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April 2, 2015

**SENT BY MESSENGER**

Mr. Otis Omenazu  
Chief Air Engineer  
Chicago Department of Public Health  
333 S. State St., Room 200  
Chicago, IL 60604

Re: 12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP  
Request for Variations from Regulations  
Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles

Dear Mr. Omenazu:

Please accept this letter on behalf of Gulf Sulphur Services Ltd., LLLP (“GSS”) as its reply to the request in your letter dated January 26, 2015, and that of the two commenters – “Southeast Side Coalition to Ban Petcoke” and “Natural Resources Defense Council” – for additional information related to GSS’s requests for variances for its site located at 12200 S. Carondolet Ave., Chicago, Illinois (the “GSS Facility”). You will recall that Jennifer Hesse, in her letter dated February 23, 2015, granted GSS until April 2, 2015 to reply.

**Inquiry 1:**

First, in all eight of the requests set forth in the GSS Request Letter, you stated that sulphur prill generates very little fugitive dust. You mentioned the pelletized design of sulphur prill and you also listed some emissions numbers that indicate that the amount of PM 10 emissions from a 75,000 long ton stockpile of sulphur prill is 0.24 lb/hr. You also noted that you could provide more scientific or industry data in support of your claims.

Please provide additional details regarding fugitive dust emissions from sulphur prill stockpiles, including any scientific studies or reports and any site-specific technical evaluations. Please also be sure to include citations and supporting calculations for all of the sources of emissions data and other information upon which you rely. In addition, discuss the potential for sulphur prill to generate fugitive dust during all handling activities at your site, including the possibility of prills being crushed by heavy

machinery. Finally, explain why the proven emissions you cited will not create a public nuisance or adversely impact the surrounding area, surrounding environment, or surrounding property uses.

**GSS Response to Inquiry 1:**

In order to obtain the emission number set forth in its Request Letter, GSS retained TRC Companies, Inc. ("TRC"). TRC is a national engineering, consulting and construction management firm that provides integrated services to the energy, environmental and infrastructure markets. TRC's calculations are attached as Exhibit 1-A and demonstrate that at maximum capacity; i.e., a maximum pile height of 42 feet, the emission rate for the GSS Facility for PM10 is 0.24 lb/hr., a rate substantially lower than the emission rates of other regulated materials. As indicated in Exhibit 1-B, the identical amount of other substances results in emission rates *30 to 165 times* the rate of sulphur prill:

Coal	7.31 lb/hr
Petroleum coke	22.64 lb/hr
Metallurgical coke	39.66 lb/hr

GSS further engaged TRC to conduct an air quality impact assessment for the GSS Facility. TRC's results are set forth in its technical memorandum, attached as Exhibit 1-C and dated March 20, 2015. TRC's air quality model assumes the maximum storage capacity of the GSS Facility and uses the 0.24 lb/hr emission rate resulting from maximum capacity. Further, the model makes predictions of the impact of dust emissions beginning at a distance of 2 meters from the sulphur prill storage pile and extending to 500 meters from the pile under 30 different meteorological conditions (wind speeds and atmospheric stability) and 36 different wind directions. See Exhibit 1-C at pg. 2. TRC concludes that the prill storage has relatively small impacts of PM10 and PM2.5, below applicable national ambient air quality standards (NAAQS) for PM10 and PM2.5. More specifically, the model demonstrates that the predicted full stockpile output of PM10 emissions of  $4.2 \mu\text{g}/\text{m}^3$  is *35 times less* than the NAAQS standard of  $150 \mu\text{g}/\text{m}^3$ .

Sulphur prill is not likely to generate fugitive dust during handling at the site because material handling at the site is typically minimal. The GSS Facility is primarily a storage facility, used to store sulphur in its most stable form. After forming, the sulphur prill is wet (having been formed by immersion in water) and dust resistant. There is no screening, sorting, crushing, or blending of stockpiled prill. Thus, the possibility of sulphur prill being crushed by heavy machinery is not likely.

The relatively small impacts of the emissions will not create a public nuisance or adversely impact the surrounding area for primarily two reasons. First, as further explained in the response to the second inquiry below, the GSS Facility is located within an industrial area that is over half a mile away from residential areas. GSS has not received complaints regarding the GSS Facility and

has not been made aware of complaints about the GSS Facility being made to the City or any other entity.

Further, the GSS Facility is a relatively new facility that is physically and operationally designed to be in conformance with all applicable governmental requirements. The GSS Facility has a 2015 Certificate of Operation issued by the City of Chicago's Pollution Prevention Unit, a City of Chicago Manufacturing Establishment Business License,<sup>1</sup> and an Illinois EPA Joint Construction and Lifetime Operating Permit.<sup>2</sup> The Illinois EPA also registered the site in its Registration of Smaller Sources (ROSS) program under 35 Ill. Adm. Code § 201.175. Copies of current approvals are attached as Exhibit 1-D. The ROSS program is intended to simplify air regulatory requirements by requiring sources with low emissions to register with the Illinois EPA rather than acquiring an air permit, although sources must still comply with all applicable environmental laws and regulations. The GSS Facility has been identified by the Illinois EPA as a low emissions source, it continues to qualify for the ROSS program criteria, and it continues to operate in accordance with agency requirements. Additionally, the U.S. Environmental Protection Agency has visited and monitored the GSS Facility on more than one occasion. U.S. EPA data for the GSS Facility is attached as Exhibit 1-E; the data shows that the site has not had any violations for the entire time that the site has been in existence.

**Inquiry 2:**

Secondly, please note that Section 8.0(2)(b) of the Bulk Material Rules requires each request for a variance to set forth in detail, "A description of the process or activity for which the variance is requested, including pertinent data on location, size, and the population and geographic area affected by, or potentially affected by, the process or activity." While the GSS Request Letter notes that the site is in Planned Development No. 1178, and that the nearest residences are located approximately 3,000 feet from the site, CDPH requires additional detail regarding the specific location and description of each activity for which a variance is requested (e.g. storage areas, conveyors, etc.), as well as specific information about the surrounding area.

Accordingly, please provide detailed information as required by Section 8.0(2)(b) of the Bulk Material Rules, including maps, diagrams, and any other pertinent supporting information.

**GSS Response to Inquiry 2:**

The following detailed information is provided with this response:

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<sup>1</sup> Although the City of Chicago initially required (and GSS obtained) a Hazardous Material Business License as well, the City has since dropped that requirement.

<sup>2</sup> Although designated as a "lifetime" operating permit, the Illinois EPA Joint Construction and Lifetime Operating Permit has been superseded by a Registration of Smaller Sources (ROSS) registration.

1. GSS Facility site plan drawings are attached as Exhibit 2-A and include labeled work areas.
2. An 'as built' survey is attached as Exhibit 2-B.
3. Aerial photos and area drawings of the site are attached as Exhibit 2-C.
4. A copy of Planned Development 1178 as approved by the Chicago City Council on December 8, 2010, is attached as Exhibit 2-D. The City Council's approval includes the following:
  - A definition of permitted uses that include but are not limited to manufacturing of products from extracted materials, or recycled or secondary materials or bulk storage and handling of such products, outdoor storage of raw materials and accessory and related uses (See Exhibit 2-B, page 109974, ¶ 5.);
  - A requirement that GSS has fulfilled to construct an extension of South Carondelet Avenue to access the property (See Exhibit 2-B, page 109975, ¶ 8.);
  - A site plan for the GSS Facility which includes the prill storage area and specific setback requirements (See, e.g., Exhibit 2-B, page 10981.);
  - A landscape plan for the GSS Facility which includes the prill storage area and specific setback requirements (See, e.g., Exhibit 2-B, page 10982.);
  - A river edge cross section for the GSS Facility which includes ridge designs, setbacks, fencing, berms, and the edge-of stockpile location (See, e.g., Exhibit 2-B, page 10984).
5. A copy of a zoning map is attached as Exhibit 2-E which shows that the GSS Facility is located entirely within – and surrounded by – Planned Manufacturing District No. 6, also designated by the Chicago City Council.
6. A copy of a Department of Planning and Development zoning information sheet for the site is attached as Exhibit 2-F and demonstrates that the GSS Facility is located entirely within – and surrounded by – the Calumet Industrial Corridor, also designated by the Chicago City Council.
7. The TIF District designation of the Lake Calumet Industrial Corridor TIF District, within which the GSS Facility is located, is attached as Exhibit 2-F and contains a finding by the Chicago City Council that the area qualifies as blighted. See 65 ILCS 5/11-74.4-2(a).
8. Aerial photos showing the residential areas closest to the GSS Facility as approximately 3,000 feet (over half a mile) away are attached as Exhibit 2-G.

**Inquiry 3:**

Item number 3 in the GSS Request Letter references “equipment manufacturer specifications and industry standards” in conjunction with the moisture content of the sulphur prills, and states that a moisture content higher than 2% would not result in an appreciable reduction of dust emissions.

Please provide verifiable documentation to support these statements regarding moisture content. In addition, if a moisture content standard below 3% is established by an applicable State Permit, Law, Rule or Regulation (see the definition of “Moist Material” in Section 2.0 of the Bulk Material Rules), then please provide such information.

**GSS Response to Inquiry 3:**

In a presentation to the Sulphur 2005 Conference in Moscow, Russia, J.B. Hyne of Hyjay Research & Development Ltd. and L.L. Lang of Enersul Limited Partnership conclude that the “happy medium” for water content for bulk sulphur storage lies within the 0.5% to 1.2% range. Their thesis paper is attached as Exhibit 3-A, and relevant portions are highlighted on pages 6 and 7. Messrs. Hyne and Lang explain that a range of 0.5% to 1.2% is the ideal moisture content in that it suppresses fugitive dust, moderates bacterial action, and maintains stability in bulk cargo movement. At high moisture levels, sulphur becomes unnecessarily wet, and, instead of reducing dust, the excess moisture content simply increases uncontrolled movement in storage and transit.

The study conducted by Messrs. Hyne and Lang has been reaffirmed and republished this year in the January/February 2015 issue of *Sulphur Magazine*, relevant pages attached as Exhibit 3-B. The November/December 2012 issue of *Sulphur Magazine* (relevant pages attached as Exhibit 3-C) and December 2013 issue of *Hydrocarbon Engineering* (relevant pages attached as Exhibit 3-D) also discuss the “optimum” moisture content of formed sulphur, specifically in connection with the Devco prilling process utilized at the GSS Facility. Both publications report that the Devco forming unit is free of sulphur dust due to the optimum moisture content of 1.5-2.0% by weight.

Also attached as Exhibit 3-E is Devco USA, LLC’s Operations & Maintenance Manual for the sulphur forming unit at the GSS Facility (the “Manual”). The Manual describes Devco’s extensive, world-wide involvement in forming sulphur and notes at page 4 that, “It is important that our formed product is produced with up to 2.0% water mechanically adhering to the surface.”

GSS is not aware of any moisture content standard for sulphur prill in the jurisdictions in which it operates, which it submits is due to the safety properties of sulphur prill and constitutes a *de facto* regulatory finding that regulation of the moisture content of sulphur prill is unnecessary. The attached publications describe an industry-wide standard for the moisture content of sulphur prill of up to 2.0% and with which the GSS Facility complies.

**Inquiry 4:**

Item number 4 in the GSS Request Letter requests a variance from having to install rumble strips or “a more elaborate washing station.” However, please note that Section 3.0(8)(d) of the Bulk Material Rules states that:

All outgoing material transport trucks, whether loaded or empty, pass through a wheel wash station and pass over rumble strips that will vibrate the trucks and shake off loose materials and dust, unless the approved Fugitive Dust Plan specifies other measures to ensure that the trucks will not cause any track-out of materials onto the public way. [Emphasis added.]

We note that GSS’s June 17, 2014 Fugitive Dust Plan, which is pending approval by CDPH, includes a section that discusses transportation and roadway cleaning. This section of the Fugitive Dust plan describes truck cleaning measures that are also set forth in the GSS Request Letter, including use of paved roads, truck sweeping, and use of a wheel washing bath.

Thus, if you believe that the current measures in place are effective to ensure that trucks do not cause track-out from the facility onto the public way, then please withdraw this variance request. If CDPH determines that additional measures are required, these may be addressed in the Fugitive Dust Plan.

**GSS Response to Inquiry 4:**

GSS believes that the Fugitive Dust Plan it submitted on June 17, 2014 satisfies the exception provided in Section 3.0(8)(d). Further, GSS is revising its Fugitive Dust Plan with the goal of submitting the revised plan for approval by June 1, 2015.

Rather than creating a compliance issue and placing itself in jeopardy by withdrawing the pending request for variation; however, GSS respectfully requests that the CDPH grant a temporary variation pending approval of the Fugitive Dust Plan. In the event the Fugitive Dust Plan is approved, the temporary variation will lapse and the relevant provisions of the Fugitive Dust Plan take its place. In the event the Fugitive Dust Plan is denied, the request for a permanent variation will proceed and GSS will pursue a mutually satisfactory resolution.

**Inquiry 5:**

Item number 5 in the GSS Request Letter seeks approval for a 42-foot high stockpile. This request mentions a state permit allowing pile heights of 42 feet, and further states that “sulphur prills cannot ‘escape’ from a properly designed and operated stockpile.”

Please provide detailed information describing the design and operation of the 42-foot high stockpile, including a scientific explanation to demonstrate that a pile of this height will not adversely impact the surrounding area, surrounding environment, or surrounding property uses.

**GSS Response to Inquiry 5:**

In reply, reference is made again to the calculations prepared by environmental engineering firm TRC, which are attached as Exhibit 1-A. The calculations assume the GSS Facility is at maximum capacity with a pile height of 42 feet. As discussed in the response to Inquiry 1, these calculations and the modeling undertaken by TRC and described in Exhibit 1-C demonstrate minimal emissions that comply with air quality standards. TRC concludes that the prill storage in a stockpile with a height of 42 feet has relatively small impacts of PM10 and PM2.5, below applicable national ambient air quality standards (NAAQS) for PM10 and PM2.5

The above referenced calculations and the 42 high stockpile were approved by the Illinois Environmental Protection Agency in its issuance of a permit to the GSS Facility. Permit drawings that were submitted with the IEPA permit application and that specifically show the 42 foot pile height are attached as Exhibit 5-A. The 42 foot pile was also approved by the Chicago Department of Environment – Pollution Prevention Division; a copy of the stamped approval is attached as Exhibit 5-B.

One of the primary justifications for the 42 foot height of the stockpile is that sulphur has a higher density than materials targeted by the bulk material regulations, as shown in Exhibit 5-C and as outlined below:

Sulphur prill	2.06 g/cm <sup>3</sup>
Coal	1.35 g/cm <sup>3</sup>
Petroleum coke	1.4 g/cm <sup>3</sup>
Metallurgical coke	0.8 g/cm <sup>3</sup>

The denseness of the sulphur prill makes it inherently wind resistant.

**Inquiry 6:**

With regard to storage of materials within fifty feet of waterways, the GSS Request Letter states that the site “has been structured to minimize the likelihood that prilled sulphur will reach the river, including, for example, GSS’ construction of a containment berm around the storage area.”

Please provide additional details describing in full all of the design measures and the complete operating program that will prevent materials from falling or blowing into waterways when stored within fifty feet of the river.

**GSS Response to Inquiry 6:**

As previously noted, in conjunction with the review and input of various City departments, the City Council of Chicago approved site plans for the prill storage area and certain setback requirements, (see Exhibit 2-B, page 10982), and a specific landscape plan for the GSS Facility. (See Exhibit 2-B, page 10982.) The GSS Facility was constructed in accordance with the City Council's requirements and with properly issued permits. As noted in the planned development ordinance, the site plan, landscaping and river bank cross section plans approved by the City Council were designed in consultation with R&M Engineering Consultants. A copy of an R&M engineering drawing is attached as Exhibit 6-A.

Also, as noted below in response to other inquiries, GSS uses the Envirobind product to minimize dust emissions, and GSS is revising its Fugitive Dust Plan to further detail operations.

Additionally, a report from The Sulphur Institute is provided as Exhibit 6-B. The report concludes that the "scientific literature and readily available data on the toxicological properties of sulphur support a conclusion that the material is not harmful to the marine environment (non-HME)," in accordance with criteria specified by the International Convention for the Prevention of Pollution from Ships (MARPOL). The report also notes that, "Solid sulphur is not listed as a marine pollutant in the International Maritime Dangerous Goods Code." Although the Calumet River contains freshwater, marine life is more sensitive to environmental changes than freshwater life, so the fact that sulphur is not hazardous for marine life establishes its safety for freshwater life. Supplementary data on the non-HME designation for sulphur is attached as Exhibit 6-C. While dispersal of sulphur prill is avoided for both environmental and commercial reasons, it is a stable product and is insoluble in water; it is not regulated under the Clean Water Act, is not regulated as a Hazardous Air Pollutant, Class I substance or Class II substance under the Clean Air Act, is not listed as an EPA RCRA hazardous waste, and is not listed under the Illinois Toxic Substances Disclosure to Employees Act.

**Inquiry 7:**

Item number 7 in the GSS Request Letter requests a variance to allow handling of sulphur prill during times when wind speeds are above 15 miles per hour (mph), up to 30 mph. However, please note that Section 5.0(4) of the Bulk Material Rules states that:

Disturbance of outdoor Bulk Solid Material piles, including but not limited to outdoor loading, unloading, and any other Processing, shall be suspended during High Wind Conditions, as detected by the wind monitor required under 3.0(5), unless alternate



measures are implemented to effectively control dust in accordance with the approved Fugitive Dust Plan. [Emphasis added.]

Notably, GSS's June 17, 2014 Fugitive Dust Plan, which is pending approval by CDPH, does not address measures to control dust during high winds, whether above 15 mph or 30 mph. CDPH asks that you consider revising the Fugitive Dust Plan to address High Wind Conditions as defined in the Bulk Material Rules. If you do, then please withdraw this variance request.

**GSS Response to Inquiry 7:**

GSS is preparing a revision to its Fugitive Dust Plan which was submitted for approval on June 17, 2014, with the goal of submitting the revision on June 1, 2015. The revised Fugitive Dust Plan will specifically discuss operations during High Wind Conditions as defined in the Bulk Material Rules.

Generally, however, with respect to the behavior of sulphur prill in high wind conditions, attached as Exhibit 7-A is a publication dated April 15, 2014 from site designer and prilling equipment manufacture Devco USA, LLC. Devco has installed over 25 operating facilities throughout the world and "has never been required to install wind screens or any extra measures for dust mitigation," and that no facility of which it is aware "has had a requirement like the proposed 15 mph wind speed operating limit." Specifically, Devco reported that:

[F]orming units...located in Donaldsonville, LA [which is a GSS site] and Beaumont, TX were put to extreme tests of pile integrity during outstanding wind events from Hurricanes Katrina and Rita in 2005, along with Ike and Gustav 2008...[and] sulfur piles were [virtually] undisturbed during these events & there were no extraordinary cleanups or remediation required.

**Inquiry 8:**

Item number 8 in the GSS Request Letter requests a variance from the requirement to install and operate a Dust Suppressant System to prevent fugitive dust emissions. However, the request letter also states that a water-based, non-toxic, biodegradable dust suppressant, called Envirobind, is sprayed onto the formed sulphur.

In addition to the information requested above regarding dust emissions and moisture content of prilled sulphur, please provide additional information explaining how and when Envirobind is applied to the prills and explaining how this is effective to control fugitive dust at all times.

**GSS Response to Inquiry 8:**

Envirobind is sold in concentrated liquid form that is diluted with water and applied by spraying. It creates a 'tacky' feel to bulk materials that inhibits dust generation (although, as noted before, sulphur prill itself generates little fugitive dust). GSS applies Envirobind in accordance with manufacturer instructions on an as needed basis to both avoid dust accumulation in the travel path around the prill pile and to maintain the pile's moisture content. The Envirobind manufacturer's product description is attached as Exhibit 8-A. The manufacturer's product application instructions are attached as Exhibit 8-B. The manufacturer's material data sheet is attached as Exhibit 8-C.

**Inquiry 9:**

Finally, if there is any further information that GSS believes is relevant to meeting its burden of proof in connection with its variance request, or which it would like to make part of the record for the City's consideration of this issue. It is invited to do so. In addition, if GSS wishes to respond to any public comments regarding its variance request, it is also invited to do so. The public comments are posted on the City's website at [www.cityofchicago.org/environmentalrules](http://www.cityofchicago.org/environmentalrules).

**GSS Response to Inquiry 9:**

The State of Florida recently eased regulations on sulphur. Florida's request to the U.S. Environmental Protection Agency, which is attached as Exhibit 9-A, noted that:

In 1985, when the sulfur storage and handling rules were first adopted, there was concern that total suspended particulate matter levels in Florida would be negatively impacted by increased sulfur handling and storage operations to such an extent as to warrant additional facility-specific work practices and monitoring. This has turned out not to be the case. The particulate matter emissions from these facilities are, in fact, negligible....Therefore, DEP has determined that separate regulations for sulfur storage and handling facilities are no longer necessary and should be removed from the SIP in the interest of streamlining Florida's air regulations.

