Air Quality Technical Report

for the Seattle Public Utilities Solid Waste Division Environmental Checklist for the North Recycling and Disposal Station

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CHAPTER 1: SUMMARY

This report characterizes existing air quality and assesses the impacts of the Proposal upon air quality. The scope of analysis is both regional (the area served by Seattle Public Utility Solid Waste Division) and local (the immediate vicinity of the North Recycling and Disposal Station (NRDS)).

Affected Environment

This document uses published data from monitoring stations operated by the Puget Sound Clean Air Agency (PSCAA) to characterize the existing air quality in the vicinity of the North Recycling and Disposal Station. Current air quality meets State and Federal standards for all regulated pollutants. Motor vehicles are the predominant source of pollution in the central Puget Sound region.

Project Impacts

Construction Impacts

Construction activities will generate a variety of pollutants from the use of heavy machinery, primarily during the earth-moving and demolition phases. Air quality impacts will be greatest for the residential areas closest to the NRDS property and diminish with distance. The construction phase of the project is not expected to create significant air quality impacts. Standard construction practices will greatly minimize air quality impacts. These techniques include:

- Spraying water over the debris during demolition of buildings, as necessary to minimize dust
- Keeping the soil damp during excavation and grading operations, as necessary to minimize dust
- Providing paved or rip-rap exit aprons for haul trucks
- Cleaning vehicle undercarriages and tires before they exit onto public streets
- Covering truck loads of soil, or spraying them with water, to prevent wind-blown dust
- Maintaining all construction machinery in good working order and operating equipment within load limits and engine RPM levels to minimize exhaust smoke

Because these practices would be adopted as part of the project, there would be no significant adverse impacts to air quality due to the construction of the project.

Operational Impacts

The handling of solid waste requires extensive use of large trucks and heavy machinery for hauling, waste handling and long-distance shipment. The gasoline and diesel engines of automobiles and trucks emit carbon monoxide (CO), carbon dioxide (CO2), fine particulate matter ($PM_{2.5}$, PM_{10}), oxides of nitrogen (NOx) and sulfur (SOx) and mobile source air toxics (MSATS)

Particulate matter in the form of fugitive dust is also a pollutant from solid waste handling operations. The movement of machinery and vehicles causes dust to rise into the air and be transported by the prevailing winds. The handling of construction and demolition debris by dumping, sorting, stockpiling and loading onto trucks also results in particulate emissions. The Proposal would reduce the air quality impacts of the operations of NRDS upon local residential areas by:

- Replacing the open-sided tipping building with solid walled structures with an engineered ventilation system to improve air quality and odor control.
- Reducing the time vehicles carrying solid waste spend idling awaiting their turn to discharge their loads.
- Reducing the time required to drop-off recyclables.
- Expediting the entrance process to reduce the time that vehicles spend idling in a queue before reaching the tipping building (e.g., multiple entry lanes, separate entry line for contracted collection trucks, use of radio frequency identification sensors for contracted collection trucks)

There are also operational practices that will assist in reducing emissions:

- Minimize dust by frequent washing down and/or sweeping of the operations yard.
- Minimize the time that tractor-trailer units spend idling as they are being loaded.
- Help control odors by minimizing the amount of time that organic materials are kept on site before being hauled to an off-site organics processing facility;

Because these design standards and practices would be adopted as part of the project, there would be no significant adverse impacts to air quality due to the operation of the project.

Indirect Impacts

When the NRDS is closed for approximately 20-28 months (beginning in 2012) during the construction phase, truck and automobile traffic could be temporarily sent to the South Recycling and Disposal Station (SRDS), resulting in the temporary increase of emissions due to additional vehicle miles traveled, and additional emissions at the SRDS location. The increase in vehicles is projected to total 1378 per day in 2012. When the bus yard's vehicle trips (which would be vacated and used for SRDS) are deducted the net daily increase is only 328 vehicles. An examination of the effects upon air quality from traffic focuses upon peak hour traffic volumes; the maximum peak hour increase at any intersection near SRDS is only 44 vehicles, thus no air quality impacts are expected.

