper shipping name** Not regulated
- **Hazard Class** None
- **Packing Group** None
- **Special Provisions** None

IATA Not regulated
- **UN/ID no.** None
- **Proper shipping name** Not regulated
- **Hazard Class** None
- **Packing Group** None
- **Special Provisions** None

IMDG	Not regulated
UN/ID no.	None
Proper shipping name	Not regulated
Hazard Class	None
Packing Group	None
Special Provisions	None

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL/NDSL	Complies
EINECS/ELINCS	Complies
ENCS	Complies
IECSC	Complies
KECL	Complies
PICCS	Complies
AICS	Complies

All ingredients are on the inventory or are exempt from listing.

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory
DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List
EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances
ENCS - Japan Existing and New Chemical Substances
IECSC - China Inventory of Existing Chemical Substances
KECL - Korean Existing and Evaluated Chemical Substances
PICCS - Philippines Inventory of Chemicals and Chemical Substances
AICS - Australian Inventory of Chemical Substances

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

Chemical Name	SARA 313 - Threshold Values %
Cumene Hydroperoxide - 80-15-9	1.0
METHANOL - 67-56-1	1.0

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	Yes
Fire hazard	Yes
Sudden release of pressure hazard	No
Reactive Hazard	Yes

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302)

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Cumene Hydroperoxide 80-15-9	10 lb	-	RQ 10 lb final RQ RQ 4.54 kg final RQ
METHANOL 67-56-1	5000 lb	-	RQ 5000 lb final RQ RQ 2270 kg final RQ

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
TITANIUM DIOXIDE - 13463-67-7	Carcinogen
METHANOL - 67-56-1	Developmental

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
TITANIUM DIOXIDE 13463-67-7	X	X	X
Cumene Hydroperoxide 80-15-9	X	X	X
METHANOL 67-56-1	X	X	X

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. OTHER INFORMATION, INCLUDING DATE OF PREPARATION OF THE LAST REVISION

NFPA	**Health hazards** -	**Flammability** -	**Instability** -	**Physical and Chemical Properties** -
HMIS	**Health hazards** 2*	**Flammability** 1	**Physical hazards** 1	**Personal protection** X

Prepared By SDS coordinator
Issue Date 25-Mar-2015
Revision Date 12-Jul-2017
Revision Note No information available

Disclaimer

The information provided in this Material Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

Safety Data Sheet

Issue Date: 01-Jan-2012 **Revision Date:** 15-Jan-2015 **Version** 2

1. IDENTIFICATION

Product Identifier

Product Name GlobalTech® Heavy Duty Degreaser/concentrate

Other means of identification

SDS # JNJ-0017

Product Code HDD-C

Recommended use of the chemical and restrictions on use

Recommended Use Cleaner for solder paste and flux.

Details of the supplier of the safety data sheet

Supplier Address
JNJ Industries
290 Beaver Street
Franklin, MA 02038

Emergency Telephone Number

Company Phone Number Phone: 800-554-9994 / 508-553-0529
Fax: 508-553-9973

Emergency Telephone (24 hr) INFOTRAC 1-352-323-3500 (International)
1-800-535-5053 (North America)

2. HAZARDS IDENTIFICATION

Appearance Dark amber liquid **Physical State** Liquid **Odor** Negligible

Classification

Serious eye damage/eye irritation	Category 2

Signal Word
Warning

Hazard Statements
Causes serious eye irritation

Precautionary Statements - Prevention
Wash face, hands and any exposed skin thoroughly after handling
Wear eye/face protection

Precautionary Statements - Response
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
If eye irritation persists: Get medical advice/attention

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%
DI Water	7732-18-5	>85
Oxygen and Phosphorous containing compound	Proprietary	Proprietary

If Chemical Name/CAS No is "proprietary" and/or Weight-% is listed as a range, the specific chemical identity and/or percentage of composition has been withheld as a trade secret.

4. FIRST-AID MEASURES

First Aid Measures

Eye Contact Flush eyes with water for 20 minutes. If eye irritation persists: Get medical advice/attention.

Skin Contact Take off contaminated clothing. Wash contaminated clothing before reuse. Wash skin thoroughly with mild soap and water. Get medical attention if irritation develops or persists.

Inhalation Remove to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Get medical attention.

Ingestion Do not induce vomiting. If drowsy or unconscious, do not give anything by mouth; place individual on the left side with head down. Dilute by giving a large amount of water.

Most important symptoms and effects

Symptoms Exposed individuals may experience eye tearing, redness and discomfort. May include redness, drying and cracking of skin. Prolonged or repeated exposure to mists/vapor may damage peripheral nerves. May cause irritation to the mucous membranes and upper respiratory tract. Overexposure by inhalation may cause CNS depression- drowsiness, dizziness, confusion or loss of coordination. Nausea.

Indication of any immediate medical attention and special treatment needed

Notes to Physician Epinephrine and other sympathomimetic drugs may potentiate arrhythmia in persons exposed to this substance. Such drugs should be used cautiously, if at all, and only with cardiac monitoring.

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media
Dry chemical. Carbon dioxide (CO2). Foam.

Unsuitable Extinguishing Media Not determined.

Specific Hazards Arising from the Chemical
Vapors can combust and liquids can burn when temperatures reach or exceed the flashpoint.

Protective equipment and precautions for firefighters
As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Use water spray to keep fire-exposed containers cool.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal Precautions Stay upwind. Remove all sources of ignition. Ventilate affected area.

Environmental Precautions Keep out of waterways.

Methods and material for containment and cleaning up

Methods for Containment Prevent further leakage or spillage if safe to do so.

Methods for Clean-Up Contain and collect with an inert absorbent and place into an appropriate container for disposal.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on Safe Handling Wash thoroughly after handling. Use personal protection recommended in Section 8. Keep away from heat/sparks/open flames/hot surfaces. — No smoking. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep containers tightly closed in a dry, cool and well-ventilated place.

Incompatible Materials Strong acids. Strong bases. Strong oxidizers. Amines.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Oxygen and Phosphorous containing compound	STEL: 3 mg/m^3 TWA: 1 mg/m^3	TWA: 1 mg/m^3 (vacated) TWA: 1 mg/m^3 (vacated) STEL: 3 mg/m^3	IDLH: 1000 mg/m^3 TWA: 1 mg/m^3 STEL: 3 mg/m^3

Appropriate engineering controls

Engineering Controls Apply technical measures to comply with the occupational exposure limits.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Avoid contact with eyes.

Skin and Body Protection Wear suitable gloves.

Respiratory Protection If airborne concentrations exceed exposure limits, use a respirator or gas mask with appropriate cartridges and canisters (NIOSH approved), or a mask with an air supply.

General Hygiene Considerations Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical State	Liquid		
Appearance	Dark amber liquid	**Odor**	Negligible
Color	Dark amber	**Odor Threshold**	Not determined

Property	**Values**	**Remarks • Method**
pH	~10	
Melting Point/Freezing Point	Not available	
Boiling Point/Boiling Range	> 93 °C / >200 °F	
Flash Point	> 149 °C / > 300 °F	
Evaporation Rate	< 0.1	(butyl acetate = 1)
Flammability (Solid, Gas)	n/a-liquid	
Upper Flammability Limits	Not determined	
Lower Flammability Limit	Not determined	
Vapor Pressure	18.0 mm Hg	
Vapor Density	Not determined	
Specific Gravity	1.06 (8.82 lbs/gal)	
Water Solubility	>90%	
Solubility in other solvents	Not determined	
Partition Coefficient	Not determined	
Auto-ignition Temperature	Not determined	
Decomposition Temperature	Not determined	
Kinematic Viscosity	Not determined	
Dynamic Viscosity	Not determined	
Explosive Properties	Not determined	
Oxidizing Properties	Not determined	
VOC Content	10.785 g/L	

10. STABILITY AND REACTIVITY

Reactivity
Not reactive under normal conditions.

Chemical Stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous Polymerization Hazardous polymerization does not occur.

Conditions to Avoid
Keep out of reach of children.

Incompatible Materials
Strong acids. Strong bases. Strong oxidizers. Amines.

Hazardous Decomposition Products
None known based on information supplied.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information

Eye Contact Causes serious eye irritation.

Skin Contact Avoid contact with skin.

Inhalation Avoid breathing vapors or mists.

Ingestion Do not taste or swallow.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
DI Water 7732-18-5	> 90 mL/kg (Rat)	-	-
Oxygen and Phosphorous containing compound	-	> 4640 mg/kg (Rabbit)	-
Trade Secret	= 620 mg/kg (Rat)	> 10 g/kg (Rat)	-
Oxygen and Phosphorous containing compound	= 1530 mg/kg (Rat)	= 2730 mg/kg (Rabbit)	> 850 mg/m^3 (Rat) 1 h

Information on physical, chemical and toxicological effects

Symptoms Please see section 4 of this SDS for symptoms.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Carcinogenicity Based on the information provided, this product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.

Numerical measures of toxicity
Not determined

12. ECOLOGICAL INFORMATION

Ecotoxicity
An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Chemical Name	Algae/aquatic plants	Fish	Toxicity to microorganisms	Crustacea
Oxygen and Phosphorous containing compound		100: 96 h Oncorhynchus mykiss mg/L LC50		100: 48 h water flea mg/L EC50

Persistence/Degradability
Not determined.

Bioaccumulation
Not determined.

Mobility
Not determined

Other Adverse Effects
Not determined

13. DISPOSAL CONSIDERATIONS

Waste Treatment Methods

Disposal of Wastes Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated Packaging Disposal should be in accordance with applicable regional, national and local laws and regulations.

California Hazardous Waste Status

Chemical Name	California Hazardous Waste Status
Oxygen and Phosphorous containing compound	Corrosive

14. TRANSPORT INFORMATION

Note Please see current shipping paper for most up to date shipping information, including exemptions and special circumstances.