*Exhibit 9-A, page 3.*

GSS urges CDPH to review Florida's findings and conclude that sulphur is an inherently different product than coal, petcoke or metcoke and need not be regulated like those products.

As explained in the original request for variations, the GSS Facility was constructed and began operating in 2012, after GSS invested over eleven million dollars to design and build a state of

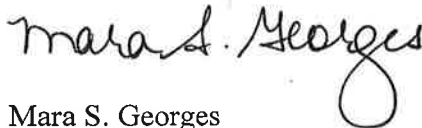
the art facility compliant with all applicable laws and regulations – demonstrating both its commitment to operational and environmental safety and to the City of Chicago. The site design and sulphur storage parameters have been recently reviewed and approved by city and state regulators during permitting. The design and approvals reflect the nature of sulphur prill, including its stability, density, safety, moisture retention, and low emission characteristics, as discussed in this letter and documented in supporting materials.

The GSS Facility was built in reliance on city and state approvals. The new regulations target other materials and for that reason fail to take into account the unique nature of sulphur prill and the GSS Facility design. Without the requested variations, the regulations will impose unreasonable costs and will not fulfill the stated purpose of the regulations to prescribe “reasonable” practices and minimize emissions.

Further, sulphur formed to the prill state is generally accepted around the world as the safest and most environmentally friendly method to handle and transport sulphur in solid form.

For all of the above reasons, Gulf Sulphur Services Ltd., LLLP respectfully requests approval of the requested Variations from the Regulations. GSS would be happy to meet with CDPH to review and discuss these requests and its proposed Fugitive Dust Plan.

Sincerely,



Mara S. Georges

**Gulf Sulphur Services Ltd., LLLP**

By: Sulphur Assets Holding Company, LLC  
a Delaware limited liability company, as its  
General Partner

By: Savage Services Corporation,  
a Utah corporation, as its manager

By: \_\_\_\_\_

Name: Jack Cohn

Title: Sr. VP & General Manager

cc: Jennifer Hesse, Chicago Department of Public Health  
Hon. John Pope, Alderman, 10th Ward

**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 1-A

Sulphur prill calculations from TRC Environmental

**MIDWEST FORMING FACILITY**  
**EU 006 Prill Storage Piles**

All equations in this tab are taken from AP-42 Chapter 13 Miscellaneous Sources: Industrial Wind Erosion, 13.2.5, US EPA, November 2006.

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 EF emission factor ( $g/m^2/yr$ )  
 k particle size multiplier (dimensionless)  
 N number of pile disturbances per year (1/yr)  
 P erosion potential corresponding to the fastest mile of wind for the *i*th period period disturbances ( $g/m^2$ )

Aerodynamic Particle Size Multipliers (k)			
30 mm	<15 mm	<10 mm	<2.5 mm
1.0	0.6	0.5	0.2

Number of pile disturbances per year (N)  
 While only a portion of the pile is disturbed on a daily basis, the conservative estimate of 365 will be used.

Assumptions:

k 0.5 (dimensionless) [Assumed per table above for 10µm]  
 N 365 (1/yr)

The erosion potential function for a dry, exposed surface is:

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 $u^*$  friction velocity (m/s)  
 $u_t^*$  threshold friction velocity (m/s)

The threshold friction velocity has been conservatively estimated based on the nature of the prill (i.e., large size w/little surface residue) using Tables 13.2.5-1 & 13.2.5-2.

Prill  $u_t^*$  1.04 m/s

Information per the National Oceanic and Atmospheric Administration (NOAA) for Chicago, IL - O'Hare Airport for 2009  
<http://www.crh.noaa.gov/product.php?site=LOT&issuedby=ORD&product=CLA&format=CI&version=1&qlossary=0>

	MPH	m/s
Highest Wind Speed	38	17
Highest Gust Wind Speed	51	23
AVERAGE		20

$u_{10}$  fastest wind speed of reference anemometer for period between disturbances (m/s)

$u_{10}$  20 (m/s)

To convert the fastest wind speed ( $u_{10}$ ) from a reference anemometer height of 10m to the equivalent friction velocity ( $u^*$ ), the logarithmic wind speed profile is used.

$$u^* = 0.053 u_{10} \quad u^* \quad 1.054 \text{ (m/s)}$$

**A. Emissions from the Prill Piles**

1) Determine the erosion potential (P) for the Prill

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 $u^*$  1.054 friction velocity (m/s)  
 $u_t^*$  1.04 threshold friction velocity (m/s)

P 0.36 ( $g/m^2$ )

**MIDWEST FORMING FACILITY**  
**EU 006 Prill Storage Piles**

2) Determine emission factor for the prill pile

$$EF = \frac{N}{k \sum_{i=1}^N P_i}$$

Where:

k	0.5 (dimensionless)
N	365 (1/yr)
P	0.365 (g/m <sup>2</sup> )
EF	67 (g/m <sup>2</sup> yr) 0.01 (lb/ft <sup>2</sup> yr)

3) Determine Size of the Pile

As a conservative simplifying assumption, assume the piles are cone shaped and are disturbed on a daily basis.

Max. Amount of Stockpiled Prill

75,000 LT or	84,000 Ton (short)	
1,500,000 ft <sup>3</sup>	[Calculated assuming prill density similar to sulfur @	112 lb/ft <sup>3</sup> ]

Cone Pile

Max. Height (h)	42 ft	[Height Range of 21 - 42 feet]
Angle (incline)	45 °	[Assumed]
Radius (r)	42.0 ft	[Calculated as follows: r = h / tan(angle in radians)]
Volume	77,585 ft <sup>3</sup>	[Calculated: Volume = 1/3 pi * r <sup>2</sup> * h]
Surface Area	7,837 ft <sup>2</sup> /pile	[Calculated: Surface Area = pi*r*SQRT(r <sup>2</sup> + h <sup>2</sup> )]
Max. No. of Piles	19 piles	[Calculated: ((Max. Prill Mass, tons) * (2,000 lbs/ton)) / (density, lb/ft <sup>3</sup> ) / (Pile Volume, ft <sup>3</sup> ) ]
Total Surface Area	151,523 ft <sup>2</sup>	[Calculated: (Surface Area, ft <sup>2</sup> /pile) x (Max. No. of Piles)]
Base Area per Pile	5,542 ft <sup>2</sup> /pile	[Calculated: pi * r <sup>2</sup> ]
	0.13 acre/pile	
Total area occupied by piles	2.46 acres	

4) Determine Annual Pile Emissions

Emissions = EF \* Area

Where:

EF	0.01 (lb/ft <sup>2</sup> yr)	Calculated emission factor (above)
Area	151,523 (ft <sup>2</sup> )	Exposed pile area to the wind
Emissions	2,063 (lb/yr) 1.03 (ton/yr)	TSP Emission from the Pile

5) Determine Hourly Pile Emissions

Assumptions:

Hours per year: 8760 hrs/yr

Emissions	0.24 (lb/hr)	TSP Emission from the Pile
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## Richard A. Toth

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**From:** Liello, Joseph <JLiello@trcsolutions.com>  
**Sent:** Thursday, March 26, 2015 6:31 PM  
**To:** Jim McCoy  
**Subject:** RE: FW: Call on Draft response for Bulk Materials Handling letter

Jim,

The following is intended to provide the requested verbiage related to the calculation of the 0.24 lb/hr particulate emission rate from the bulk storage pile:

### **Discussion of Prill Pile Emission Estimation Approach**

The wind-blown fugitive emissions from the prill storage pile have been estimated using published emission calculation methodologies contained in USEPA's AP-42, Fifth Edition - *Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*. Specifically, Section 13.2.5 (November 2006) of this document, which presents calculation methodologies for industrial wind erosion of open aggregate storage piles. As stated in this document (Page 13.2.5-1):

*"Field testing of coal piles and other exposed materials using a portable wind tunnel has shown that (a) threshold wind speeds exceed 5 meters per second (m/s) (11 miles per hour [mph]) at 15 cm above the surface or 10 m/s (22 mph) at 7 m above the surface, and (b) particulate emission rates tend to decay rapidly (half-life of a few minutes) during an erosion event. In other words, these aggregate material surfaces are characterized by finite availability of erodible material (mass/area) referred to as the erosion potential. Any natural crusting of the surface binds the erodible material, thereby reducing the erosion potential."*

*"... mean atmospheric wind speeds are not sufficient to sustain wind erosion from flat surfaces of the type tested. However, wind gusts may quickly deplete a substantial portion of the erosion potential. Because erosion potential has been found to increase rapidly with increasing wind speed, estimated emissions should be related to the gusts of highest magnitude. The routinely measured meteorological variable that best reflects the magnitude of wind gusts is the fastest mile."*

As discussed in Section 13.2.5.3 (AP-42), the emission factor for wind-generated particulate emissions from mixtures of erodible and non-erodible surface material subject to disturbance is expressed in units of grams per square meter ( $\text{g}/\text{m}^2$ ) per year – for which associated formulas are detailed in [JIM TO REFERENCE ATTACHMENT]. The calculation includes a particle size multiplier (k), which varies with aerodynamic particle size, the number of disturbances per year (N), and the erosion potential, which corresponds to the fastest mile of wind for the  $i$ th period between disturbances ( $P_i$ ).

The particle size multiplier used in the calculation is that which corresponds to respirable particulate ( $< 10 \mu\text{m}$ ). Conservatively assuming that the prill pile may be disturbed every day, the number of disturbances used is 365 per year.

The erosion potential factor is calculated based on friction velocity (and threshold friction velocity), which is a measure of wind shear stress on the erodible surface. The friction velocity is calculated based on the fastest mile of wind from a reference anemometer height of 10 m, for which the fastest mile of wind information was obtained from the National Oceanic and Atmospheric Administration (NOAA) for Chicago, IL - O'Hare Airport for 2009. Specifically, this was taken as the average of the highest wind speed (38 mph) and the highest gust wind speed (51 mph), which equates to 45 mph (20 m/s). Based on this information, the friction velocity was calculated as 1.054 m/s. The threshold friction velocity was conservatively estimated at 1.04 m/s based on the nature of the prill (i.e., large size w/little surface residue), using Tables 13.2.5-1 & 13.2.5-2. In comparison, the reference threshold friction velocity is 1.02 m/s for overburden and 1.12

for an uncrusted coal pile – both associated with western surface coal mine. These friction velocities were used to calculate an erosion potential of 0.36 g/m<sup>2</sup>.

As detailed in the emission calculations, the particle size multiplier, the number of disturbances per year and the erosion potential were combined to calculate the emission factor for wind erosion of 0.01 lb/ft<sup>2</sup>/yr (67 g/m<sup>2</sup>/yr). To estimate annual emissions, this factor was multiplied by the maximum estimated surface area of the prill piles. As a conservative simplifying assumption, it was assumed the piles are cone-shaped (45° angle sides) with a maximum height of 42 feet. This yields a volume of approximately 77,585 ft<sup>3</sup> / pile, and a surface area of 7,837 ft<sup>2</sup> / pile. The number of such piles was computed based on the total volume of prill that the side is designed to store – i.e., 75,000 long tons at a density of approximately 112 lbs/ft<sup>3</sup>, which equates to 1,500,000 ft<sup>3</sup>. This yields approximately 19 piles with a combined total surface area of 151,523 ft<sup>2</sup>. The total surface area was multiplied by the emission factor for wind erosion for an annual emission rate 2,063 lbs/yr. Dividing this by 8,760 hr/yr (24 hr/day x 365 day/yr) yields an hourly emission rate of 0.24 lbs/hr.

**Joe C. Liello, P.E.\*, CHMM**

Senior Project Manager

*\*Licensed in AZ, IL, IA, MO, NJ, TX, and WI*



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## **JOE C. LIELLO, PE, CHMM**

### **EDUCATION**

M.S., Environmental Engineering, Milwaukee School of Engineering, Milwaukee, Wisconsin, 1998

B.S., Civil and Environmental Engineering, Purdue University, West Lafayette, Indiana, 1992

### **PROFESSIONAL REGISTRATIONS/CERTIFICATIONS**

Registered Professional Engineer

Arizona	License No. 47165
Illinois	License No. 062-058646
Iowa	License No. 19450
Missouri	License No. PE-2005026795
New Jersey	License No. 24GE04541000
Texas	License No. 94441
Wisconsin	License No. 36015-006

Certified Hazardous Materials Manager – CHMM No. 14914

### **AREAS OF EXPERTISE**

- Air permitting and industrial compliance services
- Environmental auditing
- Environmental reporting, pollution prevention plan preparation, and electronic data management
- Industrial ventilation, including the development and application of holistic ventilation evaluation techniques

### **REPRESENTATIVE EXPERIENCE**

Mr. Liello has worked as a senior engineer and project manager in the environmental consulting field since 1992, and has served numerous clients with facilities located throughout the United States. His particular areas of experience include air permitting, compliance auditing, industrial services, environmental reporting, indoor air quality assessment and industrial ventilation, and electronic data management. He is also active in various pollution prevention projects, including the development of Storm Water Pollution Prevention Plans (SWPPPs); Spill Prevention, Control, and Countermeasure (SPCC) plans; and Hazardous Waste Contingency Plans.

#### **Air Pollution Control**

##### **Permitting**

Developed construction (including PSD and NSR) and operating permits for major, synthetic minor (FESOP), and minor sources for a wide range of

industries, including foundries (steel, grey iron, and aluminum), metal manufacturers, engineered chain/idler manufacturer, disc brake manufacturer, resin manufacturer, printing facilities (paper, sheet metal), proppant manufacturing facilities, industrial sand mining and processing, steel mill, copper casting facilities, industrial laundries, utilities, TSD facility, adhesives manufacturers, manganese processing facilities, aerospace turbine engine rework and overhaul facilities, an agricultural equipment manufacturer, and an industrial boiler manufacturer testing facility.

### **Emission Inventory Development**

Developed air emission inventories for a wide range of industries and process operations to determine air permitting needs and the need for annual air emission inventory reports.

### **Compliance Monitoring and Reporting**

Developed and prepared compliance monitoring and compliance certification reports for submittal to state and federal agencies as required under air operating permits. In addition, developed various Excel<sup>®</sup>-based compliance analysis spreadsheet systems, including an automated compliance monitoring system (ACMS) that is used remotely to track compliance.

### **Stack Testing**

Developed stack test plans for submittal to appropriate agencies, and provided oversight and coordinated stack test efforts

### **Miscellaneous**

Prepared operation and maintenance (O&M) plans and malfunction prevention and abatement plans (MPAPs) for various types of air pollution control devices and associated monitoring equipment. Also prepared emergency control action plans (ECAPs) that identify response actions that facilities would implement in the event an air episode is declared.

### **Environmental Compliance Auditing**

#### **Various Industrial Facilities, Multi-Media and Targeted Audits**

Involved in conducting various environmental compliance audits, including both multi-media and targeted (*i.e.*, air, EPCRA) audits of local, state, and federal environmental regulatory requirements for various industrial facilities, including foundries, printing facilities, a steel mill, metal manufacturing facilities, chemical manufacturing facilities, petroleum refining, drilling and processing facilities, petroleum extraction and processing facilities (North Slope of Alaska), a cement manufacturing/TSD facility, an aluminum die-casting facility, contract manufacturing facilities, injection molding facilities, agricultural equipment

manufacturers, diesel engine and transmission repair facilities, and aerospace turbine engine overhaul and rework facilities.

Conducted environmental compliance audits of multiple logistics for facilities (distribution centers) to identify applicable local, state, and federal requirements, including EPCRA, CERCLA, RCRA, CAA, CWA, AST/UST, spill notification, pesticide, asbestos, and PCBs. Such requirements were compiled into environmental regulatory summary handbooks, which are periodically updated, for use by the facilities.

### **Industrial Services**

#### **Storm Water Pollution Prevention Plans (SWPPPs)**

Developed and reviewed SWPPPs for various facilities, including plastics manufacturing, metal manufacturing facilities, foundries, a steel mill, air force bases, a transformer manufacturer, proppant manufacturing facilities, industrial sand mining and processing, aerospace turbine engine rework and overhaul facilities, an agricultural equipment manufacturer, a thin-film photovoltaic module and coated glass recovery facility, and a transmission and engine repair facility.

#### **Spill Prevention, Control, and Countermeasure (SPCC) Plans**

Developed, updated, reviewed, and certified SPCC plans for various facilities, including a steel mill, foundries, agricultural equipment manufacturing and training facilities, an engineered chain/idler manufacturer, an adhesives manufacturer, a transformer manufacturer, plastics molding facilities, a sheet metal coating facility, transmission and engine repair facilities, industrial sand processing facility, a drop forge facility, hydraulic and electro-hydraulic control manufacturing facilities, a hospital, and aerospace turbine engine rework and overhaul facilities.

#### **Hazardous Waste Contingency Plans**

Assisted with the preparation of hazardous waste contingency plans for several facilities, including a steel mill, a sheet metal coating facility, and an aerospace turbine engine rework and overhaul facility.

#### **Transformer Manufacturer, Hazardous Waste Contingency Plan – Waukesha, WI**

Assisted with the preparation of a Hazardous Waste Contingency Plan for a transformer manufacturer. This document was prepared in accordance with applicable requirements and was provided to the client for its distribution to appropriate entities (e.g., hospitals, fire department, police department, etc.)

### **Metals Recovery and Secondary Materials Processing Facility, Hazardous Waste Management Assistance – DeForest, WI**

In support of siting a facility in Wisconsin for metals recovery and secondary materials marketing, worked on the client's behalf to interface with the WDNR to familiarize them with the nature of the facility's operations in order to obtain WDNR concurrence regarding regulatory exclusions from the definition of a hazardous waste for commercial chemical products (CCP) and by-products to be processed via the facility's metal recovery operations, and for its marketing of secondary materials. Through such assistance, the facility was able to commence operations without the need for a RCRA Part B or RCRA storage permit. Assistance was also provided to assist the facility with identifying and establishing methods to comply with requirements applicable to a Large Quantity Generator (LQG) of hazardous waste, including: 1) preparation of a hazardous waste contingency plan; 2) preparation and submittal of a Notification of Regulated Waste Activity Form (EPA Form 8700-12); and 3) identification of employee training and waste management requirements (e.g., satellite and 90-day accumulation area management & inspection requirements)

### **Environmental Reporting**

Prepared, coordinated, reviewed, and oversaw the preparation of various environmental reports for numerous clients with facilities in various states, including the following: 1) SARA 312 Tier II reports; 2) SARA 313 Toxic Release Inventory (TRI) reports; 3) SARA 302, 303, and 311 notifications; 4) hazardous waste reports; 5) discharge monitoring reports; 6) air emission inventory reports; 7) non-storm water discharge assessments; 8) CERCLA continuous release reports; and 9) wastewater pretreatment reports.

### **Indoor Air Quality (IAQ)**

#### **Assessment of IAQ**

Coordinated and oversaw the collection of empirical data (e.g., real-time particulate measurements, tracer gas analysis, ventilation configuration, etc.) to assess indoor air quality at several facilities (including foundries and aluminum hot mill) relative to in-plant respirable particulate and oil mist concentrations, as well as opacity impacts to the ambient atmosphere. Assessments included air mass balance calculations, approximation of prevailing airflow patterns, and modeling of background (i.e., standing) contaminant profiles using Surfer®.

#### **Recommendation of Potential Control Options**

Evaluated indoor air quality data for foundries and an aluminum manufacturing facility to develop holistic strategies for reducing both employee exposure to various airborne contaminants (e.g., silica, respirable particulate, and oil mist) and visible emissions (opacity). Developed comprehensive holistic strategies,

which were comprised of a combination of local and general ventilation control techniques, including both supply and exhaust systems.

#### **Predictive Modeling of Potential Control Options**

Involved in the development of a mathematical modeling approach for use in predicting the impacts of potential control options for reducing in-plant concentrations of contaminants. Modeled the impacts of local and general ventilation control techniques to predict the effectiveness of such potential controls.

#### **Local Ventilation Assessment – Pilot Technique**

Involved in the development of a pilot visual testing technique to qualitatively assess capture efficiencies of local ventilation systems so as to facilitate and expedite the identification of localized ventilation deficiencies (in lieu of performing a branch-duct flow analysis). Involvement ranged from conceptualization to fabrication of the pilot testing equipment, as well as field testing the technique.

#### **Foundry Client, Investigation of Airborne Emissions – Waukesha, WI**

Managed this project that involved assisting the facility with investigating changes in concentrations of select airborne emissions from the use of an alternative phenolic urethane no-bake (PUNB) binder system. The project is generally being conducted in two phases to separately assess impacts to mold making operations and to pouring/cooling/shakeout operations. The first phase of this project is complete, which entailed conducting employee exposure and area sampling air quality monitoring in association with mold-making operations using its current PUNB binder system, and then repeating such sampling while using an alternative PUNB binder system. Understanding that the sampling conditions reflect a real-world environment as opposed to well-controlled laboratory conditions, attention to operating conditions (e.g., production rates, ventilation system operating status/configuration/locations, etc.) was critical to the investigation to identify potential factors that were not otherwise sufficiently controlled between testing conditions. The results indicated that emissions from the alternate material were higher than the current binder system. In considering differences in the binder systems, it is theorized that the alternate material may yield higher emissions during mold-making operations, but lower emissions during pouring/cooling/shakeout. The net change in emissions will be assessed upon completion of the second phase of the project, which is currently in the planning stage.