Cumulative Impacts

The project adds almost no additional vehicle trips or additional heavy equipment compared to its current configuration. Thus it has almost no cumulative effect upon air quality. It will increase automobile trips but reduce truck trips and the air quality impacts of onsite equipment will remain very similar to what is currently occurring.

Mitigation Measures

Construction Impacts Mitigation

This project does not have any significant adverse impacts from construction, and, therefore, no additional mitigation measures are required for the project.

Operational Impacts Mitigation

Design details of specific project elements have not been determined yet. However, the design is anticipated to incorporate many features that will reduce air quality impacts by reducing emissions. No additional mitigation measures are required for the operational activities of the project.

Indirect Impacts Mitigation

When self-haul customers are directed to the SRDS during construction of the NRDS, based upon recent traffic studies Heffron SRDS 2008), no significant adverse impacts are anticipated for the region or at the SRDS location, and no additional mitigation is required associated with this project.

Cumulative Impacts Mitigation

The project adds a few additional vehicle trips but no additional heavy equipment compared to its current configuration. It will slightly increase emissions from vehicle trips but the air quality impacts of onsite equipment will remain very similar to what is currently occurring. It will have very little cumulative effect upon air quality

Significant Unavoidable Adverse Impacts

The Proposal will have no significant unavoidable adverse impacts to local or regional air quality.

CHAPTER 2: PROJECT DESCRIPTION

Proposed Project

The proposed project involves demolition of the existing structures and building a new transfer station, recycling facilities, employee facilities, office, parking, and other associated utility facilities. The rebuild will encompass not only the existing site, but will also include Carr Place North between N. 34th St. and N. 35th St. and the property at 1550 N. 34th St. The parking lot north of N. 35th St. between Carr Pl. N. and Woodlawn Ave. N. will continue to be used for vehicle parking, such as employee parking and utility trucks. The parking area would not be used for tractor-trailer truck parking or solid waste truck parking.

The site boundaries and vicinity of the NRDS facility are shown in Figure 1. A new transfer building would be located in the existing parcel. The building would be fully enclosed except for vehicle entrances. The building would contain an engineered ventilation system to provide air quality and odor control. The top of the roof of the new building would be within height limits allowed by code. Drainage from the interior of the main transfer building and any exterior areas that collect potentially contaminated water would be conveyed to the sanitary sewer system. Drainage from the roof of the main building and the remainder of the site may be reused on site or would be conveyed to the combined sanitary sewer/stormwater collection system.

The site would also contain a small fueling station for onsite equipment. Carr Place North between North 34th Street and North 35th Street would be vacated and incorporated into the facility site. The structures on the site on the east side of Carr Place North immediately east of the existing transfer station site would be demolished and new facilities would be developed. The new facilities will include, but not limited to, a recycling drop-off area with recycling bins, an office, employee facilities, a meeting room, parking spaces, and other utility facilities. A portion of the existing building may be reused or remodeled if feasible. An existing parking lot north of N. 35th St. between Carr Place N. and Woodlawn Ave. N. would be used for vehicle parking. The main facility access would be located off of N. 34th Street. A secondary access for transfer trailers would be located off of N. 35th Street.

Activities within the industrial buffer zone in the northeast section of the existing station parcel will remain essentially the same, which include solid waste transfer activities. The industrial buffer was developed after the facility was in place and existing uses would continue.