DOT Not regulated

IATA Not regulated

IMDG Not regulated

15. REGULATORY INFORMATION

International Inventories

Chemical Name	TSCA	DSL	NDSL	EINECS	ELINCS	ENCS	IECSC	KECL	PICCS	AICS
DI Water	Present	X		Present			X	Present	X	X
Oxygen and Phosphorous containing compound	Present	X		Present		Present	X	Present	X	X

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances

IECSC - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

AICS - Australian Inventory of Chemical Substances

US Federal Regulations

Chemical Name	Hazardous Substances RQs	CERCLA/SARA RQ	Reportable Quantity (RQ)
Oxygen and Phosphorous containing compound	5000 lb		RQ 5000 lb final RQ RQ 2270 kg final RQ

SARA 313

Not determined

Chemical Name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Oxygen and Phosphorous containing compound	5000 lb			X

US State Regulations

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
DI Water 7732-18-5			X
Oxygen and Phosphorous containing compound	X	X	X

16. OTHER INFORMATION

NFPA	**Health Hazards**	**Flammability**	**Instability**	**Special Hazards**
	1	0	0	Not determined
HMIS	**Health Hazards**	**Flammability**	**Physical Hazards**	**Personal Protection**
	1	0	0	B

Issue Date: 01-Jan-2012
Revision Date: 15-Jan-2015
Revision Note: New format

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

SAFETY DATA SHEET

SC0208000

Section 1. Identification

Product name : LU™208 Cutting Oil Aerosol

Product code : SC0208000

Other means of identification : Not available.

Product type : Aerosol.

Relevant identified uses of the substance or mixture and uses advised against

Not applicable.

Manufacturer : Sprayon Products Group
101 W. Prospect Avenue,
Cleveland, Ohio 44115

Emergency telephone number of the company : US / Canada: (216) 566-2917
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Product Information Telephone Number : US / Canada: (800) 247-3266
Mexico: Not Available

Regulatory Information Telephone Number : US / Canada: (216) 566-2902
Mexico: Not Available

Transportation Emergency Telephone Number : US / Canada: (800) 424-9300
Mexico: SETIQ 01-800-00-214-00 / (52) 55-5559-1588 24 hours / 365 days a year

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE AEROSOLS - Category 1
GASES UNDER PRESSURE - Compressed gas
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2
ASPIRATION HAZARD - Category 1

Percentage of the mixture consisting of ingredient(s) of unknown oral toxicity: 10%
Percentage of the mixture consisting of ingredient(s) of unknown dermal toxicity: 10%
Percentage of the mixture consisting of ingredient(s) of unknown inhalation toxicity: 5.1%

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Extremely flammable aerosol.
Contains gas under pressure; may explode if heated.
May be fatal if swallowed and enters airways.
May cause damage to organs through prolonged or repeated exposure.

Precautionary statements

Prevention : Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Do not spray on an open flame or other ignition source. Do not breathe dust or mist. Pressurized container: Do not pierce or burn, even after use.

Section 2. Hazards identification

Response : Get medical attention if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.

Storage : Store locked up. Protect from sunlight. Do not expose to temperatures exceeding 50 °C/122 °F. Store in a well-ventilated place.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : DELAYED EFFECTS FROM LONG TERM OVEREXPOSURE. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. WARNING: This product contains a chemical known to the State of California to cause cancer. FOR INDUSTRIAL USE ONLY.

Please refer to the SDS for additional information. Keep out of reach of children. Keep upright in a cool, dry place. Do not discard empty can in trash compactor.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

Ingredient name	% by weight	CAS number
Heavy Naphthenic Petroleum Oil	≥25 - ≤50	64742-52-5
Heavy Paraffinic Oil	≥25 - ≤50	64742-65-0
Propane	≤10	74-98-6
Butane	≤5	106-97-8

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Occupational exposure limits, if available, are listed in Section 8.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention following exposure or if feeling unwell. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Continue to rinse for at least 10 minutes. Get medical attention following exposure or if feeling unwell. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
irritation
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

Specific hazards arising from the chemical : Extremely flammable aerosol. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Gas may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back, causing fire or explosion. Bursting aerosol containers may be propelled from a fire at high speed.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
carbonyl halides

Section 5. Fire-fighting measures

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. In the case of aerosols being ruptured, care should be taken due to the rapid escape of the pressurized contents and propellant. If a large number of containers are ruptured, treat as a bulk material spillage according to the instructions in the clean-up section. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Do not breathe vapor or mist. Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Empty containers retain product residue and can be hazardous.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Section 7. Handling and storage

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Protect from sunlight. Store locked up. Eliminate all ignition sources. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits (OSHA United States)

Ingredient name	Exposure limits
Heavy Naphthenic Petroleum Oil	**ACGIH TLV (United States, 3/2017).** TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL (United States, 6/2016).** TWA: 5 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist
Heavy Paraffinic Oil	**ACGIH TLV (United States, 3/2017).** TWA: 5 mg/m³ 8 hours. Form: Inhalable fraction **OSHA PEL (United States, 6/2016).** TWA: 5 mg/m³ 8 hours. **NIOSH REL (United States, 10/2016).** TWA: 5 mg/m³ 10 hours. Form: Mist STEL: 10 mg/m³ 15 minutes. Form: Mist
Propane	**NIOSH REL (United States, 10/2016).** TWA: 1000 ppm 10 hours. TWA: 1800 mg/m³ 10 hours. **OSHA PEL (United States, 6/2016).** TWA: 1000 ppm 8 hours. TWA: 1800 mg/m³ 8 hours. **ACGIH TLV (United States, 3/2017). Oxygen Depletion [Asphyxiant].**
Butane	**NIOSH REL (United States, 10/2016).** TWA: 800 ppm 10 hours. TWA: 1900 mg/m³ 10 hours. **ACGIH TLV (United States, 3/2017).** STEL: 1000 ppm 15 minutes.

Occupational exposure limits (Canada)

Ingredient name	Exposure limits
Propane	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 1000 ppm 8 hours. **CA British Columbia Provincial (Canada, 6/2017).** TWA: 1000 ppm 8 hours. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 1000 ppm 8 hours. TWAEV: 1800 mg/m³ 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 1000 ppm 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 1250 ppm 15 minutes. TWA: 1000 ppm 8 hours.
Butane	**CA Alberta Provincial (Canada, 4/2009).** 8 hrs OEL: 1000 ppm 8 hours.

Section 8. Exposure controls/personal protection

	CA British Columbia Provincial (Canada, 6/2017). TWA: 600 ppm 8 hours. STEL: 750 ppm 15 minutes. **CA Quebec Provincial (Canada, 1/2014).** TWAEV: 800 ppm 8 hours. TWAEV: 1900 mg/m³ 8 hours. **CA Ontario Provincial (Canada, 7/2015).** TWA: 800 ppm 8 hours. **CA Saskatchewan Provincial (Canada, 7/2013).** STEL: 1250 ppm 15 minutes. TWA: 1000 ppm 8 hours.

Occupational exposure limits (Mexico)

Ingredient name	Exposure limits
Propane	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 1000 ppm 8 hours.
Butane	**NOM-010-STPS-2014 (Mexico, 4/2016).** TWA: 1000 ppm 8 hours.

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8. Exposure controls/personal protection

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid.

Color : Not available.

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Melting point/freezing point : Not available.

Boiling point/boiling range : Not available.

Flash point : Closed cup: -29°C (-20.2°F) [Pensky-Martens Closed Cup]

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Lower: 1.9%
Upper: 9.5%

Vapor pressure : 101.3 kPa (760 mm Hg) [at 20°C]

Vapor density : 1.55 [Air = 1]

Relative density : 0.83

Solubility : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : Not available.

Viscosity : Kinematic (40°C (104°F)): <0.205 cm^2/s (<20.5 cSt)

Molecular weight : Not applicable.

Aerosol product

Type of aerosol : Spray

Heat of combustion : 30.574 kJ/g

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame).

Incompatible materials : No specific data.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Heavy Naphthenic Petroleum Oil	LD50 Oral	Rat	>5000 mg/kg	-
Heavy Paraffinic Oil	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Butane	LC50 Inhalation Vapor	Rat	658000 mg/m³	4 hours

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
Heavy Naphthenic Petroleum Oil	Skin - Severe irritant	Rabbit	-	500 milligrams	-

Sensitization

Not available.

Mutagenicity

Not available.

Carcinogenicity

Not available.

Reproductive toxicity

Not available.

Teratogenicity

Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Propane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects
Butane	Category 3	Not applicable.	Respiratory tract irritation and Narcotic effects

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Propane	Category 2	Not determined	Not determined
Butane	Category 2	Not determined	Not determined

Aspiration hazard

Name	Result
Propane	ASPIRATION HAZARD - Category 1
Butane	ASPIRATION HAZARD - Category 1

Information on the likely routes of exposure : Not available.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
irritation
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

General : May cause damage to organs through prolonged or repeated exposure.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT Classification	TDG Classification	Mexico Classification	IATA	IMDG
UN number	UN1950	UN1950	UN1950	UN1950	UN1950
UN proper shipping name	AEROSOLS	AEROSOLS	AEROSOLS	AEROSOLS, flammable	AEROSOLS
Transport hazard class(es)	2.1 	2.1 	2.1 	2.1 	2.1 
Packing group	-	-	-	-	-
Environmental hazards	No.	No.	No.	No.	No.
Additional information	- **ERG No.** 126	Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2. 13-2.17 (Class 2). **ERG No.** 126	- **ERG No.** 126	-	**Emergency schedules** F-D, S-U

Special precautions for user : Multi-modal shipping descriptions are provided for informational purposes and do not consider container sizes. The presence of a shipping description for a particular mode of transport (sea, air, etc.), does not indicate that the product is packaged suitably for that mode of transport. All packaging must be reviewed for suitability prior to shipment, and compliance with the applicable regulations is the sole responsibility of the person offering the product for transport. People loading and unloading dangerous goods must be trained on all of the risks deriving from the substances and on all actions in case of emergency situations.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

Proper shipping name : Not available.

Ship type : Not available.

Pollution category : Not available.

Section 15. Regulatory information

SARA 313

SARA 313 (40 CFR 372.45) supplier notification can be found on the Environmental Data Sheet.