#### **Foundry Client, Employee Exposure Air Quality Monitoring – Waukesha, WI**

In response to certain OSHA regulatory concerns, managed this project that involved conducting employee exposure air quality monitoring for formaldehyde and coal tar pitch volatiles in select areas of the foundry over several shifts.



During the monitoring, close attention was given to noting operating conditions in order to identify potential impacts that such conditions may have on measured exposure levels (e.g., fan air flow directions relative to employees and emitting processes, supply and exhaust air systems, etc.). The samples were documented, packaged, and submitted to a laboratory that is accredited by the American Industrial Hygiene Association (AIHA) for analyses. The results were reviewed in conjunction with standards that may apply, as well as the sampling, operational, and employee activity data that were collected. Findings and conclusions were presented in a report prepared by a Certified Industrial Hygienist (CIH).

### **SPECIALIZED TRAINING**

- 40-Hour Hazardous Waste Operations Training
- Confined Space Entry and Rescue Procedures Certification

### **PROFESSIONAL AFFILIATIONS**

- Federation of Environmental Technologists

### **SELECTED PUBLICATIONS AND PRESENTATIONS**

2012. Calculating Emission Rates – Selecting Appropriate Methods. Presented at the Federation of Environmental Technologists' (FET) Environment 2012 October 2012. Pewaukee, Wisconsin.

2011. Regulation of Hazardous Air Pollutants – Overview & Residual Risk and Technology Review. Presented at the Federation of Environmental Technologists' (FET) Environment 2011 Professional Development Course: *Air Pollution Control – The Winds of Change*. October 2011. Pewaukee, Wisconsin.

2009. Reporting, recordkeeping, and compliance demonstrations. Presented at the FET's Environment '09 Pre-Conference *Introduction to Air Topics* workshop. October 2009. Pewaukee, Wisconsin.

Scholz, Robert C., and J.C. Liello. 2001. A measurement method to pinpoint and assess high air contaminant zones within foundries. Transactions of the American Foundry Society. Vol. 109, Paper No. 01-152, pp. 1409-1415.

2001. A measurement method to pinpoint and assess high air contaminant zones within foundries. Presented at the 105<sup>th</sup> American Foundrymen's Society Casting Congress. April 2001. Dallas, Texas.

Scholz, Robert C., and J.C. Liello. 2000. A foundry ventilation approach whose time has come. Transactions of the American Foundry Society. Vol. 108, Paper No. 00-112, pp. 699-703.

2000. A foundry ventilation approach whose time has come. Presented at the 104<sup>th</sup> American Foundrymen's Society Casting Congress. April 2000. Pittsburgh, Pennsylvania.

1998. Indoor respirable particulate: development of a model to assess air quality and evaluate potential control options. Thesis submitted to the faculty of the Graduate School, Milwaukee School of Engineering. May 1998. Milwaukee, Wisconsin.

1995. Organic emission standards for hazardous waste tanks, surface impoundments, and containers. Presented to the FET. June 1995. Milwaukee, Wisconsin.

Osantowski, R.A., J.C. Liello, and C.S. Applegate. 1995. Generic pollution prevention: water management techniques for pollution prevention. Industrial Pollution Prevention Handbook. McGraw-Hill, Inc. 1995. New York.

**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 1-B

Calculations for other substances



**EU 006 Coal Storage Piles**

All equations in this tab are taken from AP-42 Chapter 13 Miscellaneous Sources Industrial Wind Erosion, 13.2.5, US EPA, November 2006.

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 EF emission factor (g/m<sup>2</sup>yr)  
 k particle size multiplier (dimensionless)  
 N number of pile disturbances per year (1/yr)  
 P erosion potential corresponding to the fastest mile of wind for the lth period disturbances (g/m<sup>2</sup>)

Aerodynamic Particle Size Multipliers (k)			
30 mm	<15 mm	<10 mm	<2.5 mm
1.0	0.6	0.5	0.2

Number of pile disturbances per year (N)  
 While only a portion of the pile is disturbed on a daily basis, the conservative estimate of 365 will be used.

Assumptions:

	LT/hr	ton/hr	Capacity		TPY	ft <sup>3</sup> /yr	Est. No. of Transfers	
			LT/yr	LT/yr			per hr	per year
Frontend loader transfer to railcar hopper	300	336	7,972	700,000	784,000	18,600,237	98	229,633
Frontend loader transfer to barge hopper	0	0	0	700,000	784,000	18,600,237	0	229,633
	300	336	7,972	700,000	784,000	18,600,237	98	229,633

Est. Frontend loader bucket capacity: 3.0 yd<sup>3</sup> or 81 ft<sup>3</sup>

k 0.5 (dimensionless) [Assumed per table above for 10µm]  
 N 365 (1/yr)

The erosion potential function for a dry, exposed surface is:

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* friction velocity (m/s)  
 u<sub>t</sub><sup>\*</sup> threshold friction velocity (m/s)

The threshold friction velocity is based on AP 42, Tables 13.2.5-1 & 13.2.5-2.

Coal u<sub>t</sub><sup>\*</sup> 0.83 m/s

Information per the National Oceanic and Atmospheric Administration (NOAA) for Chicago, IL - O'Hare Airport for 2009  
<http://www.crh.noaa.gov/product.php?site=LOT&issuedby=ORD&product=CLA&format=CI&version=1&glossary=0>

	MPH	m/s
Highest Wind Speed	38	17
Highest Gust Wind Speed	51	23
AVERAGE		20

u<sub>10</sub> fastest wind speed of reference anemometer for period between disturbances (m/s)

u<sub>10</sub> 20 (m/s)

To convert the fastest wind speed (u<sub>10</sub>) from a reference anemometer height of 10m to the equivalent friction velocity (u\*), the logarithmic wind speed profile is used.

$$u^* = 0.053 u_{10} \quad u^* = 1.054 \text{ (m/s)}$$

**A. Emissions from the Coal Pile**

1) Determine the erosion potential (P) for the Coal

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* 1.054 friction velocity (m/s)  
 u<sub>t</sub><sup>\*</sup> 0.83 threshold friction velocity (m/s)

P 8.52 (g/m<sup>2</sup>)

2) Determine emission factor for the Coal Pile

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 k 0.5 (dimensionless)  
 N 365 (1/yr)

P	8.516 (g/m <sup>2</sup> )
EF	1554 (g/m <sup>2</sup> yr) 0.32 (lb/ft <sup>2</sup> yr)

3) Determine Size of the Pile

As a conservative simplifying assumption, assume the piles are cone shaped and are disturbed on a daily basis.

Max. Amount of Stockpiled Coal

75,000 LT or	84,000 Ton (short)	
1,992,883 ft <sup>3</sup>	[Calculated assuming density @	84 lb/ft <sup>3</sup> ]

Cone Pile

Max. Height (h)	42 ft	[Height Range of 21 - 42 feet]
Angle (incline)	45 °	[Assumed]
Radius (r)	42.0 ft	[Calculated as follows: $r = h / \tan(\text{angle in radians})$ ]
Volume	77,565 ft <sup>3</sup>	[Calculated: $\text{Volume} = 1/3 \pi r^2 h$ ]
Surface Area	7,837 ft <sup>2</sup> /pile	[Calculated: $\text{Surface Area} = \pi r^2 \sqrt{r^2 + h^2}$ ]
Max. No. of Piles	26 piles	[Calculated: $\{(\text{Max. Coal Mass, tons}) * (2,000 \text{ lbs/ton}) / (\text{density, lb/ft}^3)\} / (\text{Pile Volume, ft}^3)$ ]
Total Surface Area	201,312 ft <sup>2</sup>	[Calculated: $(\text{Surface Area, ft}^2/\text{pile}) * (\text{Max. No. of Piles})$ ]
Base Area per Pile	5,542 ft <sup>2</sup> /pile	[Calculated: $\pi r^2$ ]
	0.13 acre/pile	
Total area occupied by piles	3.27 acres	

4) Determine Annual Pile Emissions

Emissions = EF \* Area

Where:

EF	0.32 (lb/ft <sup>2</sup> yr)	Calculated emission factor (above)
Area	201,312 (ft <sup>2</sup> )	Exposed pile area to the wind
Emissions	64,049 (lb/yr) 32.02 (ton/yr)	TSP Emission from the Pile

5) Determine Hourly Pile Emissions

Assumptions:

Hours per year: 8760 hrs/yr

Emissions	7.31 (lb/hr)	TSP Emission from the Pile
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**EU 006 Petcoke Storage Piles**

All equations in this tab are taken from AP-42 Chapter 13 Miscellaneous Sources Industrial Wind Erosion, 13.2.5, US EPA, November 2006.

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 EF emission factor (g/m<sup>2</sup>·yr)  
 k particle size multiplier (dimensionless)  
 N number of pile disturbances per year (1/yr)  
 P erosion potential corresponding to the fastest mile of wind for the i<sup>th</sup> period period disturbances (g/m<sup>2</sup>)

Aerodynamic Particle Size Multipliers (k)			
30 mm	<15 mm	<10 mm	<2.5 mm
1.0	0.6	0.5	0.2

Number of pile disturbances per year (N)  
 While only a portion of the pile is disturbed on a daily basis, the conservative estimate of 365 will be used.

Assumptions:

	LT/hr	ton/hr	ft <sup>3</sup> /hr	Capacity LT/yr	TPY	ft <sup>3</sup> /yr	Est. No. of Transfers per hr	per year
Frontend loader transfer to railcar hopper	300	336	7,689	700,000	784,000	17,940,503	95	221,488
Frontend loader transfer to barge hopper	0	0	0	700,000	784,000	17,940,503	0	221,488
	300	336	7,689	700,000	784,000	17,940,503	95	221,488

Est. Frontend loader bucket capacity: 3.0 yd<sup>3</sup> or 81 ft<sup>3</sup>

k 0.5 (dimensionless) [Assumed per table above for 10µm]  
 N 365 (1/yr)

The erosion potential function for a dry, exposed surface is:

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* friction velocity (m/s)  
 u<sub>t</sub><sup>\*</sup> threshold friction velocity (m/s)

The threshold friction velocity has been conservatively estimated based on values from AP 42 Tables 13.2.5-1 & 13.2.5-2.

Petcoke u<sub>t</sub><sup>\*</sup> 0.55 m/s

Information per the National Oceanic and Atmospheric Administration (NOAA) for Chicago, IL - O'Hare Airport for 2009  
<http://www.crh.noaa.gov/product.php?site=LOT&issuedby=ORD&product=CLA&format=CI&version=1&glossary=0>

	MPH	m/s
Highest Wind Speed	38	17
Highest Gust Wind Speed	51	23
AVERAGE		20

u<sub>10</sub> fastest wind speed of reference anemometer for period between disturbances (m/s)

u<sub>10</sub> 20 (m/s)

To convert the fastest wind speed (u<sub>10</sub>) from a reference anemometer height of 10m to the equivalent friction velocity (u\*), the logarithmic wind speed profile is used.

$$u^* = 0.053 u_{10} \quad u^* = 1.054 \text{ (m/s)}$$

**A. Emissions from the Petcoke Piles**

1) Determine the erosion potential (P) for the Petcoke

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* 1.054 friction velocity (m/s)  
 u<sub>t</sub><sup>\*</sup> 0.55 threshold friction velocity (m/s)

$$P = 27.34 \text{ (g/m}^2\text{)}$$

2) Determine emission factor for the Petcoke Pile

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 k 0.5 (dimensionless)  
 N 365 (1/yr)

P	27.343 (g/m <sup>2</sup> )
EF	4990 (g/m <sup>2</sup> ·yr) 1.02 (lb/ft <sup>2</sup> ·yr)

3) Determine Size of the Pile

As a conservative simplifying assumption, assume the piles are cone shaped and are disturbed on a daily basis.

Max. Amount of Stockpiled Petcoke

75,000 LT or	84,000 Ton (short)	
1,922,197 ft <sup>3</sup>	[Calculated assuming Petcoke density @	87 lb/ft <sup>3</sup> ]

Cone Pile

Max. Height (h)	42 ft	[Height Range of 21 - 42 feet]
Angle (incline)	45 °	[Assumed]
Radius (r)	42.0 ft	[Calculated as follows: $r = h / \tan(\text{angle in radians})$ ]
Volume	77,585 ft <sup>3</sup>	[Calculated: $\text{Volume} = 1/3 \pi \cdot r^2 \cdot h$ ]
Surface Area	7,837 ft <sup>2</sup> /pile	[Calculated: $\text{Surface Area} = \pi \cdot r \cdot \text{SQRT}(r^2 + h^2)$ ]
Max. No. of Piles	25 piles	[Calculated: $((\text{Max. Petcoke Mass, tons}) \cdot (2,000 \text{ lbs/ton})) / (\text{density, lb/ft}^3) / (\text{Pile Volume, ft}^3)$ ]
Total Surface Area	194,171 ft <sup>2</sup>	[Calculated: $(\text{Surface Area, ft}^2/\text{pile}) \times (\text{Max. No. of Piles})$ ]
Base Area per Pile	5,542 ft <sup>2</sup> /pile	[Calculated: $\pi \cdot r^2$ ]
Total area occupied by piles	0.13 acre/pile 3.16 acres	

4) Determine Annual Pile Emissions

Emissions = EF \* Area

Where:

EF	1.02 (lb/ft <sup>2</sup> ·yr)	Calculated emission factor (above)
Area	194,171 (ft <sup>2</sup> )	Exposed pile area to the wind
Emissions	198,346 (lb/yr) 89.17 (ton/yr)	TSP Emission from the Pile

5) Determine Hourly Pile Emissions

Assumptions:

Hours per year: 8760 hrs/yr

Emissions	22.64 (lb/hr)	TSP Emission from the Pile
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**EU 006 Metcoke Storage Piles**

All equations in this tab are taken from AP-42 Chapter 13 Miscellaneous Sources Industrial Wind Erosion, 13.2.5, US EPA, November 2006.

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 EF emission factor (g/m<sup>2</sup>/yr)  
 k particle size multiplier (dimensionless)  
 N number of pile disturbances per year (1/yr)  
 P erosion potential corresponding to the fastest mile of wind for the *i*th period period disturbances (g/m<sup>2</sup>)

Aerodynamic Particle Size Multipliers (k)			
30 mm	<15 mm	<10 mm	<2.5 mm
1.0	0.6	0.5	0.2

Number of pile disturbances per year (N)  
 While only a portion of the pile is disturbed on a daily basis, the conservative estimate of 365 will be used.

Assumptions:

	LT/hr	ton/hr	ft <sup>3</sup> /hr	Capacity LT/yr	TPY	ft <sup>3</sup> /yr	Est. No. of Transfers per hr	per year
Frontend loader transfer to railcar hopper	300	336	13,467	700,000	784,000	31,422,846	166	387,936
Frontend loader transfer to barge hopper	0	0	0	700,000	784,000	31,422,846	0	387,936
	300	336	13,467	700,000	784,000	31,422,846	166	387,936

Est. Frontend loader bucket capacity: 3.0 yd<sup>3</sup> or 81 ft<sup>3</sup>

k 0.5 (dimensionless) [Assumed per table above for 10µm]  
 N 365 (1/yr)

The erosion potential function for a dry, exposed surface is:

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* friction velocity (m/s)  
 u<sub>t</sub>\* threshold friction velocity (m/s)

The threshold friction velocity has been conservatively estimated based on data from AP 42, Tables 13.2.5-1 & 13.2.5-2.

Metcoke u<sub>t</sub>\* 0.55 m/s

Information per the National Oceanic and Atmospheric Administration (NOAA) for Chicago, IL - O'Hare Airport for 2009  
[http://www.crh.noaa.gov/product.php?site=L\\_OT&issuedby=ORD&product=CL\\_A&format=CL&version=1&glossary=0](http://www.crh.noaa.gov/product.php?site=L_OT&issuedby=ORD&product=CL_A&format=CL&version=1&glossary=0)

	MPH	m/s
Highest Wind Speed	38	17
Highest Gust Wind Speed	51	23
AVERAGE		20

u<sub>10</sub> fastest wind speed of reference anemometer for period between disturbances (m/s)

u<sub>10</sub> 20 (m/s)

To convert the fastest wind speed (u<sub>10</sub>) from a reference anemometer height of 10m to the equivalent friction velocity (u\*), the logarithmic wind speed profile is used.

$$u^* = 0.053 u_{10} \quad u^* = 1.054 \text{ (m/s)}$$

**A. Emissions from the Metcoke Pile**

1) Determine the erosion potential (P) for the Metcoke

$$P = 58 (u^* - u_t^*)^2 + 25(u^* - u_t^*)$$

$$P = 0 \text{ for } u^* < u_t^*$$

Where:  
 u\* 1.054 friction velocity (m/s)  
 u<sub>t</sub>\* 0.55 threshold friction velocity (m/s)

P 27.34 (g/m<sup>2</sup>)

2) Determine emission factor for the Metcoke Pile

$$EF = \sum_{i=1}^N k P_i$$

Where:  
 k 0.5 (dimensionless)  
 N 365 (1/yr)

P	27.343 (g/m <sup>3</sup> )
EF	4990 (g/m <sup>2</sup> ·yr) 1.02 (lb/ft <sup>2</sup> ·yr)

3) Determine Size of the Pile

As a conservative simplifying assumption, assume the piles are cone shaped and are disturbed on a daily basis.

Max. Amount of Stockpiled Metcoke

75,000 LT or	84,000 Ton (short)	
3,366,733 ft <sup>3</sup>	[Calculated assuming the following density @	50 lb/ft <sup>3</sup> ]

Cone Pile

Max. Height (h)	42 ft	[Height Range of 21 - 42 feet]
Angle (incline)	45 °	[Assumed]
Radius (r)	42.0 ft	[Calculated as follows: $r = h / \tan(\text{angle in radians})$ ]
Volume	77,585 ft <sup>3</sup>	[Calculated: $\text{Volume} = 1/3 \pi r^2 h$ ]
Surface Area	7,837 ft <sup>2</sup> /pile	[Calculated: $\text{Surface Area} = \pi r \sqrt{r^2 + h^2}$ ]
Max. No. of Piles	43 piles	[Calculated: $\{(\text{Max. Metcoke Mass, tons}) * (2,000 \text{ lbs/ton}) / (\text{density, lb/ft}^3)\} / (\text{Pile Volume, ft}^3)$ ]
Total Surface Area	340,091 ft <sup>2</sup>	[Calculated: $(\text{Surface Area, ft}^2/\text{pile}) * (\text{Max. No. of Piles})$ ]
Base Area per Pile	5,542 ft <sup>2</sup> /pile	[Calculated: $\pi r^2$ ]
	0.13 acre/pile	
Total area occupied by piles	5.52 acres	

4) Determine Annual Pile Emissions

Emissions = EF \* Area

Where:		
EF	1.02 (lb/ft <sup>2</sup> ·yr)	Calculated emission factor (above)
Area	340,091 (ft <sup>2</sup> )	Exposed pile area to the wind
Emissions	347,403 (lb/yr) 173.70 (ton/yr)	TSP Emission from the Pile

5) Determine Hourly Pile Emissions

Assumptions:

Hours per year:	8760 hrs/yr	
Emissions	39.66 (lb/hr)	TSP Emission from the Pile

12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 1-C

TRC Environmental - Technical Memorandum

TRC Environmental Corporation  
708 Heartland Trail, Suite 3000  
Madison, WI 53717

Main 608.826.3600 Fax 608.826.3941

## Technical Memorandum

**From:** David J. Fox CCM, TRC Environmental Corp.

**Subject:** Air Quality Assessment of PM Emissions from a Sulfur Prill Storage Pile

**Date:** March 20, 2015

**Project No.:** 218716.0000

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### Introduction

Gulf Sulphur Services Ltd., LLLP ("GSS") owns a sulfur prilling facility located 12200 S. Carondelet Avenue in Chicago, Illinois, which is operated by Savage Services Corporation ("Savage"). The facility receives sulfur in molten form, typically in tank trucks, but occasionally in rail cars. The molten sulfur is unloaded via pump into a storage tank. The molten sulfur is eventually pumped from the storage tank to an enclosed priller structure. The prilling process involves passing the molten sulfur through forming trays (*i.e.*, trays with small holes) which creates droplets of molten sulfur that fall into a water bath. The droplets solidify upon entering the water bath and the resulting sulfur product is referred to as sulfur prill – pelletized, sphere-like aggregate material that is a neater, simpler form for handling, and which results in reduced dust. Emissions from the prilling operation are controlled by a wet gas scrubber. After the prill is cooled and screened to drain water, the pellets are conveyed out of the enclosed priller structure via open-top conveyors to an outdoor storage pile.

The outdoor storage pile area rests on an engineered foundation comprised of an impermeable membrane on which a layer of molten sulfur was applied that, when solidified, provides a solid surface on which the prill can be stored without becoming cross-contaminated (*e.g.*, as with soil, etc). The storage pile is approximately 2.46 acres. When needed for shipping, front-end loaders are used to transfer the prill from the storage pile to hoppers that deposit the prill into open-top conveyors, which transfer the prill to truck containers, rail cars, and occasionally barges on the Calumet River.