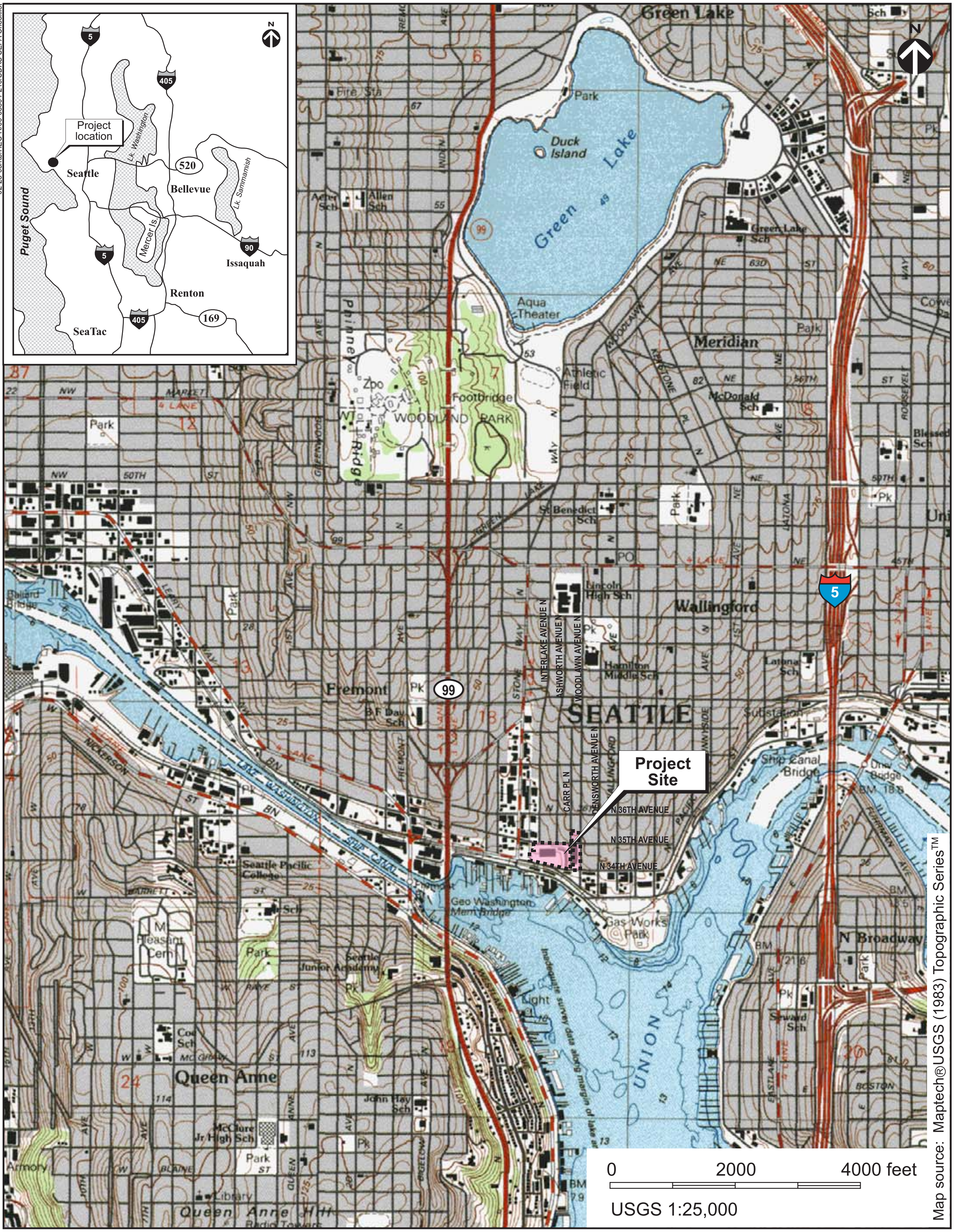


Figure 1. Vicinity map for the North Recycling and Disposal Station (NRDS), 1350 North 34th Street, Seattle, Washington.

CHAPTER 3: AFFECTED ENVIRONMENT

Characterizing the existing environmental conditions in the project vicinity is the first step in performing an air quality study. The data available for this effort included information on the local meteorology, recent and historical air quality levels as measured by state and local agencies and information on other sources of pollution in the vicinity of the project site based on field surveys.

Applicable Regulations

Air quality is regulated in the Puget Sound region by Federal, state and local agencies. The U.S. Environmental Protection Agency established National Ambient Air Quality Standards (NAAQS) for a limited number of pollutants with the enactment of the Clean Air Act of 1970 and subsequent amendments. These compounds are termed "priority pollutants. Revised ambient air standards were established by EPA in 1997 for PM_{10}, ozone and very fine particulate matter ($PM_{2.5}$). Table 1 summarizes the EPA standards.