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

Procedure used to derive the classification

Classification	Justification
FLAMMABLE AEROSOLS - Category 1	On basis of test data
GASES UNDER PRESSURE - Compressed gas	Calculation method
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2	Calculation method
ASPIRATION HAZARD - Category 1	Calculation method

History

Date of printing : 6/1/2018

Date of issue/Date of revision : 6/1/2018

Date of previous issue : 3/2/2018

Version : 8

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
UN = United Nations

Notice to reader

It is recommended that each customer or recipient of this Safety Data Sheet (SDS) study it carefully and consult resources, as necessary or appropriate, to become aware of and understand the data contained in this SDS and any hazards associated with the product. This information is provided in good faith and believed to be accurate as of the effective date herein. However, no warranty, express or implied, is given. The information presented here applies only to the product as shipped. The addition of any material can change the composition, hazards and risks of the product. Products shall not be repackaged, modified, or tinted except as specifically instructed by Sherwin-Williams, including but not limited to the incorporation of non Sherwin-Williams products or the use or addition of products in proportions not specified by Sherwin-Williams. Regulatory requirements are subject to change and may differ between various locations and jurisdictions. The customer/buyer/user is responsible to ensure that his activities comply with all country, federal, state, provincial or local laws. The conditions for use of the product are not under the control of the manufacturer; the customer/buyer/user is responsible to determine the conditions necessary for the safe use of this product. The customer/buyer/user should not use the product for any purpose other than the purpose shown in the applicable section of this SDS without first

Section 16. Other information

referring to the supplier and obtaining written handling instructions. Due to the proliferation of sources for information such as manufacturer-specific SDS, the manufacturer cannot be responsible for SDSs obtained from any other source.

SAFETY DATA SHEET

Biodegradable Penetrating Oil (Aerosol)

Section 1. Identification

GHS product identifier : Biodegradable Penetrating Oil (Aerosol)

Other means of identification : Not available.

Product type : Aerosol.

Relevant identified uses of the substance or mixture and uses advised against

Product use : Biodegradable lubricating oil.

Area of application : Industrial applications.

Supplier/Manufacturer : LUBRIPLATE® Lubricants Co.
129 Lockwood St.
Newark, NJ 07105
Telephone no.: 1-973-589-9150

e-mail address of person responsible for this SDS : SDS@lubriplate.com

Emergency telephone number (with hours of operation) : CHEM-TEL 1-800-255-3924 (24 hour)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : H280 GASES UNDER PRESSURE - Compressed gas
H304 ASPIRATION HAZARD - Category 1
Percentage of the mixture consisting of ingredient(s) of unknown toxicity: 94.3%

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H280 - Contains gas under pressure; may explode if heated.
H304 - May be fatal if swallowed and enters airways.

Precautionary statements

Prevention : Not applicable.

Response : P301 + P310 + P331 - IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting.

Storage : P405 - Store locked up.
P410 - Protect from sunlight.
P403 - Store in a well-ventilated place.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : Defatting to the skin.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Other means of identification : Not available.

CAS number/other identifiers

CAS number : Not applicable.

Product code : Not available.

Ingredient name	Other names	%	CAS number
Calcium alkaryl sulfonate	-	≥1 - <3	-
2-butoxyethanol	-	≥1 - <3	111-76-2
Carbon dioxide	-	≥1 - <3	124-38-9

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention if irritation occurs.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention if adverse health effects persist or are severe. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if symptoms occur. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Get medical attention immediately. Call a poison center or physician. Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Aspiration hazard if swallowed. Can enter lungs and cause damage. Do not induce vomiting. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : May be fatal if swallowed and enters airways.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
irritation
redness

Section 4. First aid measures

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : In a fire or if heated, a pressure increase will occur and the container may burst. Bursting aerosol containers may be propelled from a fire at high speed.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
sulfur oxides
metal oxide/oxides

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Remark : Pressurized container: may burst if heated.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. In the case of aerosols being ruptured, care should be taken due to the rapid escape of the pressurized contents and propellant. If a large number of containers are ruptured, treat as a bulk material spillage according to the instructions in the clean-up section. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Section 6. Accidental release measures

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50°C. Do not pierce or burn, even after use. Do not swallow. Avoid contact with eyes, skin and clothing. Avoid breathing gas. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Empty containers retain product residue and can be hazardous.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store away from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Protect from sunlight. Store locked up. Use appropriate containment to avoid environmental contamination.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
2-butoxyethanol	**OSHA PEL 1989 (United States, 3/1989).** **Absorbed through skin.** TWA: 25 ppm 8 hours. TWA: 120 mg/m³ 8 hours. **NIOSH REL (United States, 10/2013).** **Absorbed through skin.** TWA: 5 ppm 10 hours. TWA: 24 mg/m³ 10 hours. **ACGIH TLV (United States, 4/2014).** TWA: 20 ppm 8 hours. **OSHA PEL (United States, 2/2013).** **Absorbed through skin.** TWA: 50 ppm 8 hours. TWA: 240 mg/m³ 8 hours.

Section 8. Exposure controls/personal protection

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state : Liquid. [Transparent (Aerosol.)]

Color : Yellow.

Odor : Not available.

Odor threshold : Not available.

pH : Not available.

Melting point : Not available.

Boiling point : >288°C (>550.4°F)

Flash point : Open cup: 204°C (399.2°F) (without propellant)

Evaporation rate : >1 (butyl acetate = 1)

Flammability (solid, gas) : Not applicable.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : <0.0013 kPa (<0.01 mm Hg) [room temperature] (without propellant)

Section 9. Physical and chemical properties

Vapor density : >5 [Air = 1]

Relative density : 0.91 [Water = 1]

Solubility : Insoluble in the following materials: cold water and hot water.

Solubility in water : Not available.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : 227°C (440.6°F) (without propellant)

Decomposition temperature : Not available.

SADT : Not available.

Viscosity : Kinematic (40°C (104°F)): 0.16 cm^2/s (16 cSt) (without propellant)

Aerosol product

Type of aerosol : Sprays

Heat of combustion : 0.3452 kJ/g

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Under normal conditions of storage and use, hazardous polymerization will not occur.

Conditions to avoid : Keep away from heat, sparks and flame. Keep away from all sources of ignition.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials.
Chlorine

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
2-butoxyethanol	LC50 Inhalation Vapor LD50 Oral	Rat Rat	450 ppm 917 mg/kg	4 hours -

Irritation/Corrosion

Product/ingredient name	Result	Species	Score	Exposure	Observation
2-butoxyethanol	Eyes - Moderate irritant	Rabbit	-	24 hours 100 milligrams	-
	Eyes - Severe irritant	Rabbit	-	100 milligrams	-
	Skin - Mild irritant	Rabbit	-	500 milligrams	-

Sensitization

Not available.

Mutagenicity

Conclusion/Summary : Not available.

Section 11. Toxicological information

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
2-butoxyethanol	-	3	-

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Calcium alkaryl sulfonate	Category 3	Not applicable.	Respiratory tract irritation
2-butoxyethanol	Category 3	Not applicable.	Respiratory tract irritation

Specific target organ toxicity (repeated exposure)

Not available.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : May be fatal if swallowed and enters airways.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : Adverse symptoms may include the following:
irritation
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Skin contact : No specific data.

Ingestion : Adverse symptoms may include the following:
nausea or vomiting

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Section 11. Toxicological information

Potential chronic health effects

Not available.

General : No known significant effects or critical hazards.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Not available.

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
2-butoxyethanol	Acute EC50 >1000 mg/l Fresh water Acute LC50 800000 µg/l Marine water Acute LC50 1250000 µg/l Marine water	Daphnia - Daphnia magna Crustaceans - Crangon crangon Fish - Menidia beryllina	48 hours 48 hours 96 hours

Persistence and degradability

Product/ingredient name	Test	Result	Dose	Inoculum
2-butoxyethanol	301E Ready Biodegradability - Modified OECD Screening Test	95 % - 28 days	-	-

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
2-butoxyethanol	-	-	Readily

Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
2-butoxyethanol	0.81	<100	low

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Empty containers or liners may retain some product residues. Do not puncture or incinerate container.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	-	UN1950	ID8000
UN proper shipping name	Consumer commodity	AEROSOLS	Consumer commodity
Transport hazard class(es)	ORM-D	2.2 	9 
Packing group	-	-	-
Environmental hazards	No.	No.	No.
Additional information	**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 30 kg **Cargo aircraft** Quantity limitation: Forbidden. **Special provisions** 222 **Remarks** Packaging: Limited quantity	**Emergency schedules (EmS)** F-D, S-U **Special provisions** 63, 190, 277, 327, 344, 959	**Passenger and Cargo Aircraft** Quantity limitation: 30 kg Packaging instructions: Y963 **Cargo Aircraft Only**Quantity limitation: 30 kg Packaging instructions: Y963 **Limited Quantities - Passenger Aircraft**Quantity limitation: 30 kg Packaging instructions: Y963 **Special provisions** A112

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : Sudden release of pressure

Composition/information on ingredients

Name	%	Fire hazard	Sudden release of pressure	Reactive	Immediate (acute) health hazard	Delayed (chronic) health hazard
Calcium alkaryl sulfonate	≥1 - <3	No.	No.	No.	Yes.	No.
2-butoxyethanol	≥1 - <3	Yes.	No.	No.	Yes.	No.

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	2-butoxyethanol	111-76-2	≥1 - <3
Supplier notification	2-butoxyethanol	111-76-2	≥1 - <3

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: 2-BUTOXYETHANOL; CARBON DIOXIDE

New York : None of the components are listed.

New Jersey : The following components are listed: 2-BUTOXY ETHANOL; BUTYL CELLOSOLVE; CARBON DIOXIDE; CARBONIC ACID GAS

Pennsylvania : The following components are listed: ETHANOL, 2-BUTOXY-; CARBON DIOXIDE

California Prop. 65

None of the components are listed.

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol (Annexes A, B, C, E)

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Section 15. Regulatory information

Rotterdam Convention on Prior Inform Consent (PIC)

Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.)

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on SDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.)

Reprinted with permission from NFPA 704-2001, Identification of the Hazards of Materials for Emergency Response Copyright ©1997, National Fire Protection Association, Quincy, MA 02269. This reprinted material is not the complete and official position of the National Fire Protection Association, on the referenced subject which is represented only by the standard in its entirety.