Savage Services has requested assistance performing a screening analysis to evaluate if fugitive dust from this storage pile has the potential to cause an impact offsite that exceed applicable national ambient air quality standards (NAAQS) for PM<sub>10</sub> and PM<sub>2.5</sub>. To this end, Savage Services has requested that TRC complete the air quality impact assessment.

### Air Quality Analysis

For this analysis TRC has selected a USEPA screening level air quality model called SCREEN3. By definition, a screening level air quality model will produce a conservative result, meaning an over-prediction of the actual impact from the source being modeled. The prill storage pile has been modeled



as an area source with dimensions that approximate its actual physical dimensions. Potential fugitive particulate matter emissions from the pile have previously been calculated to be 0.24 lb/hr. In the SCREEN3 model, these emissions are assumed to be equally distributed over the extent of the pile. For the purpose of this analysis, the model has been directed to make predictions of the impact of the dust emissions beginning at a distance of 2 meters from the pile and then extending out to 500 meters. The SCREEN3 model makes predictions of the maximum 1-hr predicted concentrations after evaluating impacts for approximately 30 different meteorological conditions (wind speeds and atmospheric stability) and 36 different wind directions. The USEPA has recommended conversion factors for taking the worst case 1-hr predicted values from the model output and converting them to 24-hr and annual concentrations for direct comparison against applicable national ambient air quality standards for PM<sub>10</sub> and PM<sub>2.5</sub>, which are based on 24-hr and annual averaging periods. The key input parameters used in the SCREEN3 model include the following:

Source Type:	Area Source
Source Area Dimension – Longer Side:	390 feet (119 m)
Source Area Dimension – Shorter Side:	330 feet (101 m)
Source Height:	42 feet (12.8 m)
PM Emission Rate:	0.24 lbs/hr (2.48E-06 g/s/m <sup>2</sup> )
Receptor Height:	0 feet (0 m)
Urban / Rural Option:	Urban
Distance to Closest Boundary	6.6 feet (2 m)

Based on these SCREEN3 input parameters, the attached SCREEN3 model output was generated, which includes a maximum 1-hour impact and the distance thereof from the source. Applying the USEPA recommended conversion factors, the impacts from the prill storage pile relative to the applicable NAAQs are as follows:

SCREEN3 Predicted Impacts	Savage Impact (µg/m <sup>3</sup> )	NAAQS, µg/m <sup>3</sup>	
		PM <sub>10</sub>	PM <sub>2.5</sub>
24-hr	4.2	150	35
annual	0.8	na	12

The model results show that the prill storage pile is predicted to have relatively small impacts of PM<sub>10</sub> and PM<sub>2.5</sub>, which are below the respective NAAQs for PM<sub>10</sub> and PM<sub>2.5</sub>.

Also attached is a spreadsheet summary of the model inputs, conversions and results in comparison to PM<sub>10</sub> and PM<sub>2.5</sub> air quality standards.

Attachments: SCREEN3 Model Output  
Summary of Model Inputs and Results

SCREEN Scenario 1

03/17/15  
15:20:52

\*\*\* SCREEN3 MODEL RUN \*\*\*  
\*\*\* VERSION DATED 13043 \*\*\*

SAVAGE SERVICES - CHICAGO, IL

SIMPLE TERRAIN INPUTS:

SOURCE TYPE = AREA  
EMISSION RATE (G/(S-M\*\*2)) = 0.248000E-05  
SOURCE HEIGHT (M) = 12.8000  
LENGTH OF LARGER SIDE (M) = 119.0000  
LENGTH OF SMALLER SIDE (M) = 101.0000  
RECEPTOR HEIGHT (M) = 0.0000  
URBAN/RURAL OPTION = URBAN

THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.  
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = 0.000 M\*\*4/S\*\*3; MOM. FLUX = 0.000 M\*\*4/S\*\*2.

\*\*\* FULL METEOROLOGY \*\*\*

\*\*\*\*\*  
\*\*\* SCREEN AUTOMATED DISTANCES \*\*\*  
\*\*\*\*\*

\*\*\* TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES \*\*\*

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
2.	3.326	1	1.0	1.0	320.0	12.80	34.
100.	9.187	4	1.0	1.1	320.0	12.80	39.
200.	10.42	5	1.0	1.1	10000.0	12.80	35.
300.	8.108	5	1.0	1.1	10000.0	12.80	29.
400.	5.999	5	1.0	1.1	10000.0	12.80	17.
500.	4.556	5	1.0	1.1	10000.0	12.80	0.

MAXIMUM 1-HR CONCENTRATION AT OR BEYOND 2. M:  
183. 10.53 5 1.0 1.1 10000.0 12.80 36.

\*\*\*\*\*  
\*\*\* SUMMARY OF SCREEN MODEL RESULTS \*\*\*  
\*\*\*\*\*

CALCULATION PROCEDURE	MAX CONC (UG/M**3)	DIST TO MAX (M)	TERRAIN HT (M)
SIMPLE TERRAIN	10.53	183.	0.

\*\*\*\*\*  
\*\* REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS \*\*  
\*\*\*\*\*

# SAVAGE SERVICES - MIDWEST FORMING FACILITY

## SCREEN3 Analysis of the Impact of PM Emissions from a Sulfur Prill Storage Pile

### Previous Calculated Parameters

PM Emission rate =	0.24 lb/hr	0.03 g/s
<b>Area Dimensions</b>		
Longer Side	390 ft	118.87 m
Shorter Side	330 ft	100.58 m
Area of storage pile	128,700 ft <sup>2</sup>	11,955 m <sup>2</sup>
Emissions per m <sup>2</sup>		2.48E-06 g/s/m <sup>2</sup>
Area Source Height	42 ft	12.80 m

Assumed Closest Distance to Boundary 2 meters

### Run SCREEN3

Maximum 1-hr Impact = 10.53 µg/m<sup>3</sup>

#### SCREEN3 Adjustments

1-hr to 24-hr	0.4
1-hr to annual	0.08

SCREEN3	Savage Impact	NAAQS, µg/m <sup>3</sup>	
Predicted Impacts	(µg/m <sup>3</sup> )	PM <sub>10</sub>	PM <sub>2.5</sub>
24-hr	4.2	150	35
annual	0.8	na	12

\*National Ambient Air Quality Standards

### Conclusion

Sulfur Prill storage pile is predicted to have a relatively small impact in comparison to NAAQS.

## **DAVID J. FOX, CCM**

### **EDUCATION**

M.S., Geological and Geophysical Sciences, University of Wisconsin - Milwaukee, 1982

B.A., Geography, University of Wisconsin - Milwaukee, 1979

### **PROFESSIONAL REGISTRATIONS/CERTIFICATIONS**

Certified Consulting Meteorologist, American Meteorological Society (#500)

### **AREAS OF EXPERTISE**

- Air quality modeling
- Air pollution control permitting
- Air toxics evaluations
- Wind resource assessments

### **REPRESENTATIVE EXPERIENCE**

Mr. Fox is a Certified Consulting Meteorologist with close to 30 years of continuous experience in the field of air pollution and wind resource identification and assessment. For air pollution assessment related projects, his responsibilities include dispersion modeling (ISCST3, AERMOD, CTSCREEN, SCREEN3, and others), air pathway risk assessment, permit application preparation, compliance evaluation, compliance alternative evaluations, emission estimation, and control equipment feasibility studies. For wind resource assessment projects, his responsibilities include QA/QC of observed wind data and projected wind resources.

### **Air Quality Modeling Assessments**

#### **Air Quality Modeling Projects (Senior Environmental Specialist)**

Completed multiple air quality modeling projects in the following states: Alabama, Arizona, California, Florida, Illinois, Indiana, Michigan, Iowa, Minnesota, Missouri, New York, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Washington, Virginia, Wisconsin and West Virginia

#### **Madison Metropolitan Sewerage District**

Conducted air quality analyses for facility that includes operation of biogas fired engines and boilers and blowers.

#### **Multiple Landfills, Various Locations**

Conducted air quality modeling analyses of both industrial and municipal landfill operations to assess the ambient impact of PM emissions and various hazardous air pollutants including the assessment of risk associated with operations.

**Greenfield Lead Recycling Facility**

Conducted air quality analyses for a greenfield lead recycling facility, from initial permitting efforts through additional modeling efforts, required to satisfy concerned citizens.

**Multiple Ethanol Manufacturing Facilities**

Conducted air quality modeling analyses for eight ethanol manufacturing facilities.

**Multiple Plywood and Composite Wood Products Facilities**

Completed low risk demonstration air analyses for twelve facilities subject to the plywood and composite wood products MACT standards.

**Utility-Scale Power Plants**

Performed air quality modeling analyses related to PSD permit applications and/or SIP developments for new or existing utility-size power generation plants fired by natural gas/oil and/or coal.

**Backup Power Generating Systems at Multiple Sites**

Completed air quality analyses/permit applications for diesel engine-powered electric backup generators for sites in Iowa.

**Pechiney Plastic Packaging, Inc. – Neenah, WI; Menasha, WI; Akron, OH; Minneapolis, MN; Asheville, NC; Cleveland, OH; Des Moines, IA (Senior Environmental Specialist)**

Performed air quality impact modeling assessments of the impact of hazardous air pollutants and/or criteria air pollutants for Pechiney facilities.

**International Paper**

Completed an air quality analysis of hydrogen sulfide, hydrogen chloride, and ammonia.

**Fort Howard Company**

Completed a Prevention of Significant Deterioration modeling analysis to support the client's application for a sludge combustor.

**MeadWestvaco**

Conducted air quality analyses for in excess of 50 stack sources of criteria and hazardous air pollutants (40 substances). The analyses were completed to assess the impact of changes required at the facility to comply with MACT standards.

**Mosinee Paper**

Evaluated the air quality impacts of operating strategies associated with changes needed to comply with MACT standards.

**Consolidated Papers**

Completed air quality analyses for emissions of hazardous air pollutants from the facility's kraft mill.

**Appleton Papers**

Completed air quality analyses to support the facility's permit application for a plant expansion.

**Wisconsin Tissue Mills**

Completed an air quality analysis of a number of hazardous air contaminants to support a new source permit application.

**Neenah Foundry – WI (Senior Environmental Specialist)**

Completed an air quality analysis to support a Prevention of Significant Deterioration Permit application for the facility as well as an evaluation of compliance with respect to State of Wisconsin hazardous air pollution regulations.

**Seaswirl Boats**

Evaluated the ambient air impacts of styrene for impact with respect to health and odor standards.

**Briggs and Stratton – Air Quality Modeling Projects (Senior Environmental Specialist)**

Completed air quality modeling projects in the following states: Alabama, Arizona, California, Florida, Illinois, Indiana, Michigan, Iowa, Minnesota, Missouri, New York, North Carolina, Ohio, Oklahoma, Oregon, South Carolina, Tennessee, Texas, Washington, Virginia, Wisconsin and West Virginia.

Completed an assessment of alternatives to bring a manufacturer of small internal combustion engines into compliance with air quality regulations, including particulate emission limits, opacity limits, and National Ambient Air Quality Standards.

**Mobil Research and Development, Three Separate Large Crude Oil and Gas Production Fields – North Midway, San Ardo, and South Belridge, CA (Senior Environmental Specialist)**

Completed comprehensive multipathway (from air emissions) risk assessments for all sources of air pollutants at the fields. Fields contained hundreds of individual air pollutant sources and more than 30 specific air pollutants, including metals, volatiles, and semivolatiles. The analyses were completed to satisfy California AB 2588 requirements.

**Mobil Research and Development, Medium-Sized Crude Oil and Gas Production Fields – Glenn County, Kern County, Los Angeles County, and Sutter County, CA (Senior Environmental Specialist)**

Completed comprehensive multipathway (from air emissions) risk assessment for all sources of air pollutants at the fields. Pollutants were metals, volatiles, and

semivolatiles. The analyses were completed to satisfy California “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**Brea Canyon Oil Production Company, Four Separate Small Crude Oil Production Fields – Southern CA (Senior Environmental Specialist)**

Completed comprehensive multipathway (from air emissions) risk assessments for all sources of air pollutants at the fields. Pollutants were metals, volatiles, and semivolatiles. The analyses were completed to satisfy California “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**Unocal Oil, Three Medium-Sized Crude Oil Production Fields – Southern CA (Senior Environmental Specialist)**

Completed comprehensive multipathway (from air emissions) risk assessments for all sources of air pollutants at the fields. Pollutants were metals, volatiles, and semivolatiles. The analyses were completed to satisfy California “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**Los Angeles County Heating, Power Plant for City Facilities – Los Angeles, CA (Senior Environmental Specialist)**

Completed a multipathway risk assessment (from air emissions) for all combustion sources at the facility, including boilers, cogenerators, and the facility’s cooling towers. Air pollutants included volatiles (benzene, formaldehyde) and semivolatiles (PAHs). The analysis was completed to satisfy California’s “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**City of Burbank, Power Plant – CA (Senior Environmental Specialist)**

Completed a multipathway risk assessment (from air emissions) for all combustion sources at the facility, including boilers, cogenerators, and the facility’s cooling towers. The analysis was completed to satisfy California’s “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**Santa Fe Pipeline, Three Separate Gasoline and Fuel Distribution Terminals – CA (Senior Environmental Specialist)**

Completed a comprehensive air pathway risk assessment for emissions of volatiles (e.g., benzene, xylene, toluene) from the fuel tank and piping system at the facility. This analysis was completed to satisfy California’s “Air Toxics Hotspots” (i.e., AB 2588) requirements.

**Griffith Micro Science, Three Ethylene Oxide Sterilization Facilities – CA (Senior Environmental Specialist)**

Completed a comprehensive air pathway risk assessment for emissions of ethylene oxide and products of combustion from boilers (such as benzene, formaldehyde, and PAHs). The analysis was completed to satisfy California’s “Air Toxics Hotspots” (i.e., AB 2588) requirements.



**Henkel Corporation, Manufacturer of Fatty Acids, Glycerine, and Methyl Esters – CA (Senior Environmental Specialist)**

Completed a comprehensive multipathway (via air emissions) risk assessment for emissions from boilers, vaporizers, and cooling towers. Emissions included metals, semivolatiles, and volatiles. The analysis was completed to satisfy California's "Air Toxics Hotspots" (i.e., AB 2588) requirements.

**Two Confidential Clients, Electroplating Facilities – Los Angeles, CA (Senior Environmental Specialist)**

Completed comprehensive multipathway (via air emissions) risk assessments for emissions of hexavalent chromium and other metals from electroplating operations. The analyses were completed to satisfy California's "Air Toxics Hotspots" (i.e., AB 2588) requirements.

**Consolidated Drum Reconditioning, Reconditioning of Used Storage Drums – CA (Senior Environmental Specialist)**

Conducted a comprehensive multipathway (via air emissions) health risk assessment for facility operations, including boilers, drum burn-out furnaces, coating booths, and drying ovens. Emissions included metals, semivolatiles, and volatiles. The analyses were completed to satisfy California's "Air Toxics Hotspots" (i.e., AB 2588) requirements.

**Prudential Overall Supply, Four Perchloroethylene Dry Cleaning Facilities – CA (Senior Environmental Specialist)**

Conducted a health risk assessment of air emissions of perchloroethylene from dry cleaning operations to satisfy California's "Air Toxics Hotspots" (AB 2588) requirements.

**Moulton Niguel Water, Municipal Water Utility – CA (Senior Environmental Specialist)**

Conducted a health risk assessment of emissions of hazardous air pollutants from a municipal water treatment plant. This analysis was completed to satisfy California's "Air Toxics Hotspots" (i.e., AB 2588) requirements.

**Newport News Shipbuilding – VA (Senior Environmental Specialist)**

Completed an air quality assessment of a shipbuilding facility using an air dispersion model. This facility includes multiple processes, including foundry, metal fabrication, metal and wood coating, and boilers.

**Petersen Builders – WI (Senior Environmental Specialist)**

Completed an analysis to estimate emissions of hazardous air contaminants from a manufacturer of Mine-Counter-Measure Ships, and evaluated their compliance options.



**Rhineland Paper Company – WI (Senior Environmental Specialist)**

Assisted the client in meeting State of Wisconsin Implementation Plan requirements for the facility's coal-fired boilers by developing alternative methods of demonstrating compliance with ambient air quality standards.

**Wisconsin Power and Light – WI (Senior Environmental Specialist)**

Assisted the client in obtaining regulatory relief from a proposed Wisconsin Department of Natural Resources (WDNR) requirement to lower the sulfur content of coal used at the client's Rock River facility, based upon a review of the WDNR's air quality modeling analysis.

**Wisconsin Regional Medical Center – Milwaukee, WI (Senior Environmental Specialist)**

Prepared an indirect source permit application (including the air quality analysis) for new parking facilities at a medical center.

**W.H. Brady – WI (Senior Environmental Specialist)**

Developed a flexible compliance strategy for air toxics for a coated products manufacturing facility. The air quality modeling project included 38 hazardous substances and 15 emission points.

**Multiple Clients, State of Wisconsin NR 445 (HAP) Compliance Plan Development – WI (Senior Environmental Specialist, Project Manager)**

Developed air toxics compliance plans for numerous facilities in Wisconsin, including the following:

- American National Can (in both Neenah and Appleton)
- Appleton Papers
- Cook Composites
- Fort Howard Paper
- Hartwig Manufacturing
- Kemira Paper Chemicals
- Pierce Manufacturing
- Richardson Brothers Furniture
- Sunrise Packaging
- Thilmany Paper
- Wisconsin Precision Casting, Grantech
- Wisconsin Tissue Mills

**Wind Energy****Multiple Wind Farm Clients – NY, MI, WI**

Evaluated and provided QA/QC of wind data obtained from on-site wind observation networks. Conducted overall QA/QC of wind energy assessment studies.

**SPECIALIZED TRAINING**

- 40-Hour Hazardous Waste Operations Training
- Air Pathway Analysis at Superfund Sites - USEPA Course
- Dispersion of Air Pollution - Theory and Model Application - USEPA Course
- Introduction to Air Toxics - USEPA Course
- Organic Air Emissions from Waste Management Facilities - USEPA Course

**SELECTED PUBLICATIONS AND PRESENTATIONS**

2010. Revised National Ambient Air Quality Standards and Permitting Implications for Lead, Nitrogen Dioxide, PM2.5 and Sulfur Dioxide. Presentation to Environmental Managers at FET Chapter Meeting. February 2010. Madison, Wisconsin.

2005-Current. Currently providing Annual Training for Air Pollution Control Regulations and Permitting Applicability to a client.

1994. Dispersion modeling and risk assessment. Presented at the Casting Industry Clean/Air Environmental Conference. September 14-16, 1994. Kansas City, Missouri.

1992. Comprehensive health risk assessments for multi-source/multi-pollutant facilities. Presented at the 85<sup>th</sup> Annual Meeting and Exhibition of the Air and Waste Association Annual Conference. June 21-26, 1992. Kansas City, Missouri.

**12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 1-D

Permits and Licenses

CITY OF CHICAGO  
POLLUTION PREVENTION UNIT

ISSUED: 02/05/2015



Rahm Emanuel  
Mayor

2015  
CERTIFICATE OF OPERATION

Savage Services Corporation  
Brad Swanson  
12200 S Carondelet Avenue  
Chicago, IL 60633

PLANT NUMBER: ENVAIR129018  
PROVIDER CODE:  
Phone: (773)359-8611

INTERVIEWED:

EXAMINED BY: Emmanuel Adesanya

ON: 06/26/2014

# OF ITEMS	EQUIPMENT DESCRIPTION	EQUIP. CODE
1	804 - AREA, MATERIAL PROCESSING	804
2	804 - AREA, MATERIAL PROCESSING	804
2	703 - CONVEYOR, OTHER	703
1	325 - AERATOR, COOLING TOWER	325
1	042 - SCRUBBER, WET	042
4	745 - RAILROAD/BARGE LOAD/UNLOAD	745
1	725 - TANK, OTHER STORAGE	725
3	LOADING/UNLOADING, TRUCK	384

THIS CERTIFICATE OF OPERATION is issued for the above-described equipment following the applicant's certification that the equipment is in compliance with all standards set forth in Section 11-4-670 of the Chicago Municipal Code. The equipment must be operated in conformance with Chapter 11-4 of the Code and all terms and conditions of this Certificate. Issuance of this certificate shall not transfer, assign or otherwise affect any liability to the City of Chicago, CDPH, their employees, or agents regarding this Facility. Further, issuance of this certificate does not relieve the operator of any liability with regards to the Facility. CDPH representatives may inspect the Facility and the Facility records at any reasonable time to ensure compliance with all applicable rules, regulations and standards, as well as all conditions necessary to protect public health and safety. This certificate may be revoked at any time in accordance with Section 11-4-030(c) of the Code.

Bechara Choucair, MD  
Commissioner

By:

A handwritten signature in black ink, appearing to read "Otis Omenazu".