Table 1. Ambient Air Quality Standards

Pollutant	National Primary	National Secondary	Washington State	Puget Sound Region
Total Suspended Particulate Matter (TSP)				
Annual Geometric Mean (μg/m^3)	NS	NS	60	NS
24-hour Average (μg/m^3)	NS	NS	150	NS
Inhalable Particulate Matter (PM_{10}) (μg/m^3)				
Annual Arithmetic Mean (μg/m^3)	Revoked [2]	Revoked [2]	NS	NS
24-hour Average (μg/m^3)	150	150	150	150
Particulate Matter ($PM_{2.5}$) (μg/m^3)				
Annual Arithmetic Mean (μg/m^3)	15	15	15	15
24-hour Average (μg/m^3)	35	35	35	35
Carbon Monoxide (CO)				
8-hour Average (ppm)	9	NS	9	9
1-hour Average (ppm)	35	NS	35	35
Ozone (O_3)				
1-hour average (ppm) [1]	0.12	0.12	NS	NS
8-hour average (ppm)	0.08	0.08	0.08	0.08
Nitrogen Dioxide (NO_2)				
Annual Average (ppm)	0.053	0.053	0.053	0.053
Lead (Pb)				
Quarterly Average (μg/m^3)	1.5	1.5	NS	1.5

Source: Puget Sound Clean Air Agency 2006 Air Quality Data Summary & EPA (www.epa.gov/air/criteria.html)
NS=No standard established; (μg/m^3) = micrograms per cubic meter; ppm= parts per million

(1) As of June 15, 2005; EPA revoked the 1-hour ozone standard in all areas except the fourteen 8-hour ozone nonattainment Early Action Compact (EAC) Areas. None of which are in Washington State.

(2) Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, the agency revoked the annual PM_{10} standard in 2006 (effective December 17, 2006).

Most of the urbanized (western) portions of Snohomish, King and Pierce Counties were declared in 1991 to be in non-attainment for carbon monoxide**.** In 1997 they were re-designated as being in attainment but subject to "Maintenance Area" requirements.

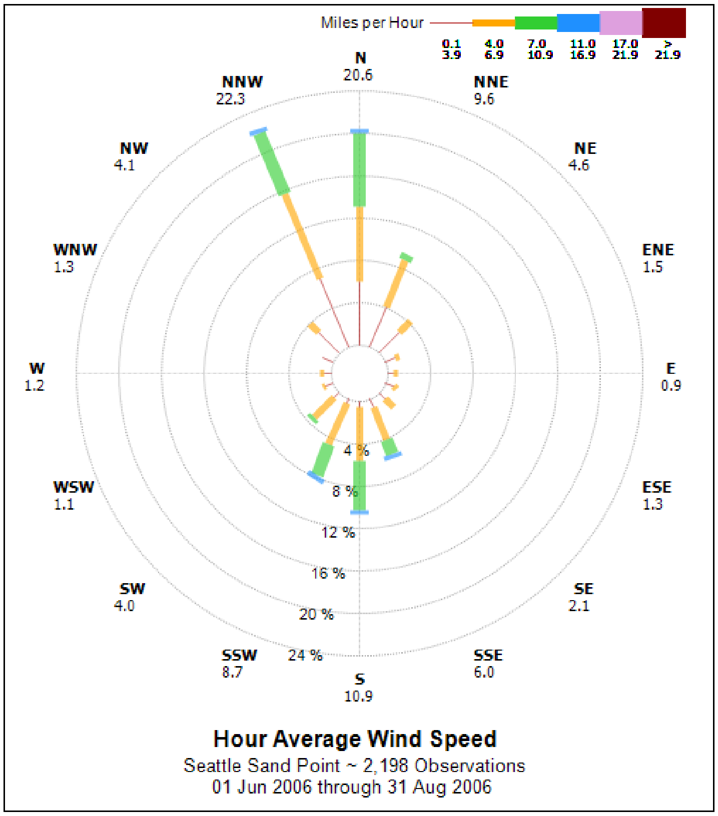
The emission of odorous compounds is regulated by the Puget Sound Clean Air Agency together with any types of emissions that might be injurious to human health, plant and animal life or that interfere with one's "enjoyment of life and property." PSCAA investigates complaints about odor and will take enforcement action if odors are found to be "distinct and definite, any unpleasant characteristics recognizable". (PSCAA, Regulation 1 Section 9.11)