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Procedure used to derive the classification

Classification	Justification
Press. Gas Comp. Gas, H280 Asp. Tox. 1, H304	Expert judgment Expert judgment

History

Date of issue/Date of revision : 07/03/2015

Date of previous issue : No previous validation

Version : 1

Prepared by : IHS

Key to abbreviations : ATE = Acute Toxicity Estimate
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL 73/78 = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)

Section 16. Other information

UN = United Nations

References : HCS (U.S.A.)- Hazard Communication Standard
International transport regulations

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

*

1 Identification

· **Product identifier**

· **Trade name: Positron Aerosol**
· **Product description**
Ultra High Purity Dielectric Solvent

Product Name	Part No.	Packaging	National Stock No.
Positron (A)	696-1	12 x 16 oz net Aerosol	6850-01-445-3545

· **Details of the supplier of the safety data sheet**
· **Manufacturer/Supplier:**
Ecolink
2177 Flintstone Dr, Ste. A, Tucker, GA 30085
www.ecolink.com email: info@ecolink.com
800-886-8240 or 770-621-8240 (8-5 EST)
· **Emergency telephone number:** Infotrac: 1-800-535-5053, 1-352-326-2510

*

2 Hazard(s) identification

· **Classification of the substance or mixture**

GHS02 Flame

Flam. Aerosol 2 H223 Flammable aerosol.

GHS08 Health hazard

Asp. Tox. 1 H304 May be fatal if swallowed and enters airways.

GHS07

Skin Irrit. 2 H315 Causes skin irritation.
Skin Sens. 1 H317 May cause an allergic skin reaction.
STOT SE 3 H335 May cause respiratory irritation.

Eye Irrit. 2B H320 Causes eye irritation.
Aquatic Chronic 3 H412 Harmful to aquatic life with long lasting effects.

· **Label elements**
· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).
· **Hazard pictograms**

GHS02 GHS07 GHS08

(Contd. on page 2)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 1)

· **Signal word** Danger

· **Hazard-determining components of labeling:**
Distillates (petroleum), hydrotreated light
(R)-p-mentha-1,8-diene
· **Hazard statements**
H223 Flammable aerosol.
H315 Causes skin irritation.
H320 Causes eye irritation.
H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.
H304 May be fatal if swallowed and enters airways.
H412 Harmful to aquatic life with long lasting effects.
· **Precautionary statements**

P251	Pressurized container: Do not pierce or burn, even after use.
P210	Keep away from heat1sparks1open flames1hot surfaces. - No smoking.
P211	Do not spray on an open flame or other ignition source.
P261	Avoid breathing dust1fume1gas1mist1vapors1spray.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves1protective clothing1eye protection1face protection. P301+P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor1physician.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321	Specific treatment (see on this label).
P362	Take off contaminated clothing and wash before reuse.
P304+P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor1physician if you feel unwell.
P405	Store locked up.
P410+P412	Protect from sunlight. Do not expose to temperatures exceeding 50 °C1122 °F.
P501	Dispose of contents1container in accordance with local1regional1national1 international regulations.

· **Classification system:**
· **NFPA ratings (scale 0 - 4)**

Health = 1
Fire = 2
Reactivity = 0

· **HMIS-ratings (scale 0 - 4)**

Health = 1
Fire = 2
Reactivity = 0

· **Other hazards**
· **Results of PBT and vPvB assessment**
· **PBT:** Not applicable.
· **vPvB:** Not applicable.

(Contd. on page 3)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS
Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 2)

3 Composition/information on ingredients

· **Chemical characterization: Mixtures**
· **Description:** Mixture of the substances listed below with nonhazardous additions.
· **Dangerous components:**

64742-47-8 Distillates (petroleum), hydrotreated light — 80-90%
Asp. Tox. 1, H304; Aquatic Chronic 2, H411; Skin Irrit. 2, H315; STOT SE 3, H336; H227

5989-27-5 (R)-p-mentha-1,8-diene — 2-12%
Flam. Liq. 3, H226; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; Skin Sens. 1, H317

124-38-9 Carbon dioxide — 2-12%
Press. Gas, H280

4 First-aid measures

· **Description of first aid measures**
· **After inhalation:**
Supply fresh air and to be sure call for a doctor.
In case of unconsciousness, place patient securely in side position for transportation.
· **After skin contact:** Immediately wash with water and soap and rinse thoroughly.
· **After eye contact:**
Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor.
· **After swallowing:** Give large amounts of water. If symptoms persist consult doctor.
· **Information for doctor:**
· **Most important symptoms and effects, both acute and delayed**
No further relevant information available.
· **Indication of any immediate medical attention and special treatment needed**
No further relevant information available.

5 Fire-fighting measures

· **Extinguishing media**
· **Suitable extinguishing agents:**
CO2, extinguishing powder or water spray. Fight larger fires with water spray or alcohol resistant foam.
· **For safety reasons unsuitable extinguishing agents:** Water with full jet
· **Special hazards arising from the substance or mixture** No further relevant information available.
· **Advice for firefighters**
· **Protective equipment:** No special measures required.

6 Accidental release measures

· **Personal precautions, protective equipment and emergency procedures**
Wear protective equipment. Keep unprotected persons away.

(Contd. on page 4)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 3)

· **Environmental precautions:**
Inform respective authorities in case of seepage into water course or sewage system.
Do not allow to enter sewers1 surface or ground water.
· **Methods and material for containment and cleaning up:** Ensure adequate ventilation.
· **Reference to other sections**
See Section 7 for information on safe handling.
See Section 8 for information on personal protection equipment.
See Section 13 for disposal information.

*
7 Handling and storage

· **Handling:**
· **Precautions for safe handling**
Ensure good ventilation1exhaustion at the workplace.
Open and handle receptacle with care.
· **Information about protection against explosions and fires:**
Do not spray on a naked flame or any incandescent material.
Keep ignition sources away - Do not smoke.
Protect from heat.
Protect against electrostatic charges.
Pressurized container: protect from sunlight and do not expose to temperatures exceeding 50 °C, i.e. electric lights. Do not pierce or burn, even after use.

· **Conditions for safe storage, including any incompatibilities**
· **Storage:**
· **Requirements to be met by storerooms and receptacles:**
Store in a cool location.
Observe official regulations on storing packagings with pressurized containers.
· **Information about storage in one common storage facility:** Not required.
· **Further information about storage conditions:**
Keep receptacle tightly sealed.
Do not gas tight seal receptacle.
Store in cool, dry conditions in well sealed receptacles.
Protect from heat and direct sunlight.
· **Specific end use(s)** No further relevant information available.

8 Exposure controls/personal protection

· **Additional information about design of technical systems:** No further data; see section 7.

· **Control parameters**

· **Components with limit values that require monitoring at the workplace:**

124-38-9 Carbon dioxide

PEL Long-term value: 9000 mg/m³, 5,000 ppm

REL Short-term value: 54.000 mg/m³, 30,000 ppm
Long-term value: 9000 mg/m³, 5,000 ppm

(Contd. on page 5)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 4)

TLV Short-term value: 54,000 mg/m³, 30,000 ppm
Long-term value: 9,000 mg/m³, 5,000 ppm

· **Additional information:** The lists that were valid during the creation were used as basis.

· **Exposure controls**
· **Personal protective equipment:**
· **General protective and hygienic measures:** Keep away from foodstuffs, beverages and feed. Immediately remove all soiled and contaminated clothing. Wash hands before breaks and at the end of work.
Avoid contact with the eyes and skin.
· **Breathing equipment:**
In case of brief exposure or low pollution use respiratory filter device. In case of intensive or longer exposure, use respiratory protective device that is independent of circulating air.
· **Protection of hands:**

Protective gloves

The glove material has to be impermeable and resistant to the product1 the substance1 the preparation.
Due to missing tests no recommendation to the glove material can be given for the product1 the preparation1 the chemical mixture.
Select glove material based on penetration times, rates of diffusion and degradation.
· **Material of gloves**
The selection of the suitable gloves does not only depend on the material, but also on further marks of quality and varies from manufacturer to manufacturer. As the product is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.
· **Penetration time of glove material**
The exact break-through time has to be determined and observed by the manufacturer of the protective gloves.
· **Eye protection:** Tightly sealed goggles or safety glasses with side shields

9 Physical and chemical properties

· **Information on basic physical and chemical properties**
· **General Information**
· **Appearance:**

Form:	Aerosol
Color:	Colorless
· **Odor:**	Citrus
· **Odour threshold:**	Not determined.
· **pH-value:**	Not determined.
· **Change in condition**	
Melting point/Melting range:	Not determined.
Boiling point/Boiling range:	176 - 212 °C (349-414 °F)

(Contd. on page 6)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 5)

· **Flash point:**	61 °C (142 °F)
· **Flammability (solid, gaseous):**	Not applicable.
· **Ignition temperature:**	231 °C (448 °F) (448°F)
· **Decomposition temperature:**	Not determined.
· **Auto igniting:**	Product is not selfigniting.
· **Danger of explosion:**	Not determined.
· **Explosion limits:**	
Lower:	0.7 Vol %
Upper:	7.0 Vol %
· **Vapor pressure @ 20 °C (68 °F):**	0.52 mm Hg
· **Density @ 20 °C (68 °F):**	0.807 g/cm³ (6.73 lbs/gal)
· **Relative density**	Not determined.
· **Vapor density**	Not determined.
· **Evaporation rate**	Not applicable.
· **Solubility in I Miscibility with**	
Water:	Not miscible or difficult to mix.
· **Partition coefficient (n-octanol/water):**	Not determined.
· **Viscosity:**	
Dynamic:	Not determined.
Kinematic:	Not determined.
· **Solvent content:**	
Organic solvents:	~95 %
VOC content:	807 g/l
· **Other information**	No further relevant information available.

10 Stability and reactivity

· **Reactivity** No further relevant information available.
· **Chemical stability** Product is stable under normal conditions.
· **Thermal decomposition I conditions to be avoided:**
No decomposition if used according to specifications.
· **Possibility of hazardous reactions** No dangerous reactions known.
· **Conditions to avoid** High temperatures.
· **Incompatible materials:**
Strong acids, strong bases, strong oxidizing agents and strong reducing agents.
· **Hazardous decomposition products:** No dangerous decomposition products known.

(Contd. on page 7)

(Contd. of page 6)

11 Toxicological information

· Information on toxicological effects
· Acute toxicity:
· LDILC50 values that are relevant for classification:
64742-47-8 Distillates (petroleum), hydrotreated light
Oral LD50 >5,000 mg/kg (rat) Dermal
LD50 >2,000 mg/kg (rabbit)
5989-27-5 (R)-p-mentha-1,8-diene
Oral LD50 4,400 mg/kg (rat)
· Primary irritant effect:
· on the skin: Irritant to skin and mucous membranes.
· on the eye: Irritating effect.
· Sensitization: Sensitization possible through skin contact.
· Additional toxicological information:
The product shows the following dangers according to internally approved calculation methods for preparations:
Irritant

· Carcinogenic categories
· IARC (International Agency for Research on Cancer)
5989-27-5 (R)-p-mentha-1,8-diene 3
· NTP (National Toxicology Program)
None of the ingredients is listed.