Otis Omenazu  
Chief Air Engineer

# CITY OF CHICAGO

## LICENSE CERTIFICATE

NON-TRANSFERABLE

BY THE AUTHORITY OF THE CITY OF CHICAGO, THE FOLLOWING SPECIFIED LICENSE IS HEREBY GRANTED TO

NAME: SAVAGE SERVICES CORPORATION  
DBA: SAVAGE SERVICES CORPORATION  
AT: 12200 S. CARONDOLET AVE., Floor 1  
CHICAGO, IL 60633

PRINTED ON:  
03/26/2014

LICENSE NO.: 2088645  
LICENSE: Manufacturing Establishments

CODE: 1009

FEE: \$\*\*\*\*275.00

PRESIDENT: ALLEN B. ALEXANDER  
SECRETARY: KELLY FLINT

This license is a privilege granted and not a property right. This license is the property of the City of Chicago.

THIS LICENSE IS ISSUED AND ACCEPTED SUBJECT TO THE REPRESENTATIONS MADE ON THE APPLICATION THEREFOR, AND MAY BE SUSPENDED OR REVOKED FOR CAUSE AS PROVIDED BY LAW, LICENSEE SHALL OBSERVE AND COMPLY WITH ALL LAWS, ORDINANCES, RULES AND REGULATIONS OF THE UNITED STATES GOVERNMENT, STATE OF ILLINOIS, COUNTY OF COOK, CITY OF CHICAGO AND ALL AGENCIES THEREOF.

WITNESS THE HAND OF THE MAYOR OF SAID CITY AND THE CORPORATE SEAL THEREOF  
THIS 16 DAY OF APRIL, 2014

EXPIRATION DATE: April 15, 2016

ATTEST:

*Rahn Emanuel*

*Suzanne J. Mendez*

ACCOUNT NO. 360982 SITE: MAYOR  
TRANS NO.

CITY CLERK

THIS LICENSE MUST BE POSTED IN A CONSPICUOUS PLACE UPON THE LICENSED PREMISES.







# ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19506, SPRINGFIELD, ILLINOIS 62794-9506 - (217) 782-2113

PAT QUINN, GOVERNOR

LISA BONNETT, DIRECTOR

217/785-1705

## REGISTRATION CONFIRMATION - CHANGED STATUS

October 1, 2013

Savage Services Corp.  
Attn: Brad Swanson  
12200 South Carondolet Avenue  
Chicago, Illinois 60633

RE: ROSS Program  
ID #: 031600GWV  
Application #: 10030011  
Location: 12200 South Carondolet Avenue, Chicago, IL

Dear Mr. Swanson:

The Illinois EPA hereby acknowledges receipt of your registration and confirms that your source has been registered in the Registration of Smaller Sources (ROSS) Program. The ROSS Program regulations can be found at 35 Ill. Adm. Code 201.175.

Although the terms and conditions of previously issued air permits do not apply during the period the source is registered as a ROSS eligible source, the source must still comply with all applicable laws and regulations.

If you have changed or intend to change this source in a way that it will no longer be eligible for the ROSS Program, you must notify the Illinois Environmental Protection Agency, Division of Air Pollution Control, Air Permit Section, 1021 N. Grand Avenue East, Springfield, Illinois 62702 in writing as required by 35 Ill. Adm. Code 201.175(g) and comply with the terms of the existing permit(s) for the source. At that time, your source's status will be changed from being a ROSS eligible source back to a permitted source. Please note, however, that if you have or will be making changes to the source such that it includes activities, equipment or emissions that are not consistent with the terms of your existing lifetime operating permit, you may be required to revise your permit or obtain additional permits as required by 35 Ill. Adm. Code 201.175(g).

As a ROSS participant, the annual payment of your Air Pollution Control Site Fee will verify your source's renewed eligibility for the ROSS Program and maintain your registration.

For further information on the ROSS Program please visit the website at [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro). If you have any questions concerning this, please contact Lori Pennington at 217/785-1720.

Sincerely,

Robert W. Bernoteit, Acting Manager  
Permit Section  
Division of Air Pollution Control

RWB:LP:psj

cc: Region 1  
Permit File



# ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 NORTH GRAND AVENUE EAST, P.O. BOX 19506, SPRINGFIELD, ILLINOIS 62794-9276

PAT QUINN, GOVERNOR

JOHN KIM, INTERIM DIRECTOR

2/7/2012

## **Site Location:**

Savage Services Corp  
12260 S Carondolet Ave  
Chicago, IL 60633

**ID #: 031600GWV**

## **NOTICE OF ROSS ELIGIBILITY**

As required by Public Act 097-0095, the Illinois Environmental Protection Agency (Illinois EPA) has created a new **Registration of Smaller Sources (ROSS)** program (35 Ill. Adm. Code 201.175). The program is intended to simplify air regulatory requirements by requiring sources with low air emissions to register with the Illinois EPA rather than acquiring or maintaining an air permit.

**Air emissions reported on your source's 2010 Annual Emission Report indicate your source may be eligible for the ROSS program. If eligible, your source must register no later than your annual Air Pollution Control Site Fee payment date in State Fiscal Year 2013 (July 1, 2012 - June 30, 2013).** (See the attached factsheet for a list of all eligibility criteria)

To register, complete and return the attached ROSS Registration Form to the Illinois EPA, or for your convenience, the Illinois EPA is nearing completion of an online registration and fee payment system for ROSS participants that will be found at: [www.ienvconnect.com/enviro](http://www.ienvconnect.com/enviro). Existing sources do not need to submit their annual site fee for ROSS until they receive their billing statement from Illinois EPA. (Your source's **Air Pollution Control Site Fee payment due date** will continue to be consistent with the *calendar month* of your initial billing anniversary date of: .)

Upon ROSS registration, the status of your source will be changed from a permitted source to a ROSS eligible source.

In addition, the State of Illinois offers free environmental assistance to small businesses in understanding their environmental requirements. If you have additional questions concerning the ROSS program or need help in determining your eligibility for ROSS, visit: [www.ienvconnect.com/enviro](http://www.ienvconnect.com/enviro) or contact the **Department of Commerce & Economic Opportunity's Small Business Environmental Assistance Program** at 800-252-3998.

As an additional service, the Illinois Small Business Environmental Assistance Program will host informational meetings regarding the ROSS Program in March. Visit the program website above or text "IL SBEAP" to 22828 to receive training announcements and subscribe to the program's electronic newsletter "Clean Air Clips" for regulatory updates.



# Registration of Smaller Sources (ROSS) Program

## What is the Registration of Smaller Sources Program?

As required by Public Act 097-0095, the Illinois Environmental Protection Agency (Agency) has created a new ROSS Program that is believed to apply to more than 3,000 permitted sources which combined produce less than 1% of the air pollution in the State of Illinois. The program is intended to simplify air regulatory requirements by requiring sources with low emissions to register with the Agency rather than acquiring an air permit. It is important to note that although the source may no longer be subject to permitting requirements, the source must still comply with all applicable environmental laws and regulations. The ROSS regulation can be found at 35 Ill. Adm. Code 201.175.

Under the ROSS program, smaller sources eligible for registration will avoid several potentially burdensome regulatory obligations and their associated costs. For example, qualifying small air emission sources will no longer be required to:

- Apply for air construction or air operating permits;
- Wait for the Illinois EPA to complete an air application review and issue an air permit before commencement of construction of a project;
- Pay both air construction permit application and air operating permit fees;
- Submit Annual Emission Reports.

## How do I determine if I am ROSS eligible and must register with the Agency under the ROSS?

Sources meeting the following ROSS eligibility criteria must register:

- Not required to get a Title V or Clean Air Act Permit Program (CAAPP) permit
- Not required to get a Federally Enforceable State Operating Permit (FESOP)
- Not required to get a permit under the New Source Performance Standards (NSPS) or under the National Emission Standards for Hazardous Air Pollutants (NESHAP) or by USEPA.
- Actual emissions from the source's emission units are less than the following limits for the prior calendar year\*:
  - 5.0 Tons/yr of combined pollutants (particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide and volatile organic material)
  - 0.50 Tons/yr of combined Hazardous Air Pollutants (HAPs)\*\*

- 0.05 Tons/yr of mercury air emissions
- 0.05 Tons/yr of lead air emissions

\* Do not include emission units that are exempt from the permitting requirements by 35 Ill. Adm. Code 201.146 in your actual emissions calculations (a list of these exemptions can also be found in the publication "Does My Business Need An Air Pollution Control Permit?")

\*\* A list of HAPs can be found at:

<http://www.epa.gov/ttn/atw/188polls.html>

- If a new source, the sum of the anticipated estimated actual annual emissions from all non-exempt emission units associated with the source must meet the limits as stated above. If the source has been operating less than one calendar year, projected estimated emissions may be used for all of the remaining months in the prior calendar year.
- Emission units or source is not subject to maximum achievable control technology under 40 CFR Part 61 or the NESHAP under 40 CFR Part 63 unless it is categorized as an area source.
- Emission units at the source are not used as thermal desorption systems pursuant to 35 Ill. Adm. Code 728 Table F or as an incinerator system.
- The source is not subject to local siting review under Section 39.2 of the Act.

*Note: Permitted sources that reported emission levels on their Annual Emission Reports consistent with the ROSS eligibility criteria will be sent information regarding the ROSS program the first year of the program.*

## Is there a fee and is there a deadline to register?

Yes, the annual registration fee is \$235 and there are registration deadlines. Payment of the annual air pollution control site fee will serve as the owner or operator's verification that the source continues to meet the eligibility criteria each year. The registration deadlines are as follows:

- Sources holding a permit must register no later than their annual fee payment date in state fiscal year 2013 (July 1, 2012 through June 30, 2013). The registration fee is due by this date also.
- The owner or operator of an operating source not holding a permit shall register no later than July 1, 2012 and payment of the fee is due at the time of registration.
- The owner or operator of a new source shall register at least 10 days before commencing construction or operation and may commence construction or operation 10 days after submittal to the Agency. Fee payment is due at the time of registration.



## How do I register under the ROSS Program?

If your source meets the above eligibility criteria, complete form ROSS200 and return it to the Illinois EPA Bureau of Air address on the form. Currently permitted sources may submit the registration form without fee payment, however, ROSS registration fees must be paid by your annual site fee due date for State Fiscal Year 2013.

For your convenience, the Illinois EPA offers online registration and fee payment. Electronic payment methods include: electronic check, debit, or credit card transactions. Electronic payments will incur a convenience fee to cover expenses relating to this payment option.

For links to the ROSS Registration form, online registration and fee payment visit: [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro)

## What are my regulatory requirements under ROSS?

ROSS sources are required to keep the following records and make them available for inspection by the Agency:

- A description of the emission units associated with the source and their associated control devices;
- A description of control efficiency or emission rates of any control devices that are relied upon to meet the ROSS eligibility criteria;
- Documentation of the source's actual emissions and calculations demonstrating that the source is eligible for ROSS. This documentation may include, but is not limited to, annual material usage or emission rates;
- A copy of the source's initial registration; and
- A copy of the source's annual fee payment for at least the most recent 5 calendar years.

The Illinois EPA must also be notified in writing within 45 days if there is a change in the name, address, or telephone number of the source or if the person responsible for submitting and retaining copies of the registration information and the records has changed per 35 Ill. Adm. Code 201.175(f). Visit [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro) for additional information.

Payment of the annual fee will serve as the owner or operator's verification that the source continues to meet the eligibility criteria and will automatically renew the source's registration under ROSS.

Many state and federal environmental requirements may apply to sources regardless of permit status. Many times these requirements are reinforced as permit terms or conditions. It is important to note that sources must still comply with all applicable environmental laws and regulations regardless if they are a permitted or registered ROSS source. These requirements may include but are not limited to best management practices, use of certain materials or equipment, record keeping, reporting and monitoring requirements. If you have questions regarding your compliance requirements, you may contact the Small Business Environmental Assistance

Program at 800/252-3998 or visit [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro) for additional guidance materials.

## What happens to my existing state lifetime operating permit if I meet the ROSS eligibility criteria and have to register?

Existing state lifetime operating permits for ROSS eligible sources will be kept in the source's file at the Illinois EPA. While the source is registered under ROSS, the source no longer has to comply with the terms and conditions of the permit. Should the source's eligibility for the ROSS program change, the source must notify the Agency within 90 days of the source's annual fee payment date that it will comply with the terms of its permit and the source's status will be changed from a ROSS eligible source to a permitted source. Visit [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro) for more information. If your operation has changed since the issuance of the lifetime operating permit and now includes activities, equipment or emissions that are not consistent with the terms of your permit, you may be required to obtain a new or revised permit per 35 Ill. Adm. Code 201.175(g).

If the source was not constructed or operated at the time of initial registration and has actual emissions in excess of the eligibility levels during the first or second year of operations, the owner or operator must apply for an operating permit and pay applicable construction permit application fees per 35 Ill. Adm. Code 201.175(g).

The owner or operator of a source that did not have a permit prior to registration must apply for a permit within 90 days of the source's annual fee payment date if they fail to meet the eligibility criteria per 35 Ill. Adm. Code 201.175(g).

## Am I required to re-enter the ROSS Program after I triggered permit requirements the previous calendar year but emissions from the current calendar year again meet ROSS eligibility criteria?

Yes, re-entry into the ROSS program is required if a source determines that the sum of the actual emissions associated with the source meet the ROSS eligibility criteria for the prior calendar year per 35 Ill. Adm. Code 201.175(h).



For More Information:

The State of Illinois provides free assistance to Illinois small businesses in understanding and complying with their environmental requirements. If you have questions or would like more information regarding the ROSS Program or other state or federal environmental requirements, contact the Illinois Department of Commerce & Economic Opportunity's Small Business Environmental Assistance Program at 800-252-3998 or visit [www.ienconnect.com/enviro](http://www.ienconnect.com/enviro).

**12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 1-E

U.S. Environmental Protection Agency data on GSS Facility

## Menu



# Detailed Facility Report

## Facility Summary

**SAVAGE SERVICES CORP**  
**12260 S CARONDOLET AVE, CHICAGO, IL 60633** ⓘ

### Facility Information (FRS)

FRS ID: 110040531868  
 EPA Region: 05  
 Latitude: 41.67361  
 Longitude: -87.55  
 Locational Data Source: EIS  
 Industry:  
 Indian Country: N

### Regulatory Interests

Clean Air Act: Operating Minor (1703106003)  
 Clean Water Act: No Information  
 Resource Conservation and Recovery Act: No Information  
 Safe Drinking Water Act: No Information

### Also Reports

Air Emissions Inventory (EIS): 14971511  
 Greenhouse Gas Emissions (eGGRT): No Information  
 Toxic Releases (TRI): No Information

### Enforcement and Compliance Summary ⚠

Statute	Insp (5 Years)	Date of Last Inspection	Current Compliance Status	Qtrs in NC (of 12)	Qtrs in Significant Violation	Informal Enforcement Actions (5 years)	Formal Enforcement Actions (5 years)	Penalties from Formal Enforcement Actions (5 years)	EPA Cases (5 years)	Penalties from EPA Cases (5 years)
CAA			No Violation	0	0					

## Facility/System Characteristics

### Facility/System Characteristics

Statute	Identifier	Universe	Status	Areas	Permit Expiration Date	Indian Country	Latitude	Longitude
CAA	110040531868					N	41.67361	-87.55
CAA	1703106003	Other Minor	Operating	SIP, NSPS		N		
CAA	14971511		Operating			N	41.673608	-87.55

### Facility Address

System	Identifier	Facility Name	Facility Address
FRS	110040531868	SAVAGE SERVICES CORP	12260 S CARONDOLET AVE, CHICAGO, IL 60633
AFS	1703106003	SAVAGE SERVICES CORP	12200 S CARONDOLET AVE, CHICAGO, IL 60633
EIS 2011	14971511	Savage Services Corp	12260 S Carondelet Ave, Chicago, IL 60633

### Facility SIC Codes

System	Identifier	SIC Code	SIC Desc
AFS	1703106003	5052	

### Facility NAICS Codes

System	Identifier	NAICS Code	NAICS Desc
EIS 2011	14971511	423520	Coal and Other Mineral and Ore Merchant Wholesalers
AFS	1703106003	423520	Coal and Other Mineral and Ore Merchant Wholesalers

### Facility Tribe Information

Tribal Name	EPA Tribal ID	Distance to Tribe (miles)
No data records returned		

## Enforcement and Compliance

### Compliance Monitoring History (5 years)

Statute	Source ID	System	Inspection Type	Lead Agency	Date	Finding
CAA	1703106003	AFS	EPA PCE/OFF-SITE	EPA	09/12/2014	
CAA	1703106003	AFS	EPA PCE/ON-SITE	EPA	07/02/2014	
CAA	1703106003	AFS	EPA PCE/OFF-SITE	EPA	10/15/2014	
CAA	1703106003	AFS	EPA PCE/OFF-SITE	EPA	10/03/2014	

Entries in italics are not considered inspections in official counts.

### Compliance Summary Data

Statute	Source ID	Current SNC/HPV	Description	Current As Of	Qtrs in NC (of 12)
CAA	1703106003	No		03/28/2015	0

### Three Year Compliance Status by Quarter

Statute	Program/Pollutant/Violation Type	QTR 1	QTR 2	QTR 3	QTR 4	QTR 5	QTR 6	QTR 7	QTR 8	QTR 9	QTR 10	QTR 11	QTR 12
CAA	(Source ID: 1703106003)	10/01-12/31 2011	01/01-03/31 2012	04/01-06/30 2012	07/01-09/30 2012	10/01-12/31 2012	01/01-03/31 2013	04/01-06/30 2013	07/01-09/30 2013	10/01-12/31 2013	01/01-03/31 2014	04/01-06/30 2014	07/01-09/30 2014
	Facility-Level Status	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol	No Viol
	HPV History												
	Program/Pollutant in Current Violation												
	CAA SIP												
	CAA NSPS												

### Informal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date
No data records returned				

### Formal Enforcement Actions (5 Years)

Statute	Source ID	Type of Action	Lead Agency	Date	Penalty	Penalty Description
No data records returned						

### ICIS Case History (5 years)

Primary Law/Section	Case No.	Case Type	Lead Agency	Case Name	Issued/Filed Date	Settlement Date	Federal Penalty	State/Local Penalty	SEP Cost	Comp Action Cost
No data records returned										

## Environmental Conditions

### Water Quality

Permit ID	Watershed (HUC 8)	Watershed Name (HUC 8)	Watershed (HUC 12)	Watershed Name (HUC 12)	Receiving Waters	Impaired Waters	Combined Sewer System?
110040531868	04040001	LITTLE CALUMET-GALIEN	040400010603	Calumet River-Frontal Lake Michigan		No	

### Air Quality

Non-Attainment Area?	Pollutant(s)
Yes	Ozone
No	Lead
Yes	Particulate Matter

## Pollutants

### TRI History of Reported Chemicals Released in Pounds per Year at Site ⓘ

TRI Facility ID	Year	Total Air Emissions	Surface Water Discharges	Off-Site Transfers to POTWs	Underground Injections	Releases to Land	Total On-site Releases	Total Off-site Releases
No data records returned								

### TRI Total Releases and Transfers in Pounds by Chemical and Year

Chemical Name
No data records returned

## Demographic Profile

### Demographic Profile of Surrounding Area (1 Mile)

This section provides demographic information regarding the community surrounding the facility. ECHO compliance data alone are not sufficient to determine whether violations at a particular facility had negative impacts on public health or the environment. Statistics are based upon the 2010 US Census and American Community Survey data, and are accurate to the extent that the facility latitude and longitude listed below are correct. The latitude and longitude are obtained from the EPA Locational Reference Table (LRT) when available.