Regional Climate and Meteorology

The Project area is located in central Puget Sound and is subject to same general climatic conditions that control weather in Seattle and most of the Puget Sound Basin. The climate is characterized by moderate temperatures, wet winters, and frequent onshore flows of moist marine air. Monthly average temperatures range from the 30's and 40's in winter and range from the 50's to the mid-70's in summer. Annual precipitation, concentrated in the winter months, ranges from 35 to 40 inches. There are 150 days a year with rainfall of 0.01" or greater.

Winds generally range south to southwest in the winter or during other rainy periods with southwest winds predominating. Winds during fair periods, and generally throughout the warm months, are west to northwest. Easterly winds occur frequently during periods of high pressure. Figure 2 is known as a "wind rose", showing the frequency that winds of a given speed were measured during the summer months (source: PSCAA) at Sand Point. The portion of winds from a given direction is indicated by the length of the lines. Thicker lines represent stronger wind; the highest winds shown in Figure 2 range from 11 to 16.9 mph and occur rarely. The warm summer months are when solid waste can generate the most odors as it decomposes and also when more people are outside and could smell odors. The Sand Point wind monitoring site is 4.7 miles northeast of NRDS and is representative of conditions at the project site. It is evident that winds from the southeast to southwest quadrant would carry odors from NRDS towards the residential areas to the north.

Figure 2. Summer Wind Patterns in North Seattle



Description of Pollutants

The examination of existing air quality will focus upon those pollutants which are of concern in the Puget Sound region and which are likely to be emitted by the proposed project. The pollutants with the greatest impact upon air quality in the Puget Sound region are particulate matter, carbon monoxide and ozone (formed from chemical reactions with hydrocarbons, oxides of nitrogen and sunlight). The primary impacts to air quality generated by this type of project are due to dispersion of dust particles by the turbulence caused by trucks. These dust emissions are typically termed "fugitive dust". Other pollutants include carbon monoxide, oxides of nitrogen and sulfur dioxide emissions from the diesel engines of trucks and the complex hydrocarbon emissions from diesel engines.

Objectionable odors are another form of air pollution and are caused by a great variety of compounds. Odors are generated by some of the existing operations of the City of Seattle’s solid waste system such as the diesel exhaust of trucks and decaying garage and yard waste. The following is a more detailed discussion of the pollutants likely to be emitted by this project.

Particulate Matter

Particulate matter consists of particles of wood smoke, diesel smoke, dust, pollen or other materials. It has traditionally been measured in two forms: total suspended particulate (TSP) and PM_{10}. PM_{10} (respirable or fine particulate matter) is a subset of TSP and is defined as being smaller than 10 micrometers in diameter. Due to concerns about the effect of very fine particulate matter such as that found in wood smoke and combustion engine exhaust, the EPA in 1997 established separate regulations for particulate matter smaller than 2.5 microns in diameter ($PM_{2.5}$).

Coarse particles greater than 10 micrometers settle out of the air fairly close to where they are produced. PM_{10} (and to an even greater degree $PM_{2.5}$) remains suspended in the air for long periods of time and is readily inhalable deep into the smaller airways of human lungs. High ambient concentrations of PM_{10} and $PM_{2.5}$ contribute to impaired respiratory functioning. Fine particulate matter is primarily responsible for haze that impairs the visibility of distant objects.