12 Ecological information

· Toxicity
· Aquatic toxicity: No further relevant information available.
· Persistence and degradability No further relevant information available.
· Behavior in environmental systems:
· Bioaccumulative potential No further relevant information available.
· Mobility in soil No further relevant information available.
· Ecotoxical effects:
· Remark: Toxic for fish
· Additional ecological information:
· General notes:
Water hazard class 2 (Self-assessment): hazardous for water
Do not allow product to reach ground water, water course or sewage system.
Danger to drinking water if even small quantities leak into the ground.
Also poisonous for fish and plankton in water bodies.
Toxic for aquatic organisms
· Results of PBT and vPvB assessment
· PBT: Not applicable.
· vPvB: Not applicable.

(Contd. on page 8)

Trade name: Positron Aerosol

(Contd. of page 7)

· Other adverse effects No further relevant information available.

13 Disposal considerations

· Waste treatment methods
· Recommendation:
Must not be disposed of together with household garbage. Do not allow product to reach sewage system.

· Uncleaned packagings:
· Recommendation: Disposal must be made according to official regulations.

14 Transport information

· UN-Number
· DOT, ADR, IMDG, IATA — UN1950

· UN proper shipping name
· DOT — Aerosols, flammable
· ADR — UN1950 Aerosols
· IMDG — AEROSOLS
· IATA — AEROSOLS, flammable

· Transport hazard class(es)

· DOT

Limited Quantity

· Class — 2.1
· Label — 2.1

· ADR

Limited Quantity

· Class — 2 5F Gases

(Contd. on page 9)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 8)

· Label	2.1

· IMDG, IATA

Limited Quantity

· Class	2.1
· Label	2.1
· Packing group	
· DOT, ADR, IMDG, IATA	Non-Regulated Material
· Environmental hazards:	
· Marine pollutant:	Yes
· Special precautions for user	Warning: Gases
· Danger code (Kemler):	-
· EMS Number:	F-D,S-U
· Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code	Not applicable.
· Transport/Additional information:	
· DOT	ORM-D consumer commodity
· UN "Model Regulation":	UN1950, Aerosols, 2.1

15 Regulatory information

· Safety, health and environmental regulations/legislation specific for the substance or mixture
· Sara
· Section 355 (extremely hazardous substances):
None of the ingredients is listed.
· Section 313 (Specific toxic chemical listings):
None of the ingredients is listed.
· TSCA (Toxic Substances Control Act):
All ingredients are listed.
· Proposition 65
· Chemicals known to cause cancer:
None of the ingredients is listed.

(Contd. on page 10)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 9)

· **Chemicals known to cause reproductive toxicity for females:**
None of the ingredients is listed.

· **Chemicals known to cause reproductive toxicity for males:**
None of the ingredients is listed.

· **Chemicals known to cause developmental toxicity:**
None of the ingredients is listed.

· **Carcinogenic categories**

· **EPA (Environmental Protection Agency)**
None of the ingredients is listed.

· **TLV (Threshold Limit Value established by ACGIH)**
None of the ingredients is listed.

· **NIOSH-Ca (National Institute for Occupational Safety and Health)**
None of the ingredients is listed.

· **OSHA-Ca (Occupational Safety & Health Administration)**
Corrosive to eyes

· **GHS label elements**
The product is classified and labeled according to the Globally Harmonized System (GHS).

· **Hazard pictograms**

GHS02 GHS07 GHS08

· **Signal word** Danger

· **Hazard-determining components of labeling:**
Distillates (petroleum), hydrotreated light
(R)-p-mentha-1,8-diene

· **Hazard statements**
H223 Flammable aerosol.
H315 Causes skin irritation.
H320 Causes eye irritation.
H317 May cause an allergic skin reaction.
H335 May cause respiratory irritation.
H304 May be fatal if swallowed and enters airways.
H412 Harmful to aquatic life with long lasting effects.

· **Precautionary statements**

P251	Pressurized container: Do not pierce or burn, even after use.
P210	Keep away from heat1sparks1open flames1hot surfaces. - No smoking.
P211	Do not spray on an open flame or other ignition source.
P261	Avoid breathing dust1fume1gas1mist1vapors1spray.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves1protective clothing1eye protection1face protection.
P301+P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor1physician.

(Contd. on page 11)

Safety Data Sheet (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS Rev03.

Reviewed on 11/11/2014

Trade name: Positron Aerosol

(Contd. of page 10)

P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P321 Specific treatment (see on this label).
P362 Take off contaminated clothing and wash before reuse.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER or doctor1physician if you feel unwell.
P405 Store locked up.
P410+P412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C1122 °F.
P501 Dispose of contents1container in accordance with local1regional1national1 international regulations.

· **National regulations:**

The product is subject to be labeled according with the prevailing version of the regulations on hazardous substances.

· **State Right to Know**

64742-47-8 Distillates (petroleum), hydrotreated light 80-90%
Asp. Tox. 1, H304; Aquatic Chronic 2, H411; Skin Irrit. 2, H315; STOT SE 3, H336; H227

5989-27-5 (R)-p-mentha-1,8-diene 2-12%
Flam. Liq. 3, H226; Aquatic Acute 1, H400; Aquatic Chronic 1, H410; Skin Irrit. 2, H315; Skin Sens. 1, H317

124-38-9 Carbon dioxide 2-12%
Press. Gas, H280

None of the ingredients is listed.

· **Chemical safety assessment:** A Chemical Safety Assessment has not been carried out.

16 Other information

This information is based on our present knowledge. However, this shall not constitute a guarantee for any specific product features and shall not establish a legally valid contractual relationship.

· **Date of preparation I last revision** 11/11/2014

· **Abbreviations and acronyms:**

ADR: Accord europeen sur le transport des marchandises dangereuses par Route (European Agreement concerning the International Carriage of Dangerous Goods by Road)
IMDG: International Maritime Code for Dangerous Goods
DOT: US Department of Transportation
IATA: International Air Transport Association
ACGIH: American Conference of Governmental Industrial Hygienists
EINECS: European Inventory of Existing Commercial Chemical Substances
ELINCS: European List of Notified Chemical Substances
CAS: Chemical Abstracts Service (division of the American Chemical Society)
NFPA: National Fire Protection Association (USA)
HMIS: Hazardous Materials Identification System (USA)
VOC: Volatile Organic Compounds (USA, EU)
LC50: Lethal concentration, 50 percent
LD50: Lethal dose, 50 percent

SDS / MSDS Created by MSDS Authoring Services (www.MSDSAuthoring.com)

USA

Safety Data Sheet

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Initial preparation date: 01.26.2017

Tap Magic Eco-Oil (Aerosol)

SECTION 1: Identification

Material name: Tap Magic Eco-Oil (Aerosol)
Product code: 60012CL
Additional information: After use of this product, clean and lubricate metal surfaces to avoid staining and/or corrosion.
Recommended use of the product and restriction on use:
Machining, Cutting, Tapping, and Metal Processing.

Manufacturer or supplier details

Manufacturer:
The Steco Corporation
2330 Cantrell Road
Little Rock, AR 72202
1-501-375-5644
steco@tapmagic.com

Emergency telephone number:
ChemTel Inc.
(800)255-3924
+1 (813)248-0585

SECTION 2: Hazard(s) identification

GHS classification:
Compressed gases.

Label elements

Hazard pictograms:

Signal word: Warning

Hazard statements:
H280 Contains gas under pressure; may explode if heated

Precautionary statements:
P410+P403 Protect from sunlight. Store in a well ventilated place.

Hazards not otherwise classified: None

SECTION 3: Composition/information on ingredients

Identification	Name	Wt. %
CAS number: 124-38-9	Carbon dioxide	<100

SECTION 4: First-aid measures

Description of first aid measures

After inhalation:

Loosen clothing as necessary and position individual in a comfortable position.
Maintain an unobstructed airway.
Get medical advice/attention if you feel unwell.

After skin contact:

Rinse affected area with soap and water.
If symptoms develop or persist, seek medical attention.

After eye contact:

Rinse/flush exposed eye(s) gently using water for 15-20 minutes.
If symptoms develop or persist, seek medical attention.

After swallowing:

Rinse mouth thoroughly.
Seek medical attention if irritation, discomfort, or vomiting persists.

Most important symptoms and effects, both acute and delayed

Acute symptoms:

No information available.

Delayed symptoms:

No information available.

Immediate medical attention and special treatment:

No information available.

SECTION 5: Fire-fighting measures

Extinguishing media

Suitable extinguishing media:

Use appropriate fire suppression agents for adjacent combustible materials or sources of ignition.

Unsuitable extinguishing media:

No information available.

Specific hazards during fire-fighting:

Thermal decomposition can lead to release of irritating gases and vapors.
Contents under pressure.
In a fire or if heated, a pressure increase will occur and the container may burst or explode.

Special protective equipment for firefighters:

Use typical firefighting equipment, self-contained breathing apparatus, special tightly sealed suit.

Additional information:

Shut off sources of ignition.
Carbon monoxide and carbon dioxide may form upon combustion.
Heating causes a rise in pressure, risk of bursting and combustion.

SECTION 6: Accidental release measures

Personal precautions, protective equipment and emergency procedures:

Wear protective eye wear, gloves and clothing.

Environmental precautions:

Should not be released into the environment.
Prevent from reaching drains, sewer or waterway.

Methods and material for containment and cleaning up:

Wear protective eye wear, gloves and clothing.
Absorb with non-combustible liquid-binding material (sand, diatomaceus earth (clay), acid binders, universal binders).
Dispose of contents / container in accordance with local regulations.

Reference to other sections:

None

SECTION 7: Handling and storage

Precautions for safe handling:

Use only with adequate ventilation.
Avoid breathing mist or vapor.
Do not eat, drink, smoke or use personal products when handling chemical substances.
Do not puncture, crush, or incinerate containers, even when empty.
Protect cylinders from physical damage.