Radius of Area:	1	Land Area:	92%	Households in Area:	790
Center latitude:	41.67361	Water Area:	8%	Housing Units in Area:	818
Center Longitude:	-87.55	Population Density:	\$18/sq.mi.	Households on Public Assistance:	16
Total Persons:	2,278	Percent Minority:	55%	Persons Below Poverty Level:	1,037
<b>Race Breakdown</b>		<b>Persons (%)</b>		<b>Age Breakdown</b>	
White:	1,690 (74.19%)	Child 5 years and younger:	130 (5.71%)	Minors 17 years and younger:	563 (24.71%)
African-American:	61 (2.68%)	Adults 18 years and older:	1,716 (75.33%)	Seniors 65 years and older:	400 (17.56%)
Hispanic-Origin:	1,142 (50.13%)				
Asian/Pacific Islander:	24 (1.05%)				
American Indian:	5 (.22%)				
Other/Multiracial:	499 (21.91%)				
<b>Education Level (Persons 25 &amp; older)</b>		<b>Persons (%)</b>		<b>Income Breakdown</b>	
Less than 9th Grade:	59 (3.56%)	Less than \$15,000:	92 (9.55%)	\$15,000 - \$25,000:	104 (10.8%)
9th through 12th Grade:	145 (8.76%)	\$25,000 - \$50,000:	301 (31.26%)	\$50,000 - \$75,000:	200 (20.77%)
High School Diploma:	563 (34%)	Greater than \$75,000:	266 (27.62%)		
Some College/2-yr:	637 (38.47%)				
B.S./B.A. or More:	252 (15.22%)				

**12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-A

Overall Site Plan







**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

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# GSS EXHIBIT 2-B

'As Built' Survey

**William, David A. Measurement**  
 Surveyor  
 License No. 123456789  
 State of Illinois

**LEGEND**

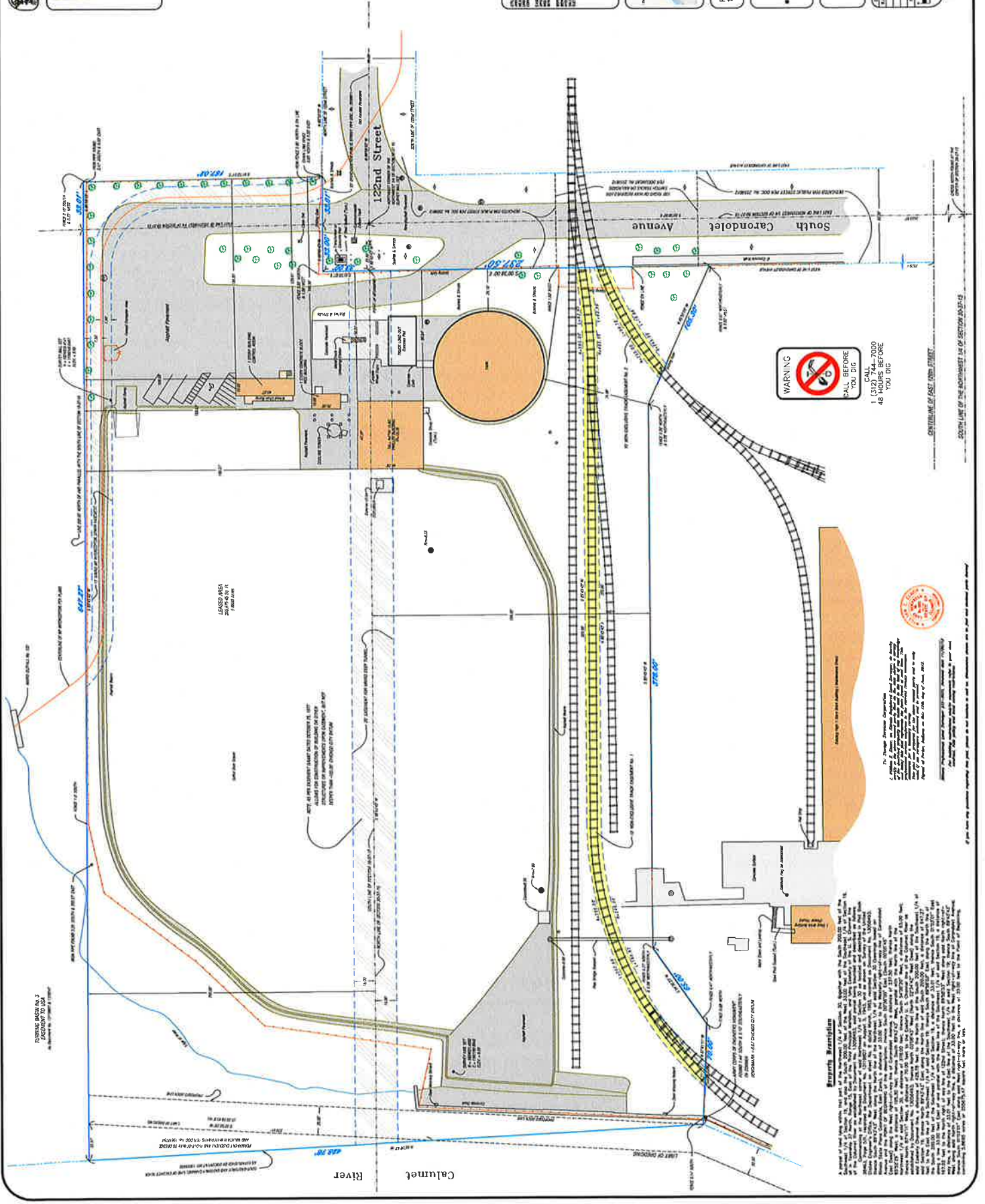
[Symbol]	Property Boundary
[Symbol]	Survey Boundary
[Symbol]	Right-of-Way
[Symbol]	Utility Line
[Symbol]	Water Feature
[Symbol]	Structure
[Symbol]	Setback Line
[Symbol]	Other

**NOTICE TO THE PUBLIC**  
 THIS SURVEY IS BASED ON THE RECORDS OF THE SURVEYOR'S OFFICE AND THE FIELD NOTES OF THE SURVEYOR. IT IS THE RESPONSIBILITY OF THE CLIENT TO VERIFY THE ACCURACY OF THE DATA PROVIDED TO THE SURVEYOR. THE SURVEYOR DOES NOT WARRANT THE ACCURACY OF THE DATA PROVIDED TO THE SURVEYOR.

**PROJECT INFORMATION**  
 PWS CHEMICAL SOLUTIONS, INC.  
 1222nd Street  
 Chicago, Illinois, 60633

**SAVAGE**  
 PROJECT NO. 123456789  
 DATE: 12/31/2023

**BOUNDARY SURVEY**  
 OF LEASE AREA



**WARNING**  
 CALL BEFORE YOU DIG  
 1 (312) 744-7000  
 48 HOURS BEFORE YOU DIG

**Surveyor's Declaration**  
 I, William David A. Measurement, Surveyor, License No. 123456789, State of Illinois, do hereby certify that I am a duly licensed and qualified surveyor, and that I have personally supervised the execution of this survey. I have read the foregoing plat and the accompanying field notes, and I certify that the same are a true and correct representation of the facts as shown in the field and as shown on the plat. I have not observed any fraud or irregularity in the execution of this survey, and I have not observed any fraud or irregularity in the preparation of this plat. I have not observed any fraud or irregularity in the execution of this survey, and I have not observed any fraud or irregularity in the preparation of this plat. I have not observed any fraud or irregularity in the execution of this survey, and I have not observed any fraud or irregularity in the preparation of this plat.

IF YOU HAVE ANY QUESTIONS REGARDING THIS PLAT, PLEASE CONTACT THE SURVEYOR AT THE ADDRESS LISTED ABOVE OR BY PHONE AT THE NUMBER LISTED ABOVE. THE SURVEYOR'S OFFICE IS LOCATED AT 123456789, CHICAGO, ILLINOIS, 60633. THE SURVEYOR'S PHONE NUMBER IS (312) 744-7000. THE SURVEYOR'S FAX NUMBER IS (312) 744-7001. THE SURVEYOR'S E-MAIL ADDRESS IS WDA@SAVAGE-SURVEY.COM. THE SURVEYOR'S WEBSITE IS WWW.SAVAGE-SURVEY.COM. THE SURVEYOR'S SOCIAL MEDIA PAGES ARE FACEBOOK.COM/SAVAGE-SURVEY, TWITTER.COM/SAVAGE-SURVEY, AND LINKEDIN.COM/company/savage-survey.

**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**

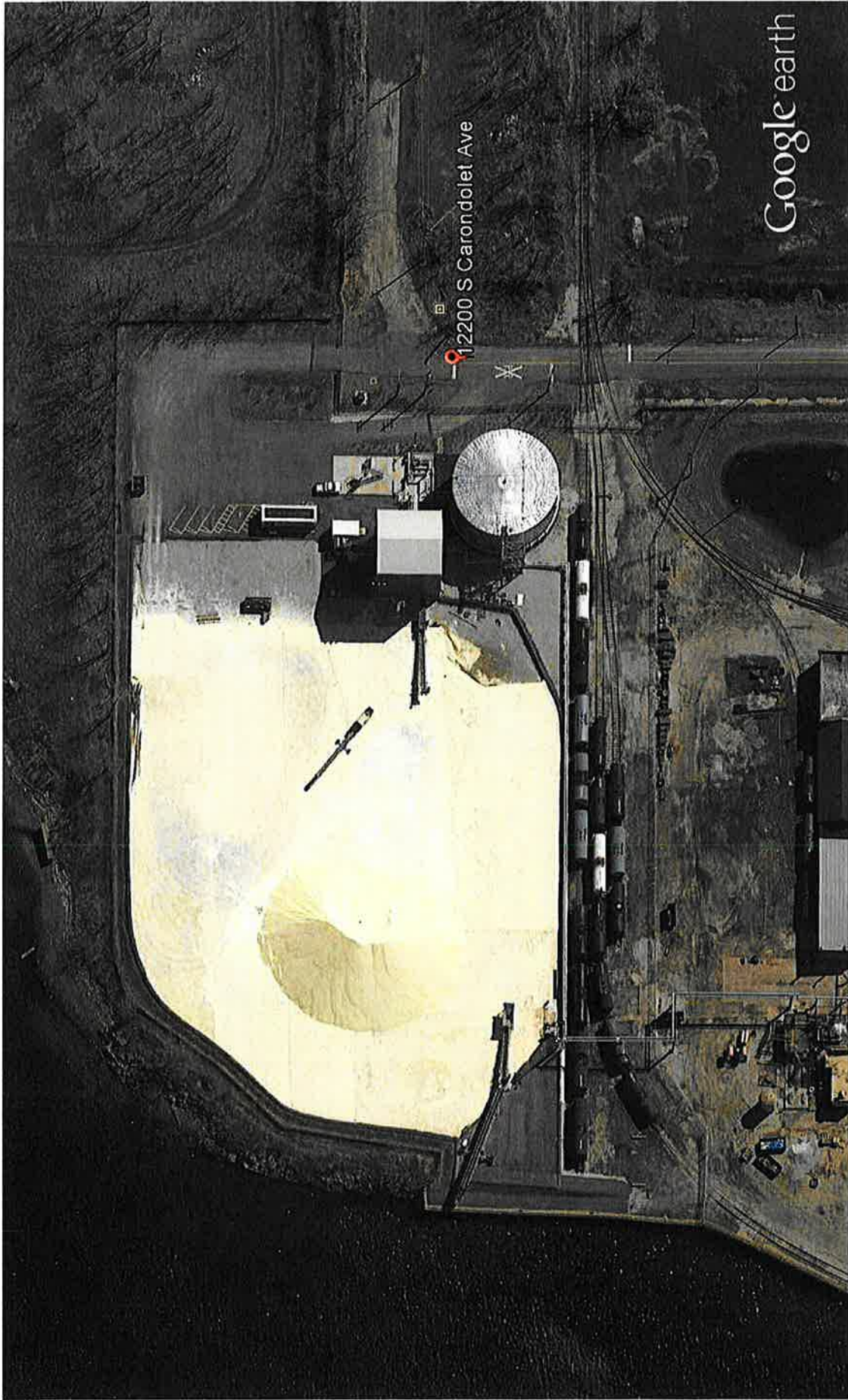
*Request for Variations from Regulations*

(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-C

Aerial Photos and Area Drawing





12200 S Carondolet Ave

Google earth

Google earth

feet  
meters

100

600







Google earth

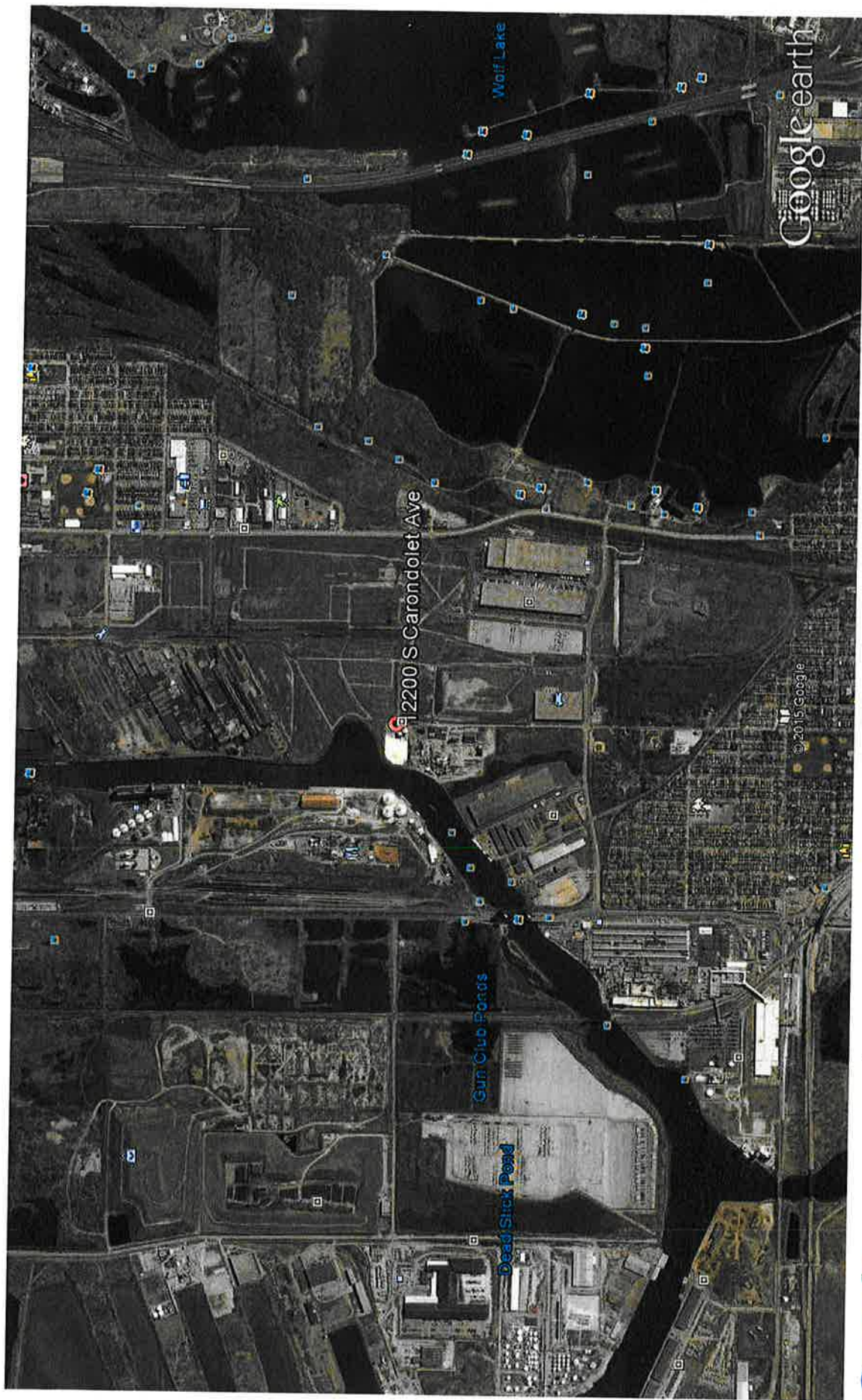
feet  
meters

2000

800





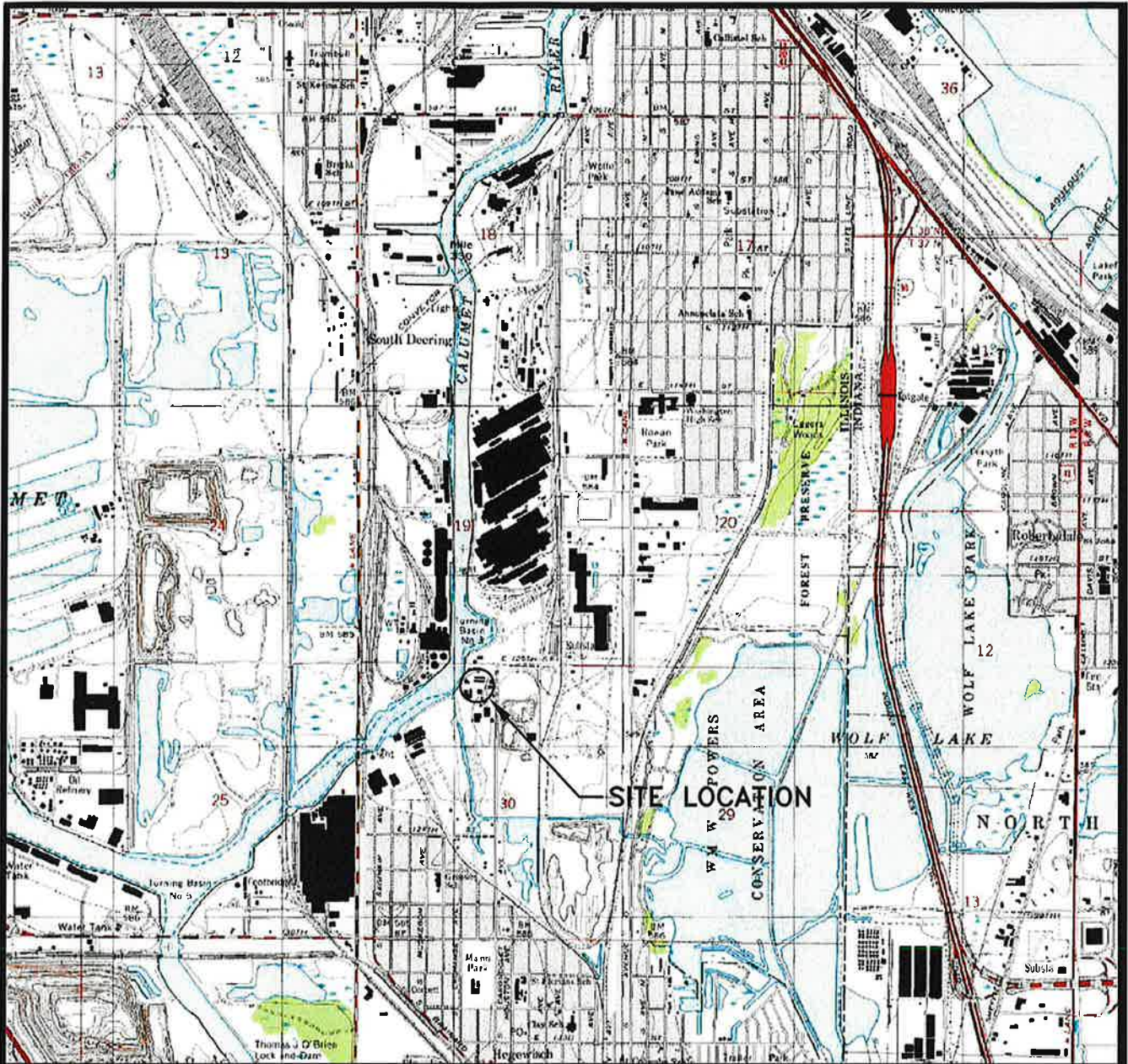


Google earth

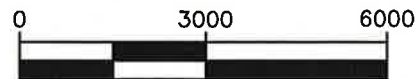
miles  
km







**STATE LOCATION**



SCALE: 1"=3000'



**SITE LOCATION MAP  
SAVAGE SERVICES CORP.  
12200 S. CARONDOLET AVE.  
CHICAGO, ILLINOIS**

SOURCE: BASE MAP FROM CHICAGO, ILLINOIS  
7.5 MINUTE USGS QUADRANGLE.



DWN. BY: EJP
APPROVED BY:
DATE: JANUARY 2010
PROJ. # 50-09076.06
FILE # 50090760601.DWG

**FIGURE 1**

**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-D

Planned Development Ordinance



Extract for  
Planned Development 1178

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Journal of the Proceedings  
of the  
City Council  
of the  
City of Chicago, Illinois

Portions of this document are taken directly from The City of Chicago's Office of the City Clerk, City Council's Journal of the Proceedings.

Related documentation pertaining to this Planned Development may also be included.

---

12/8/2010

REPORTS OF COMMITTEES

17110  
109973

*Reclassification Of Area Shown On Map No. 30-B.  
(As Amended)  
(Application No. 17110)  
(Common Address: 12200 -- 12220 S. Carondolet Ave.)*

WIPD 1178

[SO2010-7389]

*Be It Ordained by the City Council of the City of Chicago:*

SECTION 1. Title 17 of the Municipal Code of Chicago, the Chicago Zoning Ordinance, is hereby amended by changing all of the Planned Manufacturing District Number 6 symbols as shown on Map Number 30-B in the area bounded by:

a line 167.02 feet north of and parallel to the north boundary line of East 122<sup>nd</sup> Street; a line 66.01 feet east of and parallel to the west boundary line of South Carondolet Avenue (if extended); East 122<sup>nd</sup> Street; south along South Carondolet Avenue for a distance of 270.50 feet; thence a northwesterly line for a distance of 105.30 feet; thence an east/west line for a distance of 378 feet; thence a southwesterly line for a distance of 65 feet; thence an east/west line for a distance of 70 feet; thence a northwest line for a distance of 428.78 feet along the southeasterly and easterly channel line of the Calumet River,

to those of Waterfront Industrial Planned Development, as amended, and a corresponding use district is hereby established in the area above described.

SECTION 2. This ordinance takes effect after its passage and approval.

Plan of Development Statements referred to in this ordinance read as follows:

*Waterway Industrial Planned Development No. 1178 As Amended.*

*Plan Of Development Statements.*

1. The area delineated herein as Waterway Industrial Planned Development Number 1178 (the "Planned Development") consists of approximately 255,675.45 square feet (5.8695 acres) and is owned by PVS Chemical Solutions and controlled by the applicant, Savages Services Corporation.
2. All applicable official reviews, approvals, or permits are required to be obtained by the applicant or its successors, assignees or grantees. Any dedication or vacation of street

or alleys, or easements, or adjustments of rights-of-way, or consolidation or resubdivision of parcels, shall require a separate submittal on behalf of the applicant or its successors, assignees, or grantees.