Studies by the Washington State Department of Ecology have shown that the burning of wood in stoves and fireplaces have historically accounted for more than 80% of the PM_{10} concentrations in areas and periods of heavy woodstove use. This percentage is declining as less people use wood for their primary source of heat. The diesel engines of trucks, heavy equipment and ships are another important source of particulate matter. Particulate matter from diesel engines and other sources has come under increasing scrutiny as a significant source of hazardous air pollutants in urban areas.

Ozone

Ozone is a pungent-smelling, colorless gas. It is a pulmonary irritant that affects lung tissues and respiratory functions and, at concentrations between 0.15 and 0.25 PPM, causes lung tightness, coughing and wheezing.

Ozone is produced in the atmosphere when nitrogen oxides and some hydrocarbons chemically react under the effect of strong sunlight. Unlike carbon monoxide, however, ozone and the other reaction products do not reach their peak levels closest to the source of emissions, but rather at downwind locations affected by the urban plume after the primary pollutants have had time to mix and react under sunlight.

Sulfur Dioxide

Sulfur dioxide is a colorless, corrosive gas with a bitter taste. It has been associated with respiratory diseases. Sources of sulfur dioxide include power plants, paper mills and smelters. It reacts with atmospheric moisture to form sulfuric acid.

Nitrogen Dioxide

Nitrogen dioxide is a brownish, poisonous gas which reacts with water vapor to form nitric acid. It has been associated with respiratory diseases and is one of the essential precursors in the formation of ozone. Nitrogen dioxide is formed from the high temperature combustion of fuels (such as diesel engines) and subsequent atmospheric reactions. It reacts with atmospheric moisture to form nitric acid which, together with sulfuric acid, falls as “acid rain” damaging vegetation and freshwater marine ecosystems.

Mobile Source Air Toxics

Mobile source air toxics (MSATS) consist of a wide variety of pollutants emitted by gasoline and diesel powered motor vehicles; particularly formaldehyde, benzene and heavy metals. Health effects include potential cancer risks and pollution of ground water supplies. Useful mitigation measures have been undertaken on a regional basis, such as the phase-out of lead in gasoline, the introduction of low-sulfur diesel fuel and the installation of particulate traps on diesel vehicles. The particulate matter emissions from diesel engines have been shown to contain several types of MSATS.

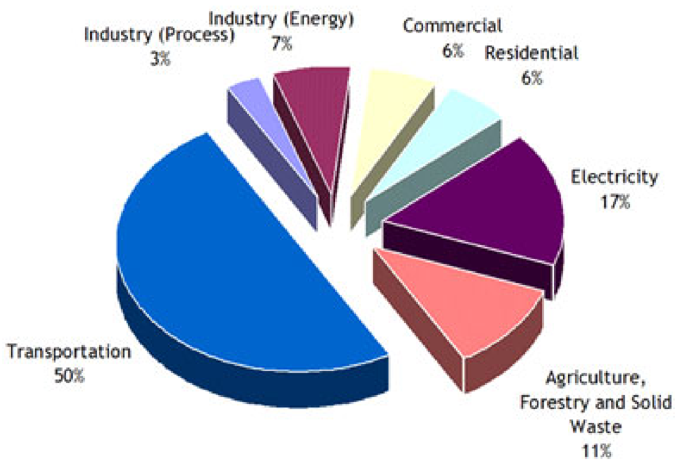
Carbon Monoxide

Carbon monoxide is a toxic, clear and odorless gas. CO interferes with the blood's ability to absorb oxygen and impairs the heart's ability to pump blood. Carbon monoxide (CO) is the primary priority pollutant associated with motor vehicle traffic. Monitoring for CO is performed throughout the Puget Sound region by the Department of Ecology and the Puget Sound Clean Air Agency (PSCAA). The highest concentrations of CO are found immediately adjacent to large congested intersections and arterials. Concentrations rapidly decrease as one moves further away from these sources. There are no monitoring sites close enough to be representative of conditions in either the NRDS or NRDS sites. Existing locality-wide background concentrations of CO are primarily traffic generated and can be assumed to range from 2-3 PPM as an 8-hour average compared to the 9 PPM standard.