Conditions for safe storage, including any incompatibilities:

Protect from freezing and physical damage.
Protect from direct sunlight.
Store in a cool, well-ventilated area.
Store cylinders upright.
Store away from all ignition sources (open flames, hot surfaces, direct sunlight, spark sources).

SECTION 8: Exposure controls/personal protection

Components with workplace control parameters:

Component name	Identifier	Permissible concentration
Carbon dioxide	124-38-9	ACGIH TWA 5,000 ppm
Carbon dioxide	124-38-9	ACGIH STEL 30,000ppm
Carbon dioxide	124-38-9	OSHA TWA 5,000 ppm 9,000 mg/m3
Carbon dioxide	124-38-9	NIOSH ST 30,000 ppm 54,000 mg/m3

Appropriate engineering controls:

Emergency eye wash fountains and safety showers should be available in the immediate vicinity of use or handling.
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapor and

mists below the applicable workplace exposure limits (Occupational Exposure Limits-OELs) indicated above.

Respiratory protection:

If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.

Eye protection:

Safety goggles or glasses, or appropriate eye protection.

Skin and body protection:

Select glove material impermeable and resistant to the substance.
Wear appropriate clothing to prevent any possibility of skin contact.

General hygienic measures:

Avoid contact with skin, eyes and clothing.
Wash hands before breaks and at the end of work.
Wash contaminated clothing before reuse.

SECTION 9: Physical and chemical properties

Appearance (physical state, color):	Amber colored pressurized liquid with propellant	**Explosion limit lower:** **Explosion limit upper:**	Not available Not available
Odor:	Mild	**Vapor pressure:**	Not available
Odor threshold:	Not available	**Vapor density:**	Not available
pH-value:	Not available	**Relative density:**	0.92 g/ml
Melting/Freezing point:	Not available	**Solubilities:**	Insoluble in water.
Boiling point/range:	Not available	**Partition coefficient (n-octanol/water):**	Not available
Flash point (closed cup):	>100 °C	**Auto/Self-ignition temperature:**	Not available
Evaporation rate:	Not available	**Decomposition temperature:**	Not available
Flammability (solid, gaseous):	Not available	**Dynamic viscosity:**	Not available
Density:	Not available	**Kinematic viscosity:**	34 cSt at 100 ºF

SECTION 10: Stability and reactivity

Reactivity:

Does not react under normal conditions of use and storage.

Chemical stability:

Stable under normal conditions of use and storage.

Possibility of hazardous reactions:

None under normal conditions of use and storage.

Conditions to avoid:

None known.

Incompatible materials:

None known.

Hazardous decomposition products:

None known.

SECTION 11: Toxicological information

Exposure routes:

No information available.

Acute toxicity:

No information available.

Skin corrosion/irritation:

No information available.

Serious eye damage/irritation:

No information available.

Respiratory or skin sensitization:

No information available.

Carcinogenicity:

IARC (International Agency for Research on Cancer):

None of the ingredients are listed.

NTP (National Toxicology Program):

None of the ingredients are listed.

Germ cell mutagenicity:

No information available.

Reproductive toxicity:

No information available.

STOT-single and repeated exposure:

No information available.

Aspiration toxicity:

No information available.

Additional toxicological information

No information available.

SECTION 12: Ecological information

Ecotoxicity:

No information available.

Persistence and degradability:

No information available.

Bioaccumulative potential:

No information available.

Mobility in soil:

No information available.

Other adverse effects:

No information available.

SECTION 13: Disposal considerations

Disposal methods:

It is the responsibility of the waste generator to properly characterize all waste materials according to applicable regulatory entities.

SECTION 14: Transportation information

Land transport:

DOT (49 CFR) transport

UN Number:	UN 1950
UN Proper shipping name:	Aerosol, non-flammable
UN Transport hazard classes:	2
Packing group:	N/A
Danger label:	2.2 Non-flammable non-toxic gases 
Environmental hazards:	No
Special precautions for user:	None

Air transport:

IATA-DGR

UN Number:	UN 1950

UN Proper shipping name:	Aerosol, non-flammable
UN Transport hazard classes:	2
Packing group:	N/A
Danger label:	2.2 Non-flammable non-toxic gases 
Environmental hazards:	No
Special precautions for user:	None

Sea transport:

IMDG

UN Number:	UN 1950
UN Proper shipping name:	Aerosol, non-flammable
UN Transport hazard classes:	2
Packing group:	N/A
Danger label:	2.2 Non-flammable non-toxic gases 
EMS code:	None
Environmental hazards:	No
Special precautions for user:	None
Transport in bulk according to Annex II of MARPOL73/78 and the IBC Code: Not applicable	

SECTION 15: Regulatory information

North American

SARA Section 311/312 (Specific toxic chemical listings):
Not classified.

SARA Section 302 (Extremely hazardous substances):
None of the ingredients are listed.

SARA Section 313 (Specific toxic chemical listings):
None of the ingredients are listed.

TSCA (Toxic Substances Control Act):
124-38-9 Carbon dioxide: listed.

TSCA Rules and Orders:
Not applicable.

Proposition 65 (California):
Chemicals known to cause cancer:
None of the ingredients are listed.
Chemicals known to cause reproductive toxicity for females:
None of the ingredients are listed.
Chemicals known to cause reproductive toxicity for males:
None of the ingredients are listed.
Chemicals known to cause developmental toxicity:
None of the ingredients are listed.

Canada

DSL (Canadian Domestic Substances List):
124-38-9 Carbon dioxide: listed.

SECTION 16: Other information

Abbreviations and Acronyms: None

This product has been classified in accordance with OSHA HCS 2012 guidelines. The information provided in this SDS is correct, to the best of our knowledge, based on information available. The information given is designed only as a guidance for safe handling, use, storage, transportation and disposal and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials, unless specified in the text. The responsibility to provide a safe workplace remains with the user.

NFPA: 1-1-0

HMIS: 1-1-0

Initial preparation date: 01.26.2017

SECTION 1. IDENTIFICATION

Product name : ZERO VOC BRAKE & PARTS CLEANER

Product code : 189099106

Manufacturer or supplier's details

Company name of supplier : Wurth USA Inc.

Address : 93 Grant St.
Ramsey, NJ 07446

Telephone : (201) 825-2710

Telefax : (201) 825-1643

Emergency telephone : +1 800 255 3924

E-mail address : prodsafe@wuerth.com

Recommended use of the chemical and restrictions on use

Recommended use : Cleaning agent
Detergent
Solvent

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Flammable aerosols : Category 1

Gases under pressure : Compressed gas

Eye irritation : Category 2A

Specific target organ systemic toxicity - single exposure : Category 3

Aspiration hazard : Category 1

Simple Asphyxiant

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : H222 Extremely flammable aerosol.
H280 Contains gas under pressure; may explode if heated.

H304 May be fatal if swallowed and enters airways.
H319 Causes serious eye irritation.
H336 May cause drowsiness or dizziness.
May displace oxygen and cause rapid suffocation.

Precautionary Statements :

Prevention:

P210 Keep away from heat/sparks/open flames/hot surfaces. No smoking.
P211 Do not spray on an open flame or other ignition source.
P251 Pressurized container: Do not pierce or burn, even after use.
P261 Avoid breathing spray.
P264 Wash skin thoroughly after handling.
P271 Use only outdoors or in a well-ventilated area.
P280 Wear eye protection/ face protection.

Response:

P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER/doctor.
P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P331 Do NOT induce vomiting.
P337 + P313 If eye irritation persists: Get medical advice/ attention.

Storage:

P405 Store locked up.
P410 + P412 Protect from sunlight. Do not expose to temperatures exceeding 50 °C/ 122 °F.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

Repeated exposure may cause skin dryness or cracking.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous ingredients

Chemical name	CAS-No.	Concentration (% w/w)
Acetone	67-64-1	>= 90 - < 100
Carbon dioxide	124-38-9	>= 5 - < 10

SECTION 4. FIRST AID MEASURES

General advice	:	In the case of accident or if you feel unwell, seek medical advice immediately. When symptoms persist or in all cases of doubt seek medical advice.
If inhaled	:	If inhaled, remove to fresh air. Get medical attention if symptoms occur.
In case of skin contact	:	In case of contact, immediately flush skin with plenty of water. Get medical attention if symptoms occur.
In case of eye contact	:	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. If easy to do, remove contact lens, if worn. Get medical attention.
If swallowed	:	If swallowed, DO NOT induce vomiting. If vomiting occurs have person lean forward. Call a physician or poison control center immediately. Rinse mouth thoroughly with water. Never give anything by mouth to an unconscious person.
Most important symptoms and effects, both acute and delayed	:	May be fatal if swallowed and enters airways. Causes serious eye irritation. May cause drowsiness or dizziness. Prolonged or repeated contact may dry skin and cause irritation.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection, and use the recommended personal protective equipment when the potential for exposure exists.
Notes to physician	:	Treat symptomatically and supportively.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water spray Alcohol-resistant foam Carbon dioxide (CO2) Dry chemical
Unsuitable extinguishing media	:	None known.
Specific hazards during fire fighting	:	Flash back possible over considerable distance. Vapors may form explosive mixtures with air. Exposure to combustion products may be a hazard to health. If the temperature rises there is danger of the vessels bursting due to the high vapor pressure.
Hazardous combustion products	:	Carbon oxides
Specific extinguishing meth-	:	Use extinguishing measures that are appropriate to local cir-

ods		cumstances and the surrounding environment. Use water spray to cool unopened containers. Remove undamaged containers from fire area if it is safe to do so. Evacuate area.
Special protective equipment for fire-fighters	:	In the event of fire, wear self-contained breathing apparatus. Use personal protective equipment.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Evacuate personnel to safe areas. Remove all sources of ignition. Ventilate the area. Use personal protective equipment. Follow safe handling advice and personal protective equipment recommendations.
Environmental precautions	:	Discharge into the environment must be avoided. Prevent further leakage or spillage if safe to do so. Prevent spreading over a wide area (e.g., by containment or oil barriers). Retain and dispose of contaminated wash water. Local authorities should be advised if significant spillages cannot be contained.
Methods and materials for containment and cleaning up	:	Non-sparking tools should be used. Soak up with inert absorbent material. Suppress (knock down) gases/vapors/mists with a water spray jet. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbent. Local or national regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which regulations are applicable. Sections 13 and 15 of this SDS provide information regarding certain local or national requirements.