3. The requirements, obligations, and conditions contained within this Planned Development shall be binding upon the applicant, its successors, and assignees and, if different than the applicant, the legal titleholder and any ground lessors. All rights granted hereunder to the applicant shall inure to the benefit of the applicant's successors and assigns and if different than the applicant, then to the owners of record title to all of the property and any ground lessors. Furthermore pursuant to the requirements of the Section 17-8-0400 of the Chicago Zoning Ordinance, the property, at the time any application for amendment, modifications or changes (administrative, legislative, or otherwise) to this Planned Development are made, shall be under single ownership or under single designated control. Single designated control for the purpose of this paragraph shall mean any application to the City for any amendment to this Planned Development or any other modification or change thereto (administrative, legislative or otherwise) shall be made or authorized by all the owners of the property and any ground lessors. An agreement among property owners or a covenant binding property owners may designate an authorized party for any future amendment, modification or change.
4. This plan development consists of these seventeen (17) statements; a Bulk Regulation and Data Table; an Existing Zoning Map; an Existing Land Use Map; a Planned Development Boundary and Property Line Map; and a Site Plan: a Landscape Plan, including Landscape Details and River Bank Cross Section; and Structure Elevations prepared by R&M Engineering Consultants, Wolff Landscape Architecture, and Hutter Architects, Ltd. dated October 21, 2010. Full-size sets of the Site Plan, Landscape Plan, and Structure Elevations are on file with Department of Zoning and Land Use Planning. This Planned Development is in conformity with the intent and purposes of the Chicago Zoning Ordinance (Title 17 of the Municipal Code of Chicago) and all requirements thereof, and satisfies established criteria for approval of a planned development. In any instance where a provision of the Planned Development conflicts with the Chicago Building Code, the Building Code shall control.
5. The following uses shall be permitted within the area delineated herein as Waterway Manufacturing Planned Development Number 1178: all uses permitted in PMD 6, including manufacturing, production and industrial service; general manufacturing (all manufacturing of finished or unfinished products, primarily from extracted materials, or recycled or secondary materials or bulk storage and handling of such products); outdoor storage of raw materials and accessory and related uses.
6. On-premises signs shall be permitted within the Planned Development subject to the review and approval of the Department of Zoning and Land Use Planning. Temporary

signs such as construction and marketing signs shall be permitted, subject to the review and approval of the Department. Off-premise signs shall be prohibited.

7. Off-street parking shall be provided in compliance with this Planned Development subject to review of the Chicago Department of Transportation ("CDOT") and the approval of the Department of Zoning and Land Use Planning. The minimum number of off-street parking spaces shall be determined in accordance with attached Bulk Regulations and Data Table.
8. Ingress and egress shall be adequately designed and paved in accordance with the regulations of the Department of Transportation in effect at the time of construction and in compliance with the Municipal Code of the City of Chicago, to provide ingress and egress for motor vehicles including emergency vehicles. Ingress and egress is subject to the review and approval of the Department of Transportation and the Department of Zoning and Land Use Planning. Closure of all or part of any public streets or alleys during demolition or construction shall be subject to the review and approval of the Chicago Department of Transportation. All work in the public way must be designed and constructed in accordance with the Chicago Department of Transportation Construction Standards for Work in the Public Way and in accordance with the Municipal Code of the City of Chicago.

Prior to issuance of any Certificate of Occupancy, the applicant shall complete to the satisfaction of CDOT, the improvement of South Carondelet Avenue, from the north end of CDOT's most recent improvement of South Carondelet Avenue (about 350 feet south of the Norfolk Southern rail crossing) to the north right-of-way line of 122<sup>nd</sup> Street, a total distance of about 500 feet. The design of the improvement shall be the same as the segment of South Carondelet Avenue to the south of the rail crossing. CDOT will provide a copy of the previous design for the applicant's use and reference, and the applicant shall be responsible for preparation of construction drawings, securing all necessary permits, coordination with the railroad and the Illinois Commerce Commission (if necessary), and construction of the improvement.

9. The height restriction of any building or any appurtenance attached hereto shall not exceed the height established in the Bulk Regulations and Data Table and Structure Elevations and shall also be subject to height limitations established by the Federal Aviation Administration. For purposes of building height measurements, the definitions in the Zoning Ordinance shall apply.
10. The maximum permitted floor area ratio for the entire parcel shall be in accordance with the attached Bulk Regulations and Data Table. For purposes of floor area ratio ("FAR") calculations and floor area measurements, the definition in the City of Chicago Zoning Ordinance shall apply.

11. Improvement to the property including landscaping and all entrances and exits to the parking and loading areas, shall be designed and installed in substantial conformity with the Bulk Regulations and Data Table, the Site Plan, and the Landscape Plan attached hereto and made a part hereof. In addition, landscaping shall be installed and maintained at all times in accordance with the applicable standards of the City of Chicago Zoning Ordinance and corresponding guidelines and regulations.
12. The terms, conditions and exhibits of this Planned Development may be modified administratively, by the Commissioner of the Department of Zoning and Land Use Planning upon the application for such modification by the applicant and after a determination by the Commissioner that such modification is minor, appropriate and consistent with the nature of the improvements contemplated in this Planned Development. Any such modification of the requirements of this Planned Development by the Commissioner of the Department of Zoning and Land Use Planning shall be deemed to be a minor change in the Planned Development as contemplated by Section 17-13-0611 of the Chicago Zoning Ordinance.
13. The applicant acknowledges that it is in the public interest to design, construct and renovate all buildings in a manner that provides healthier environments, reduces operating costs and conserves energy and resources. The applicant shall comply with the requirements of the City of Chicago Storm Water Ordinance.
14. The applicant acknowledges that it is in the public interest to design, construct and maintain all buildings in a manner which promotes, enables and maximizes universal access throughout the property. Plans for all the buildings and improvements on the subject property shall be reviewed and approved by the Mayor's Office for People with Disabilities to ensure compliance with all applicable laws and regulations related to access for persons with disabilities and to promote the highest standard of accessibility.
15. The applicant will comply with Rules and Regulations for the Maintenance of Stockpiles promulgated by the Commissioner of Streets and Sanitation, the Commissioner of the Environment and the Commissioner of Buildings under Section 13-32-125 of the Municipal Code of Chicago or any other provision of that Code.
16. Upon Part II Review, a Part II Review Fee shall be assessed by the Department of Zoning and Land Use Planning pursuant to Section 17-13-0610 of the Chicago Zoning Ordinance. The fee as determined by the staff at the time is final and binding on the applicant and must be paid to the Department of Revenue prior to the issuance of any Part II approval.
17. Unless substantial construction of the improvements contemplated by the Planned Development has commenced within six (6) years following the adoption of this Planned Development, this Planned Development shall lapse. Should this Planned Development

ordinance lapse, the Commissioner of the Department of Zoning and Land Use Planning shall initiate a zoning map amendment to rezone the property to the pre-existing Planned Manufacturing District Number 6.

[Existing Zoning Map; Existing Land-Use Map; Planned Development Boundary and Property Line Map; Site Plan; Landscape Plan; Landscape Plan Details; River Edge Cross Section; Structure Elevation; and Office Elevations referred to in these Plan of Development Statements printed on pages 109978 through 109986 of this *Journal*.]

Bulk Regulations and Data Table referred to in these Plan of Development Statements reads as follows:

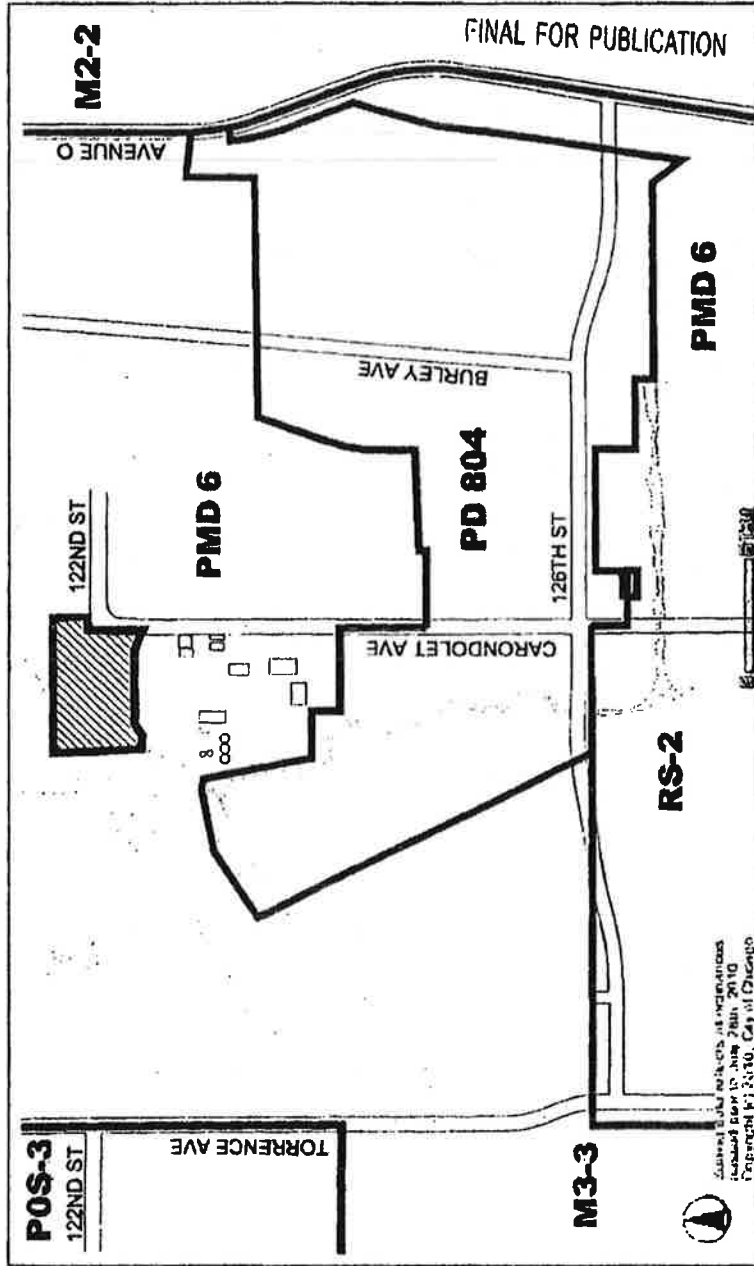
*Waterway-Industrial Planned Development No. 1178.*

*Bulk Regulations And Data Table.*

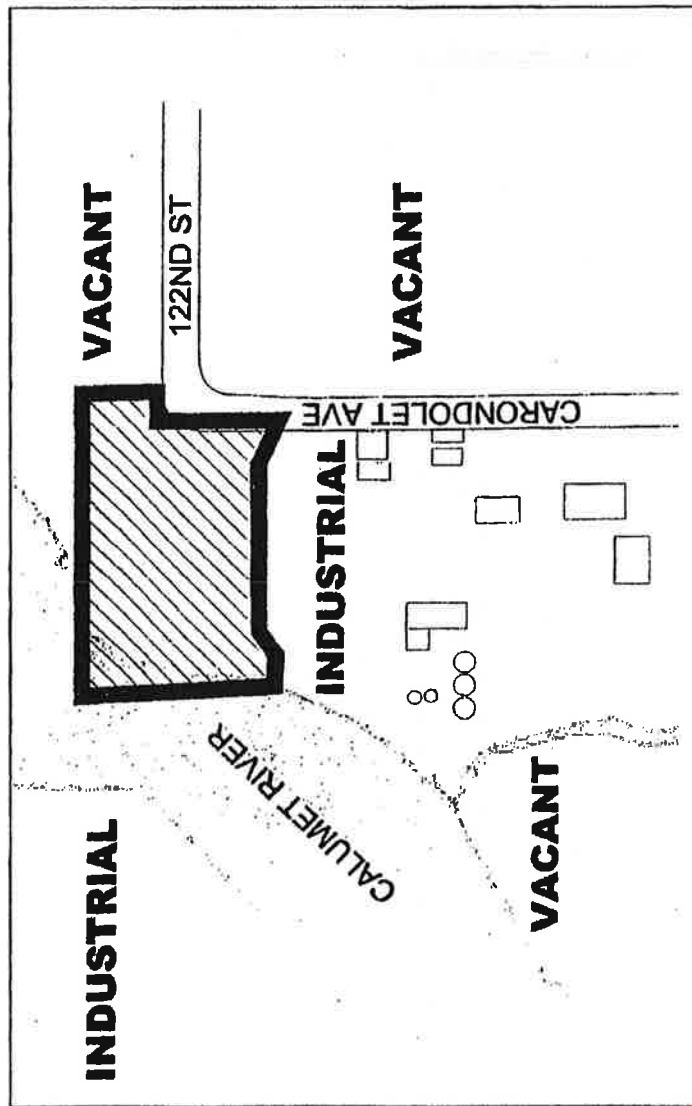
Total:

Gross Site Area:	263,711 square feet (6.05 acres)
Area in Public Right-of-Way:	8,036 square feet (0.18 acre)
Net Site Area:	255,675 square feet (5.87 acres)
Maximum Floor Area Ratio:	3.0
Minimum Number of Off-Street Parking Spaces:	4
Minimum Number of Bicycle Storage Spaces:	1
Maximum Building Height:	None
Minimum Setbacks:	See Site Plan

Existing Zoning Map.

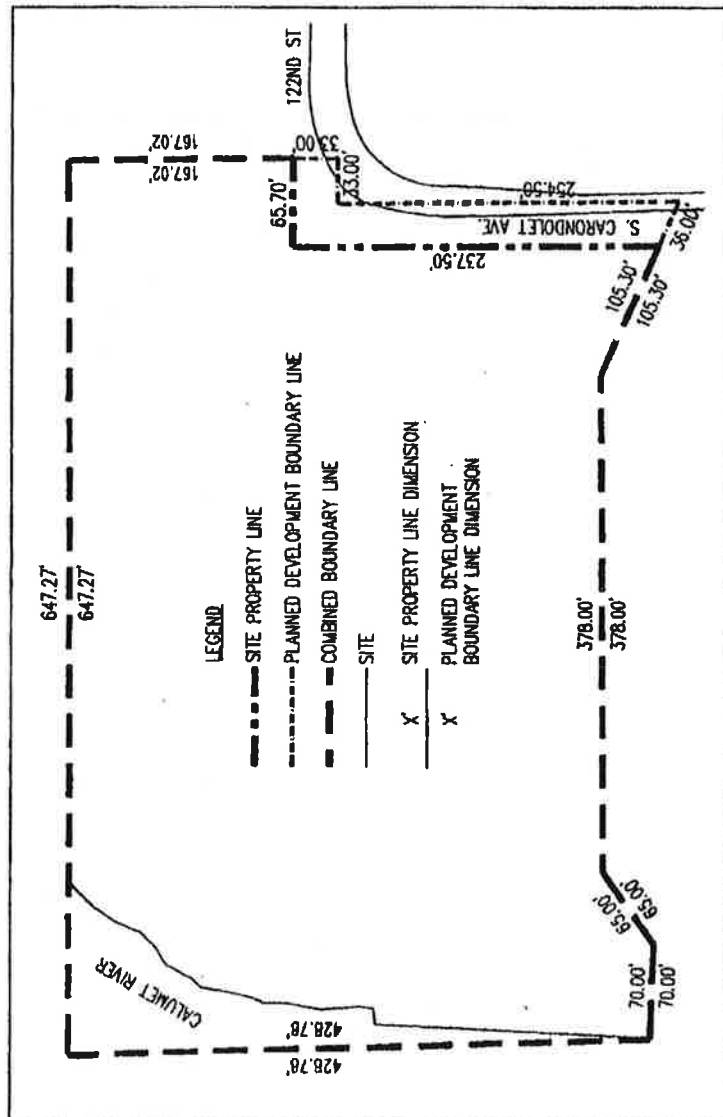


Existing Land-Use Map.

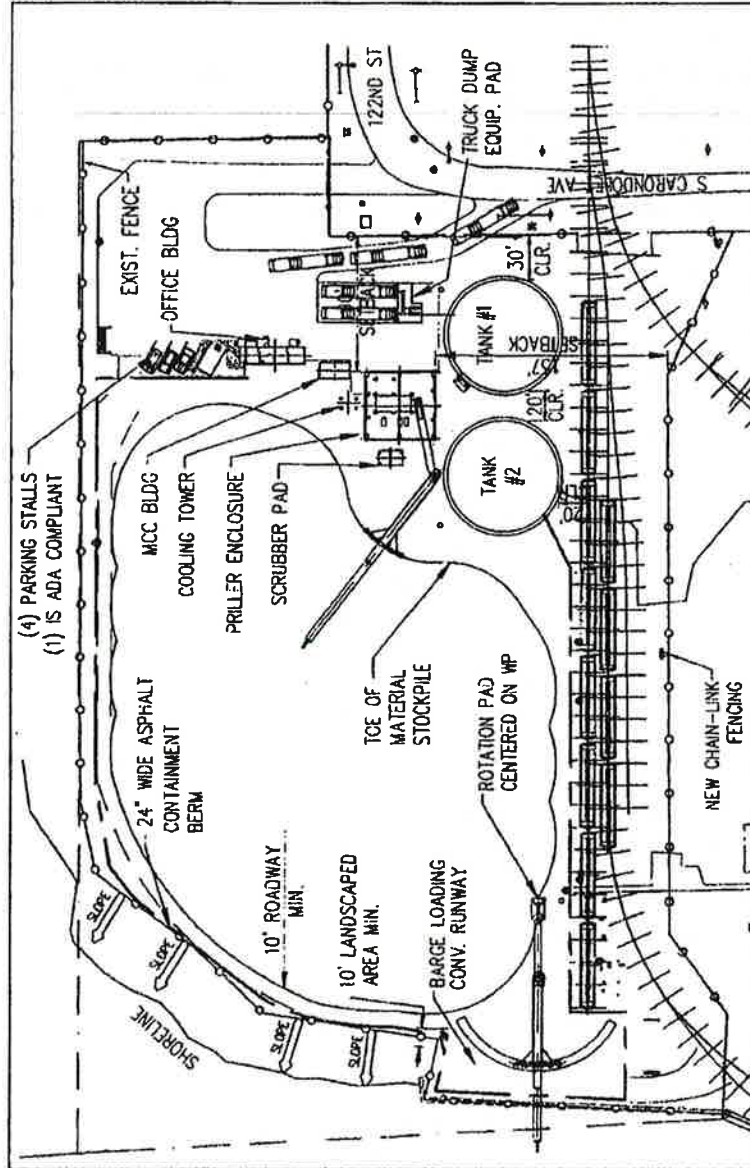




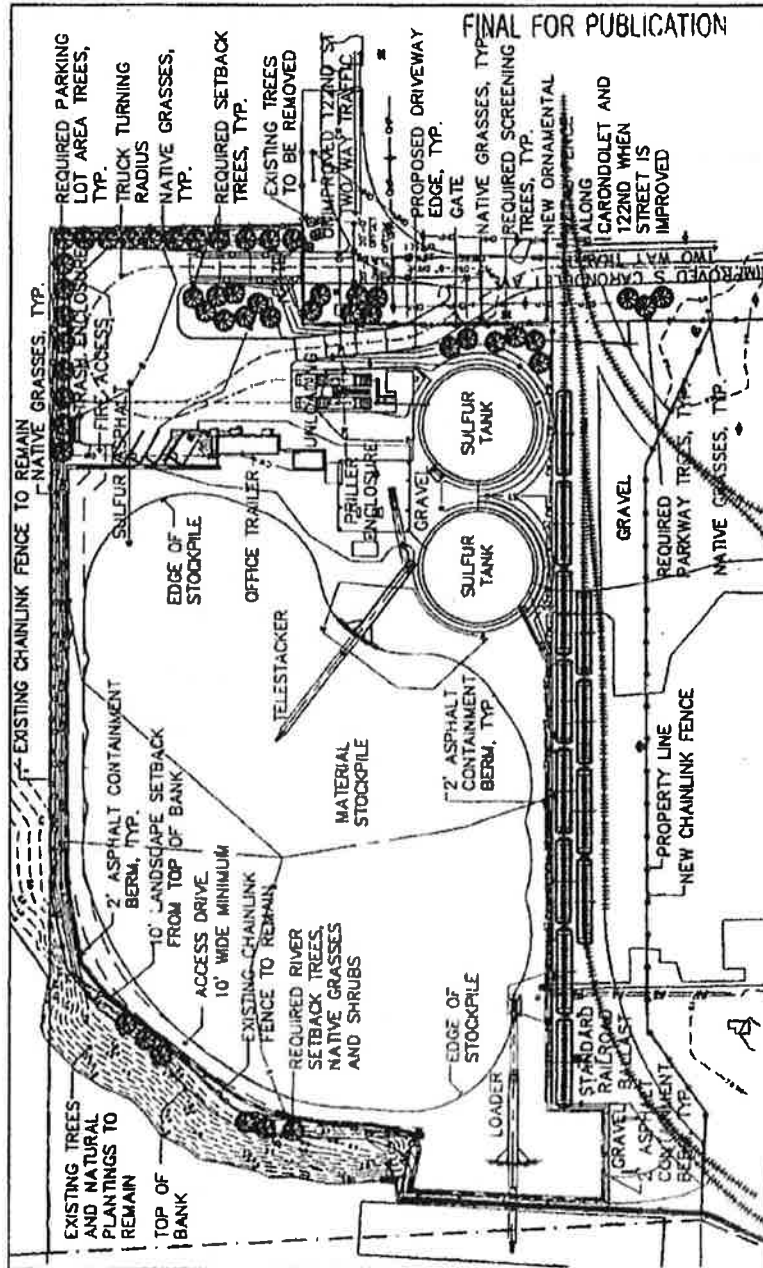
Planned Development Boundary And Property Line Map.