Greenhouse Gases

Greenhouse gases is a generic term referring to gases such as carbon dioxide, ozone, methane, nitrous oxide and hydrofluorocarbons which accumulate in the atmosphere trapping the sun’s energy causing changes in local, regional and world climates. The primary sources of greenhouse gases are both natural (respiration of plants and animals and the decomposition of organic matter) and man-made (internal combustion engines, the burning of fossil fuels and wood and the application of nitrogen fertilizers on agricultural lands). Figure 3 illustrates the contribution of various emission sources to the total greenhouse gas inventory in the Puget Sound region.

Figure 3. Sources of Greenhouse Gases in Puget Sound Region



Source: PSCAA website. http://www.pscleanair.org/programs/climate

Local Ambient Air Quality

The NRDS project site is immediately west of the University District, an area of high residential densities surrounding a major educational institution. Motor vehicle traffic is the major source of air pollution, with smaller contributions from industry, maritime traffic and residential wood burning appliances.

Carbon monoxide is the only pollutant that has been monitored in the vicinity of NRDS. PSCAA operated a monitoring site in the University District (about 1.3 miles southwest of NRDS) until June 30, 2006 when it was shut down. There have been no exceedances of the 8-hour standard of 9PPM since 1990. The highest 8-hour reading in 2006 (the latest year of monitoring) was 2.4 PPM, approximately 27% of the standard. The CO monitor was located on an arterial that carried more traffic than the streets leading to the NRDS facility, consequently CO levels on 34th and 35th Streets will be well below the 9 PPM NAAQS.

The closest particulate monitoring site is located too far away to be representative of conditions at NRDS. That site is on Beacon Hill, six miles south of NRDS. Levels at NRDS can be assumed to be less than those on Beacon Hill, which is close to the Duwamish industrial area, and the Port of Seattle.

Nitrogen dioxide has been monitored at sites in Seattle and Enumclaw since 1996. The closest monitor is located on Beacon Hill, approximately 6 miles south of NRDS. Monitored levels are far lower than the NAAQS standard. Levels at NRDS can be assumed to be less than those on Beacon Hill as there are less industrial emissions at NRDS.

Sulfur dioxide is monitored at several locations in the heavily industrial areas of Everett, Seattle and Tacoma. The closest monitor is located on Beacon Hill, approximately 5 miles southeast of NRDS. The Puget Sound region is in compliance with Federal and State standards with no exceedances since 1988. Concentrations at the NRDS site are expected to be well below these standards.

Ozone is primarily monitored around the edges of the central Puget Sound urban metropolis, but there is a site within Seattle, at Beacon Hill, approximately 5 miles southeast of NRDS. No exceedances of the NAAQS standard have been recorded, in 2006 the highest reading was 0.033 PPM compared to the 0.08 PPM standard. Ozone levels at NRDS will be similar to those at Beacon Hill.

Odors

Odors from a solid waste handling facility are caused by the decay of lawn mowings, pruning, food scraps and other organic materials in the solid waste mixture. The formation of odor causing compounds peaks during warm weather. The Puget Sound Clean Air Agency has received complaints about odors from the NRDS site. Table 2 summarizes this information for the NRDS facility.

Table 2. Odor Complaints (1994-2007) at NRDS

Year	The Number of Odor Complaints and the number of Addresses filing the Complaints
1994	58 (8 addresses)
1995	7 (3 addresses)
1996	6 (1 address)
1997-2001	0
2002	2 (2 addresses)
2003	1 (1 address)
2004	1 (1 address)
2005-2007	0

Source: Mary Hofman, Puget Sound Clean Air Agency 2007

The significant decrease in odor complaints since 1994 reflects improvements at the NRDS site. A misting system was added and management practices were updated.