SECTION 7. HANDLING AND STORAGE

Technical measures	:	See Engineering measures under EXPOSURE CONTROLS/PERSONAL PROTECTION section.
Local/Total ventilation	:	Use with local exhaust ventilation. Use only in an area equipped with explosion-proof exhaust ventilation if advised by assessment of the local exposure potential
Advice on safe handling	:	Do not spray on an open flame or other ignition source.

Do not get on skin or clothing.
Do not breathe vapors or spray mist.
Do not swallow.
Do not get in eyes.
Handle in accordance with good industrial hygiene and safety practice, based on the results of the workplace exposure assessment
Keep container tightly closed.
Keep away from heat and sources of ignition.
Take precautionary measures against static discharges.
Take care to prevent spills, waste and minimize release to the environment.

Conditions for safe storage : Store locked up.
Keep tightly closed.
Keep in a cool, well-ventilated place.
Store in accordance with the particular national regulations.
Do not pierce or burn, even after use.
Keep cool. Protect from sunlight.

Materials to avoid : Do not store with the following product types:
Self-reactive substances and mixtures
Organic peroxides
Oxidizing agents
Flammable solids
Pyrophoric liquids
Pyrophoric solids
Self-heating substances and mixtures
Substances and mixtures which in contact with water emit flammable gases
Explosives

Recommended storage temperature : < 35 °C

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Ingredients	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
Acetone	67-64-1	TWA	250 ppm	ACGIH
		STEL	500 ppm	ACGIH
		TWA	1,000 ppm 2,400 mg/m³	OSHA Z-1
		TWA	250 ppm 590 mg/m³	NIOSH REL
Carbon dioxide	124-38-9	TWA	5,000 ppm	ACGIH
		STEL	30,000 ppm	ACGIH
		TWA	5,000 ppm 9,000 mg/m³	OSHA Z-1
		TWA	5,000 ppm	NIOSH REL

			9,000 mg/m³	
		ST	30,000 ppm 54,000 mg/m³	NIOSH REL

Biological occupational exposure limits

Ingredients	CAS-No.	Control parameters	Biological specimen	Sampling time	Permissible concentration	Basis
Acetone	67-64-1	Acetone	Urine	End of shift (As soon as possible after exposure ceases)	25 mg/l	ACGIH BEI

Engineering measures : Minimize workplace exposure concentrations.
Use only in an area equipped with explosion-proof exhaust ventilation if advised by assessment of the local exposure potential
Use with local exhaust ventilation.

Personal protective equipment

Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

Hand protection
Material : butyl-rubber

Remarks : Choose gloves to protect hands against chemicals depending on the concentration specific to place of work. For special applications, we recommend clarifying the resistance to chemicals of the aforementioned protective gloves with the glove manufacturer. Wash hands before breaks and at the end of workday. Breakthrough time is not determined for the product. Change gloves often!

Eye protection : Wear the following personal protective equipment:
Safety goggles

Skin and body protection : Select appropriate protective clothing based on chemical resistance data and an assessment of the local exposure

potential.
Wear the following personal protective equipment:
Flame retardant antistatic protective clothing, unless assessment demonstrates that the risk of explosive atmospheres or flash fires is low
Skin contact must be avoided by using impervious protective clothing (gloves, aprons, boots, etc).

Hygiene measures : Ensure that eye flushing systems and safety showers are located close to the working place.
When using do not eat, drink or smoke.
Wash contaminated clothing before re-use.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Aerosol containing a compressed gas
Color	:	No data available
Odor	:	No data available
Odor Threshold	:	No data available
pH	:	No data available
Melting point/freezing point	:	No data available
Initial boiling point and boiling range	:	Not applicable
Flash point	:	-18 °C
Evaporation rate	:	Not applicable
Flammability (solid, gas)	:	Extremely flammable aerosol.
Upper explosion limit / Upper flammability limit	:	No data available
Lower explosion limit / Lower flammability limit	:	No data available
Vapor pressure	:	Not applicable
Relative vapor density	:	> 1
Relative density	:	No data available
Density	:	0.79 g/cm³ (20 °C)
Solubility(ies)		
Water solubility	:	soluble
Partition coefficient: n-	:	Not applicable

octanol/water

Autoignition temperature	:	No data available
Decomposition temperature	:	No data available
Viscosity Viscosity, kinematic	:	Not applicable
Explosive properties	:	Not explosive
Oxidizing properties	:	The substance or mixture is not classified as oxidizing.
Particle size	:	Not applicable

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	Not classified as a reactivity hazard.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	Extremely flammable aerosol. Vapors may form explosive mixture with air. If the temperature rises there is danger of the vessels bursting due to the high vapor pressure. Can react with strong oxidizing agents.
Conditions to avoid	:	Heat, flames and sparks.
Incompatible materials	:	Oxidizing agents
Hazardous decomposition products	:	No hazardous decomposition products are known.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Inhalation
Skin contact
Ingestion
Eye contact

Acute toxicity

Not classified based on available information.

Ingredients:

Acetone:

Acute oral toxicity	:	LD50 (Rat): > 5,000 mg/kg
Acute inhalation toxicity	:	LC50 (Rat): > 40 mg/l Exposure time: 4 h Test atmosphere: vapor

Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg

Skin corrosion/irritation

Not classified based on available information.

Ingredients:

Acetone:

Assessment: Repeated exposure may cause skin dryness or cracking.

Serious eye damage/eye irritation

Causes serious eye irritation.

Ingredients:

Acetone:

Species: Rabbit
Result: Irritation to eyes, reversing within 21 days
Method: OECD Test Guideline 405

Respiratory or skin sensitization

Skin sensitization

Not classified based on available information.

Respiratory sensitization

Not classified based on available information.

Ingredients:

Acetone:

Test Type: Maximization Test
Routes of exposure: Skin contact
Species: Guinea pig
Result: negative

Germ cell mutagenicity

Not classified based on available information.

Ingredients:

Acetone:

Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Method: OECD Test Guideline 476
Result: negative

Genotoxicity in vivo : Test Type: In vivo micronucleus test
Species: Hamster
Application Route: Intraperitoneal injection
Result: negative

Carcinogenicity

Not classified based on available information.

Ingredients:

Acetone:

Species: Mouse
Application Route: Skin contact
Exposure time: 1 Years
Result: negative

IARC	No ingredient of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
OSHA	No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.
NTP	No ingredient of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Not classified based on available information.

Ingredients:

Acetone:

Effects on fertility	:	Test Type: One-generation reproduction toxicity study Species: Rat Application Route: Ingestion Result: negative
Effects on fetal development	:	Test Type: Embryo-fetal development Species: Mouse Result: negative

STOT-single exposure

May cause drowsiness or dizziness.

Ingredients:

Acetone:

Assessment: May cause drowsiness or dizziness.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Ingredients:

Acetone:

Species: Rat
LOAEL: 1,700 mg/kg
Application Route: Ingestion
Exposure time: 90 Days

Aspiration toxicity

May be fatal if swallowed and enters airways.

Product:

The substance or mixture is known to cause human aspiration toxicity hazards or has to be regarded as if it causes a human aspiration toxicity hazard.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Ingredients:

Acetone:

Toxicity to fish	:	LC50 (Pimephales promelas (fathead minnow)): 6,210 - 8,120 mg/l Exposure time: 96 h Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia pulex (Water flea)): 8,800 mg/l Exposure time: 48 h
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 1,106 - 2,212 mg/l Exposure time: 28 d

Carbon dioxide:

Toxicity to fish	:	NOEC (Lepomis macrochirus (Bluegill sunfish)): > 100 mg/l Exposure time: 96 h Remarks: Based on data from similar materials
Toxicity to daphnia and other aquatic invertebrates	:	NOEC (Daphnia magna (Water flea)): > 100 mg/l Exposure time: 48 h Remarks: Based on data from similar materials

Persistence and degradability

Ingredients:

Acetone:

Biodegradability	:	Result: Readily biodegradable. Biodegradation: 91 % Exposure time: 28 d

Bioaccumulative potential

Ingredients:

Acetone:

Partition coefficient: n-	:	log Pow: -0.24

octanol/water

Carbon dioxide:

Partition coefficient: n-octanol/water : log Pow: 0.83

Mobility in soil

No data available

Other adverse effects

No data available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : Dispose of in accordance with local regulations.

Contaminated packaging : Empty containers should be taken to an approved waste handling site for recycling or disposal.
Empty containers retain residue and can be dangerous.
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, or other sources of ignition. They may explode and cause injury and/or death.
If not otherwise specified: Dispose of as unused product.
Please ensure aerosol cans are sprayed completely empty (including propellant)

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 1950
Proper shipping name	:	AEROSOLS
Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	2.1

IATA-DGR

UN/ID No.	:	UN 1950
Proper shipping name	:	Aerosols, flammable
Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	Flammable Gas
Packing instruction (cargo aircraft)	:	203
Packing instruction (passenger aircraft)	:	203

IMDG-Code

UN number	:	UN 1950
Proper shipping name	:	AEROSOLS

Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	2.1
EmS Code	:	F-D, S-U
Marine pollutant	:	no

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 1950
Proper shipping name	:	Aerosols
Class	:	2.1
Packing group	:	Not assigned by regulation
Labels	:	FLAMMABLE GAS
ERG Code	:	126
Marine pollutant	:	no

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know

CERCLA Reportable Quantity

Ingredients	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Acetone	67-64-1	5000	5399

SARA 304 Extremely Hazardous Substances Reportable Quantity

This material does not contain any components with a section 304 EHS RQ.

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

SARA 311/312 Hazards	:	Flammable (gases, aerosols, liquids, or solids) Gases under pressure Simple Asphyxiant Serious eye damage or eye irritation Aspiration hazard Specific target organ toxicity (single or repeated exposure)
SARA 313	:	This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

Volatile organic compounds (VOC) content 40 CFR Part 59 National VOC Emission Standard For Consumer Products, Subpart C: VOC content: 0 % / 0 g/l

US State Regulations

Pennsylvania Right To Know

Acetone	67-64-1
Carbon dioxide	124-38-9

California Prop. 65

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

California List of Hazardous Substances

Acetone	67-64-1
Carbon dioxide	124-38-9

California Permissible Exposure Limits for Chemical Contaminants

Acetone	67-64-1
Carbon dioxide	124-38-9

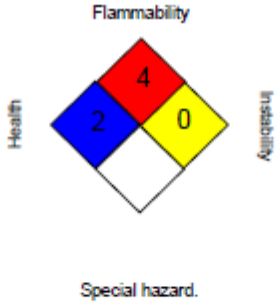
The ingredients of this product are reported in the following inventories:

TSCA : All chemical substances in this product are either listed on the TSCA Inventory or are in compliance with a TSCA Inventory exemption.