Site Plan.



Landscape Plan.

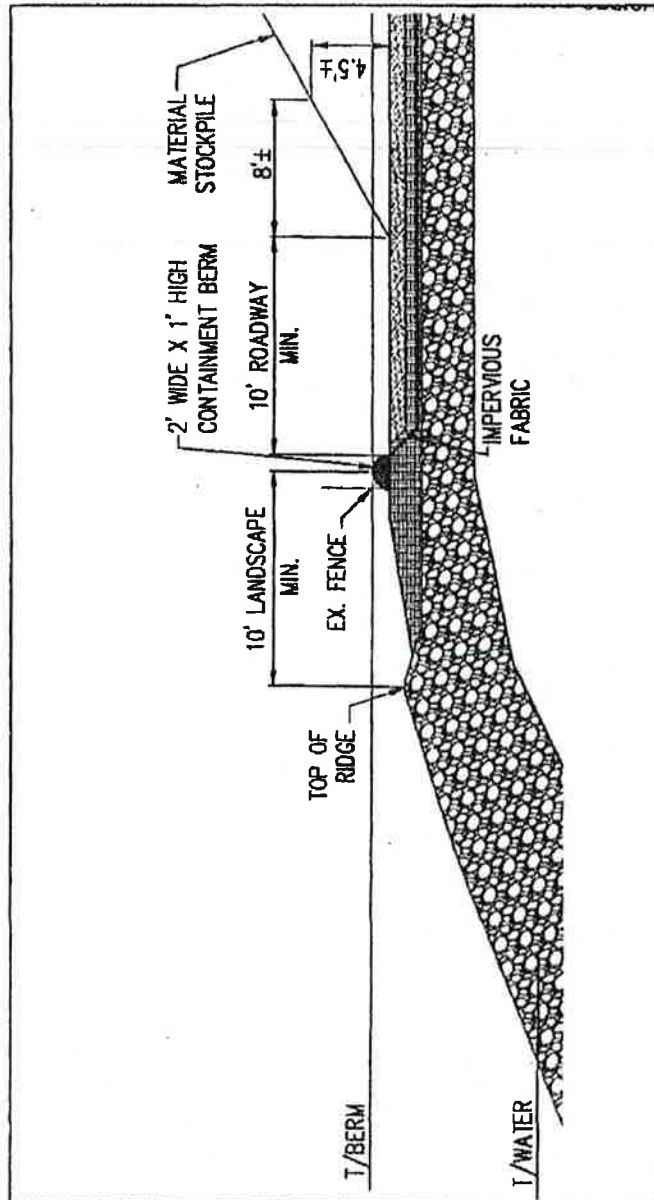


FINAL FOR PUBLICATION

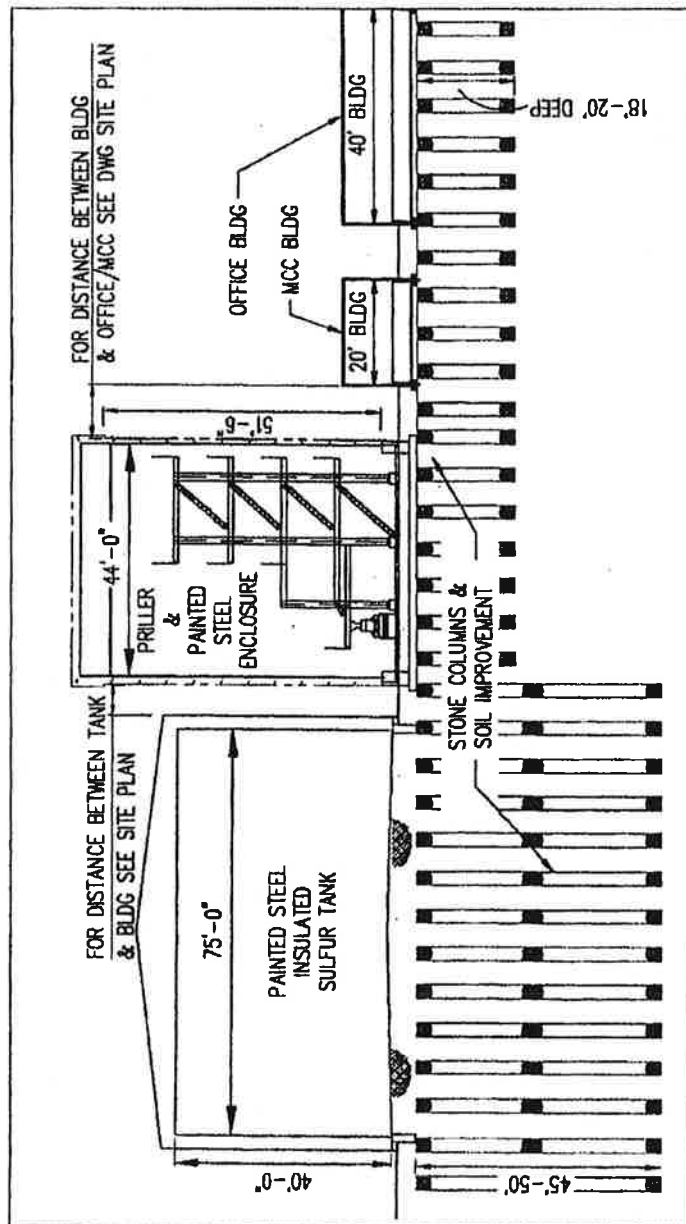
Landscapø Plan Details.

CALLUMET DESIGN GUIDELINES ANALYSIS	
<b>PERIMETER YARD - 30' SETBACK PLANTING</b>	
SOUTH CARONDOLET AVENUE	
NUMBER OF OVERSTORY TREES	7
NUMBER OF INTERMEDIARY TREES	2
NUMBER OF DECIDUOUS SHRUBS	54
122ND STREET	
NUMBER OF OVERSTORY TREES	2
NUMBER OF INTERMEDIARY TREES	0
NUMBER OF DECIDUOUS SHRUBS	13
<b>PERIMETER YARD - 20' SETBACK PLANTING</b>	
NORTH	
10'-0" WIDE PLANTING AREA WITH NATIVE GRASSES DUE TO EXTENT OF STOCKPILE	
SOUTH	
NO LANDSCAPE SETBACK DUE TO HOMELAND SECURITY ISSUES WITH ADJACENT PMS SITE THAT REQUIRE UNOBSTRUCTED VIEWS	
<b>RIVER SETBACK - 10' SAVANNA PLANTING</b>	
NUMBER OF OVERSTORY TREES REQUIRED	0
NUMBER OF OVERSTORY TREES PROVIDED	3
NUMBER OF INTERMEDIARY TREES REQUIRED	0
NUMBER OF INTERMEDIARY TREES PROVIDED	3
NUMBER OF DECIDUOUS SHRUBS REQUIRED	21
NUMBER OF DECIDUOUS SHRUBS PROVIDED	21
<b>PARKWAY PLANTING</b>	
SOUTH CARONDOLET AVENUE	
LENGTH (LINEAR FEET)	270'-0"
NUMBER OF TREES REQUIRED (1 PER 40 LF)	7
NUMBER OF EXISTING TREES TO REMAIN	0
NUMBER OF ADDITIONAL TREES TO BE PROVIDED	7
122ND STREET	
LENGTH (LINEAR FEET)	65'-0"
NUMBER OF TREES REQUIRED (1 PER 40 LF)	2
NUMBER OF EXISTING TREES TO REMAIN	0
NUMBER OF ADDITIONAL TREES TO BE PROVIDED	2
<b>PARKING LOT SCREENING</b>	
NOT APPLICABLE	
<b>PARKING LOT AREA PLANTING</b>	
PERIMETER OF PARKING LOT AREA	628 LF
NUMBER OF TREES REQUIRED (628 / 40)	16
NUMBER OF EXISTING TREES TO REMAIN	0
NUMBER OF ADDITIONAL TREES TO BE PROVIDED	16
<b>STORAGE AREA PLANTING</b>	
AREA OF STORAGE	10,000 SF
NUMBER OF TREES REQUIRED	20
NUMBER OF TREES TO BE PROVIDED	6
NUMBER OF SHRUBS TO BE PROVIDED	280

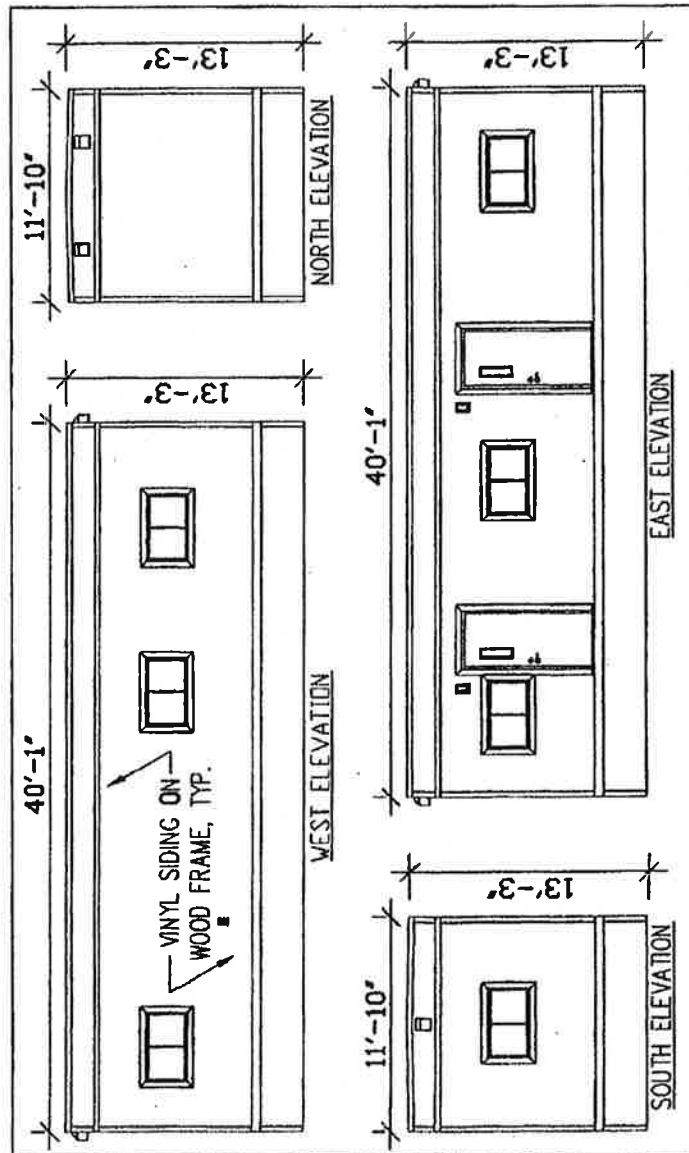
River Edge Cross Section.



Struoture Elevation.



Office Elevations.



**12200 S. Carondelet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-E

Zoning Map (Site / Planned Development No. 1178)





**12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP**  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-F

Zoning Information Sheet

<b>ZONE Classification</b>	<b>Ordinance Number</b>	<b>Ordinance Date</b>				
PD 1178 City Council Journal	17110	Wednesday, December 8, 2010				
<b>PLEASE NOTE:</b> The ordinance number may or may not directly relate the contents of your search. Please refer to the actual ordinance text for additional information.						
<b>TIF</b> Lake Calumet Ind. Corridor						
<b>Industrial Corridor Name</b> Calumet						
<b>Map Index</b>		<b>Page Number</b>				
30-B		236B				
<b>PIN</b>	<b>From Address</b>	<b>To Address</b>	<b>Dir</b>	<b>Street</b>	<b>Type</b>	<b>Suffix</b>
2619301003	3018	3018	E	122ND	ST	
<b>Ward</b>	<b>Alderman</b>	<b>Phone</b>	<b>Address</b>			
10	JOHN POPE	773-721-1999	3522 E. 106th St.			

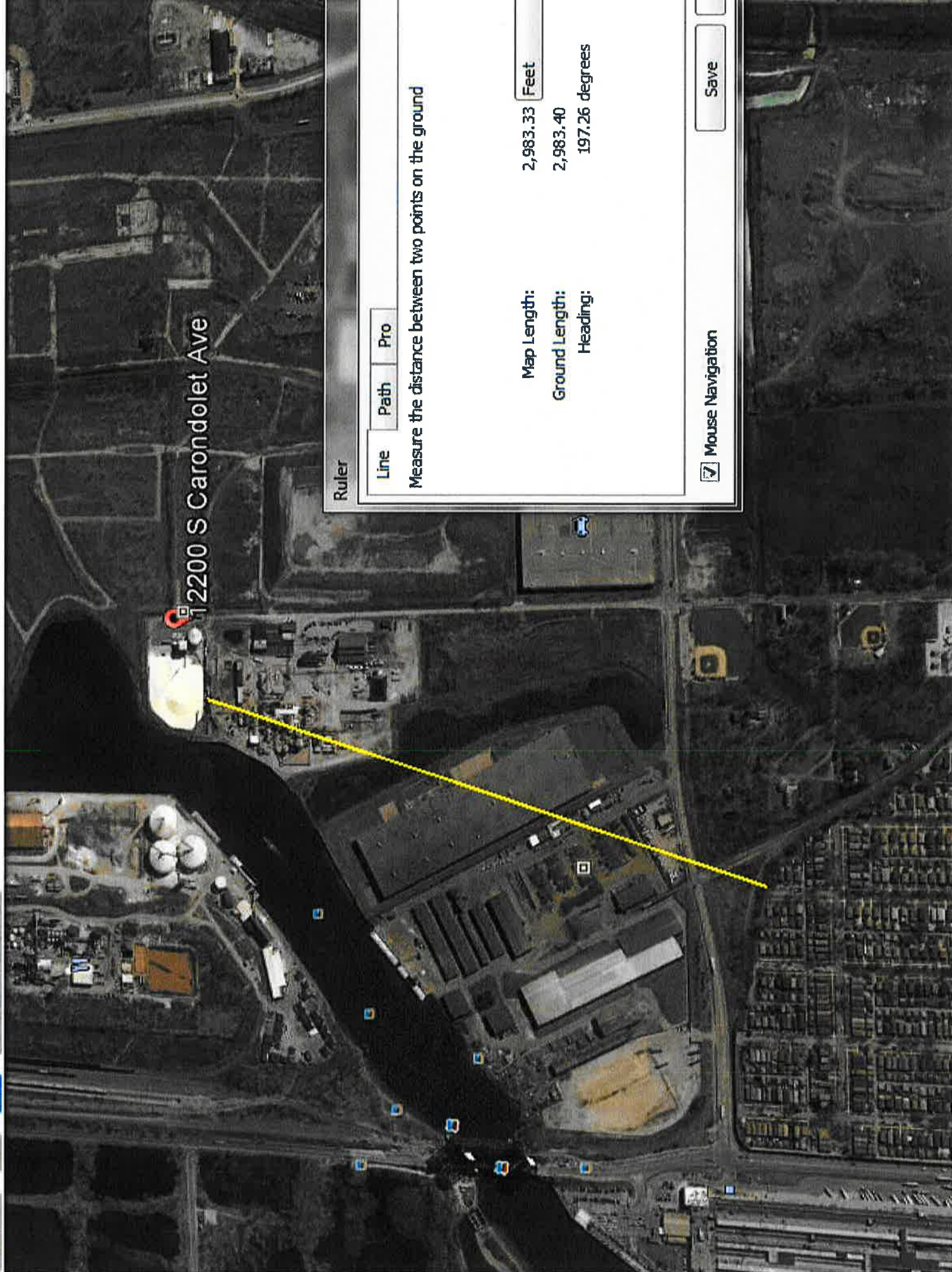
Close Window

12200 S. Carondolet Ave., Chicago, Illinois – Gulf Sulphur Services Ltd., LLLP  
*Request for Variations from Regulations*  
(Air Pollution Control Rules and Regulations for the Handling and Storage of Bulk Material Piles)

# GSS EXHIBIT 2-G

Measurements to Residential Areas





Ruler

Line Path Pro

Measure the distance between two points on the ground

Map Length:

2,983.33 Feet

Ground Length:

2,983.40

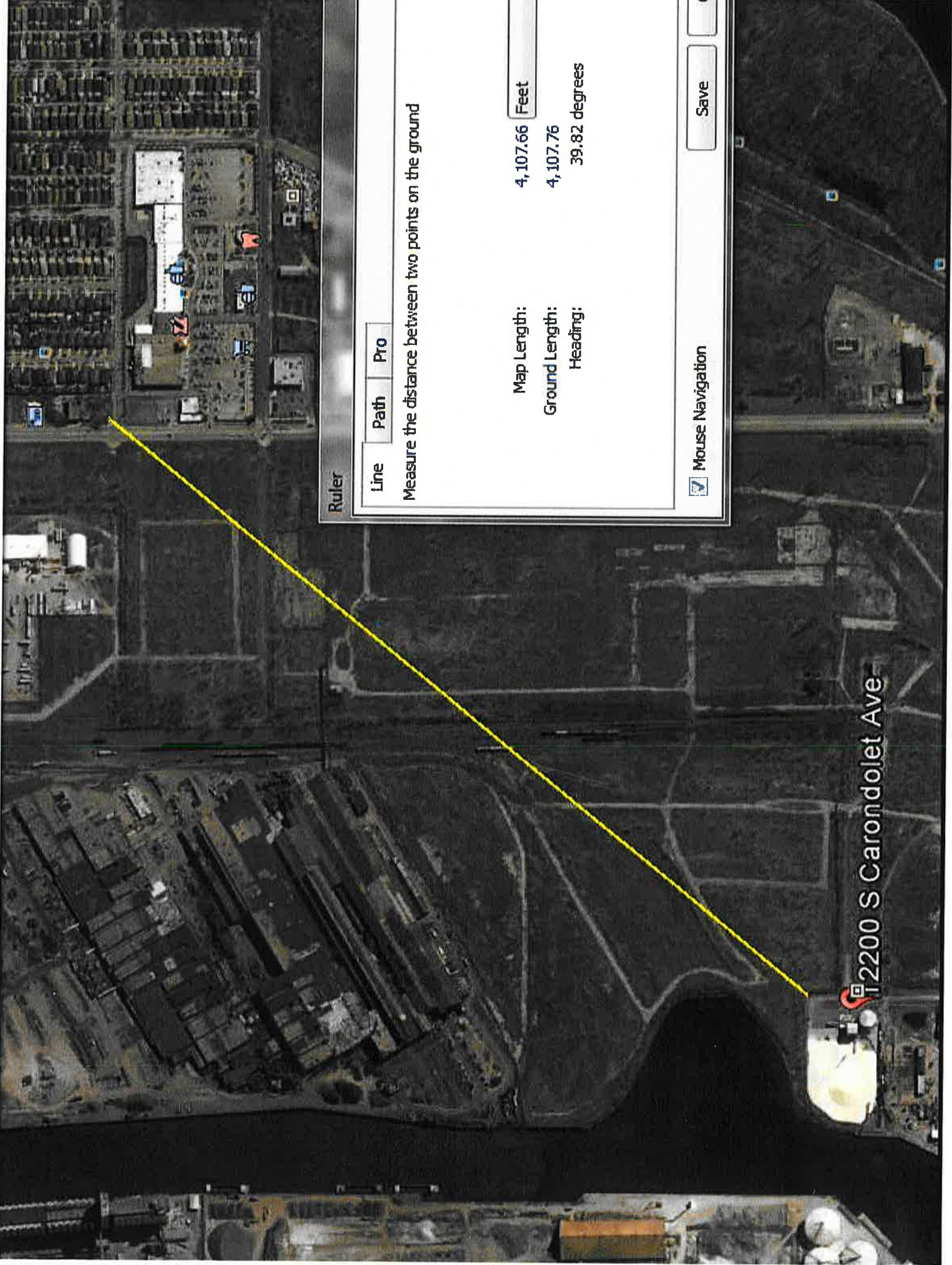
Heading:

197.26 degrees

Mouse Navigation

Save





2200 S Carondolet Ave

### Ruler

Line Path Pro

Measure the distance between two points on the ground

Map Length: 4,107.66 Feet  
Ground Length: 4,107.76  
Heading: 39.82 degrees

Mouse Navigation

Save