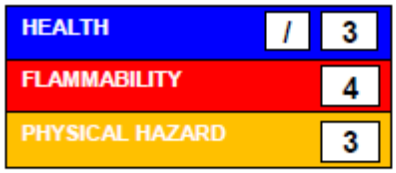
SECTION 16. OTHER INFORMATION

Further information

NFPA:



HMIS® IV:



HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard.

Full text of other abbreviations

ACGIH	:	USA. ACGIH Threshold Limit Values (TLV)
ACGIH BEI	:	ACGIH - Biological Exposure Indices (BEI)
NIOSH REL	:	USA. NIOSH Recommended Exposure Limits
OSHA Z-1	:	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
ACGIH / TWA	:	8-hour, time-weighted average
ACGIH / STEL	:	Short-term exposure limit
NIOSH REL / TWA	:	Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek
NIOSH REL / ST	:	STEL - 15-minute TWA exposure that should not be exceeded at any time during a workday
OSHA Z-1 / TWA	:	8-hour time weighted average

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG - United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Sources of key data used to compile the Material Safety Data Sheet	:	Internal technical data, data from raw material SDSs, OECD eChem Portal search results and European Chemicals Agency, http://echa.europa.eu/
Revision Date	:	12/08/2017

Items where changes have been made to the previous version are highlighted in the body of this document by two vertical lines.

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and shall not be considered a warranty or quality specification of any type. The information provided relates only to the specific material identified at the top of this SDS and may not be valid when the SDS material is used in combination with any other materials or in any process, unless specified in the text. Material users should review the information and recommendations in the specific context of their intended manner of handling, use, processing and storage, including an assessment of the appropriateness of the SDS material in the user's end product, if applicable.

US / Z8

Safety Data Sheet

1 - Identification

Trade Name: WD-40 Specialist Industrial-Strength Cleaner & Degreaser **Product Use: Degreaser** **Restrictions on Use: None identified** **SDS Date Of Preparation: 4/6/16**	**Manufacturer: WD-40 Company** **Address: 1061 Cudahy Place (92110)** **P.O. Box 80607** **San Diego, California, USA** **92138 –0607** **Telephone:** **Emergency only: 1-888-324-7596 (PROSAR)** **Information: 1-888-324-7596** **Chemical Spills: 1-800-424-9300 (Chemtrec)** **1-703-527-3887 (International Calls)**

2 – Hazards Identification

Hazcom 2012/GHS Classification:
Not hazardous

Note: This product is a consumer product and is labeled in accordance with the US Consumer Product Safety Commission regulations which take precedence over OSHA Hazard Communication labeling.

Label Elements:
Not Required

3 - Composition/Information on Ingredients

Ingredient	CAS #	Weight Percent	US Hazcom 2012/ GHS Classification
Water and Non-Hazardous Ingredients	Mixture	100%	Not Hazardous

Note: The exact percentages are a trade secret.

4 – First Aid Measures

Ingestion (Swallowed): Not toxic. Rinse out mouth and give sips of water. Do not induce vomiting. Call physician, poison control center or the WD-40 Safety Hotline at 1-888-324-7596.
Eye Contact: Flush thoroughly with water for 5 minutes then remove contact lenses if present. Continue flushing eyes for several minutes. Get medical attention if irritation persists.
Skin Contact: No first aid should be required. If irritation develops, rinse thoroughly with water. If irritation persists, get medical attention.
Inhalation (Breathing): Not toxic. If irritation develops, discontinue use and move to fresh air. Get medical attention if irritation persists.
Signs and Symptoms of Exposure: May cause mild eye irritation. May cause skin mild irritation and dryness on prolonged contact.
Indication of Immediate Medical Attention/Special Treatment Needed: Immediate medical attention is not required.

5 – Fire Fighting Measures

Suitable (and unsuitable) Extinguishing Media: This product is not flammable or combustible. Use any media that is appropriate for the surrounding fire.
Specific Hazards Arising from the Chemical: Thermal decomposition will release oxides of carbon and nitrogen.
Special Protective Equipment and Precautions for Fire-Fighters: No special precautions needed.

6 – Accidental Release Measures

Personal Precautions, Protective Equipment and Emergency Procedures: Wear suitable protective clothing if large amounts are involved.
Methods and Materials for Containment/Cleanup: Wipe or soak up contents in an inert material. Pick up spill for recovery or disposal and place in a closed container.

7 – Handling and Storage

Precautions for Safe Handling: This product is not toxic and is not expected to cause irritation when used as directed. Avoid eye contact. Avoid prolonged contact with skin. Avoid breathing mists. Use with adequate ventilation. Keep container closed when not in use. Keep out of the reach of children
Conditions for Safe Storage: Store in a cool, dry area, away from incompatible materials.

8 – Exposure Controls/Personal Protection

Chemical	Occupational Exposure Limits
Water and Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product
Appropriate Engineering Controls: Use in a well-ventilated area.
Engineering Controls: No special controls needed.
Personal Protection:
Eye Protection: Avoid eye contact. No special protection is required for normal use.
Skin Protection: No special protection is required for normal use. For sensitive skin or prolonged use, wear rubber gloves.
Respiratory Protection: None required.

For Bulk Processing or Workplace Use the Following Controls are Recommended
Engineering Controls: Use with adequate general ventilation or local exhaust to minimize exposure levels.
Personal Protection:
Eye Protection: Safety glasses or goggles recommended if splashing or exposure to spray mists is possible.
Skin Protection: Wear rubber gloves and protective clothing if needed to avoid prolonged skin contact.
Respiratory Protection: None normally required. If exposure levels are excessive and irritation is experienced, wear an approved respirator. Selection of respiratory protection depends on the contaminant type, form and concentration. Select in accordance with OSHA 1910.134 and good Industrial Hygiene practice.
Work/Hygiene Practices: Avoid contact with the eyes. Wash hands thoroughly after use.

9 – Physical and Chemical Properties

Appearance:	Clear, colorless liquid	Flammable Limits: (Solvent Portion)	None
Odor:	Pleasant	Vapor Pressure:	Same as water
Odor Threshold:	Not established	Vapor Density:	Same as water
pH:	~11.2	Relative Density:	~1.0
Melting/Freezing Point:	Not established	Solubilities:	100% in water
Boiling Point/Range:	Not determined	Partition Coefficient; n-octanol/water:	Not established
Flash Point:	None	Autoignition Temperature:	None
Evaporation Rate:	Not established	Decomposition Temperature:	None
Flammability (solid, gas):	Not applicable	Viscosity:	Not determined
VOC:	Not established	Pour Point:	Not applicable

10 – Stability and Reactivity

Reactivity: Not reactive under normal conditions
Chemical Stability: Stable
Possibility of Hazardous Reactions: None known.
Conditions to Avoid: None known.
Incompatible Materials: Strong oxidizing agents.
Hazardous Decomposition Products: Thermal decomposition may yield oxides of carbon and nitrogen.

11 – Toxicological Information

Symptoms of Overexposure:
Inhalation: No adverse effects expected from normal use. Breathing of high concentrations of spray mists may cause minor irritation to the eyes, mucous membranes of the throat and nose and upper respiratory tract.
Skin Contact: May cause mild irritation or dryness of skin on prolonged contact. No significant irritation is expected.
Eye Contact: May cause mild irritation.
Ingestion: Not orally toxic. May cause upset stomach, nausea and diarrhea if large amount is swallowed.
Carcinogen Status: None of the components are listed as a carcinogen or suspect carcinogen by IARC, NTP, ACGIH or OSHA.
Reproductive Toxicity: None of the components is considered a reproductive hazard.

Numerical Measures of Toxicity:
No animal testing was conducted on this product. The following data is based on assessment of the ingredients.
Product: Oral LD50 >5000 mg/kg; Dermal LD50 >2000 mg/kg – Classification: Non-Toxic
This product was found to be non-irritating to skin and only minimally irritating to the eyes in *in-vitro* studies.

12 – Ecological Information

Ecotoxicity: No specific aquatic toxicity data is currently available; however components of this product are not expected to be harmful to aquatic organisms
Persistence and Degradability: This product was readily biodegradable according to OECD 301B.
Bioaccumulative Potential: Bioaccumulation is not expected based on an assessment of the ingredients.
Mobility in Soil: No data available.
Other Adverse Effects: None known.

13 - Disposal Considerations

Dispose in accordance with local, state and federal regulations.

14 – Transportation Information

DOT Classification: Not Regulated
IMDG Shipping Description: Not Regulated
ICAO Shipping Description: Not Regulated

NOTE: WD-40 Company does not test containers to assure that they can withstand the pressure change without leakage when transported by air. We do not recommend that our products be transported by air unless a specific review is conducted.

15 – Regulatory Information

U.S. Federal Regulations:
CERCLA 103 Reportable Quantity: This product is not subject to CERCLA reporting requirements. Many states have more stringent reporting requirements. Report spills and other releases as required under federal, state and local regulations.

SARA TITLE III:
Hazard Category For Section 311/312: Not Hazardous

Section 313 Toxic Chemicals: This product contains the following chemicals subject to SARA Title III Section 313 Reporting requirements: None
Section 302 Extremely Hazardous Substances (TPQ): None
EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are listed on the TSCA inventory.
VOC Regulations: This product complies with the consumer product VOC limits of CARB, the US EPA and states adopting the OTC VOC rules.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65): This product does not contain chemicals regulated under California Proposition 65.
Canadian Environmental Protection Act: All of the ingredients are listed on the Canadian Domestic Substances List or exempt from notification.

16 – Other Information

HMIS Hazard Rating:
Health – 0 (minimal hazard), Fire Hazard – 0 (minimal hazard), Physical Hazard – 0 (minimal hazard)

Revision Date: April 6, 2016 Supersedes: New SDS

Revision Summary: New SDS

Prepared by: Industrial Health & Safety Consultants, Inc. Shelton, CT, USA

Reviewed By: I. Kowalski Regulatory Affairs Dept.

1031300/No.0125001