CHAPTER 4: ENVIRONMENTAL IMPACTS

The Pollutants Generated by Solid Waste Handling Systems

The handling of solid waste requires extensive use of large trucks and heavy machinery for hauling, waste handling and long-distance shipment. The gasoline and diesel engines of automobiles and trucks emit carbon monoxide (CO), carbon dioxide (CO2), fine particulate matter ($PM_{2.5}$, PM_{10}), oxides of nitrogen (NOx) and sulfur (SOx) and mobile source air toxics (MSATs)

Particulate matter in the form of fugitive dust is also a pollutant from solid waste handling operations. The movement of machinery and vehicles causes dust to rise into the air and be transported by the prevailing winds. The handling of construction and demolition debris by dumping, sorting, stockpiling and loading onto trucks also results in particulate emissions. The primary pollutants emitted by the operation of Seattle's waste handling system and the sources of these emissions are shown in Table 3.

Table 3. Typical Pollutants Emitted by the Operations of a Solid Waste Utility

Source of Emissions	Pollutants Emitted
Self-haul vehicles	CO, PM10, PM2.5, NOx, SO, MSATs, CO2
Commercial Haulers	CO, PM10, PM2.5, NOx, SO, MSATs, CO2
Solid waste handling equipment (bulldozers, yard tractors, front-end loaders)	CO, PM10, PM2.5, NOx, SO, MSATs, CO2
Loading solid waste into trailers	CO, PM10, PM2.5, NOx, SO, fugitive dust, odorous compounds, MSATs, CO2
Trailers at NRDS awaiting hauling to Argo Intermodal site	odorous compounds
Transferring solid waste from trailers to containers at Argo Intermodal site, compacting solid waste	CO, PM10, PM2.5, NOx, SO, fugitive dust, odorous compounds, MSATs, CO2
Loaded containers at transfer Argo Intermodal site awaiting train transport	odorous compounds
Long-distance shipment by train	CO, PM10, PM2.5, NOx, SO, MSATs, CO2

The relative change in emissions compared to existing and future No Build conditions are summarized in Table 4.

Table 4. Relative Change in Emissions as a Result of Implementing the Proposal

Type of Emission Source	Facility Location
	NRDS
Sources of Emissions at the Stations	**Relative Change at NRDS Compared to Existing Conditions**
Emissions from self- haul vehicles	Less emissions due to reduced time in queues
Emissions from Commercial Haulers	Less emissions due to reduced time in queues
Emissions from vehicles using the recycle/appliance drop-off lane	Less emissions due to reduced time in queues More emissions due to greater levels of recycling
Emissions from waste handling machinery	Less emissions due to use of electric compactors
Odors from decaying solid waste	Decrease due to ventilation/filtration of tipping building
Fugitive dust	Decrease due to ventilation/filtration of tipping building
Regional Sources of Emissions Generated within Seattle Service Area	**Relative Change In the Area Served by Seattle Public Utilities**
Emissions from self- haul vehicles	No change from current system
Emissions from Commercial Haulers	Little change from No Build scenario.
Odors from decaying solid waste	Odors decrease in vicinity of station.
Fugitive dust	Little change from No Build scenario.

Comparison of Emissions of Solid Waste Hauling

In 2004 the City of Seattle examined the annual truck mileage accumulated by commercial solid waste haulers, at the year 2004 and at 2011 with and without the Proposal. The annual mileage accumulated by the contractors' truck fleet will be very similar for the current year, 2007, and 2030, the design year for this project. In comparing the Proposal with the 2030 No Build scenario, there will be little difference in the annual miles driven on the collection routes or from the collection route to NRDS; a slight increase mostly due to increased numbers of people bringing recyclables to NRDS. Consequently there will be very little difference in emissions. The decline is emission amounts between 2007 and 2030 is due to improvements in engine technology and fuel formulation, resulting in lower emission rates. Changes in MSAT emissions are not quantified in Table 5 but will also decline significantly. The mileage shown is for trucks traveling from their collection areas to either of the Recycling and Disposal Stations and/or the Cedar Grove composting facility. Annual mileage does not include travel on the collection route which can be assumed to be essentially the same now or in 2030 with or without the Proposal. The data is presented in Table 5.

Table 5. Comparison of Emissions and Mileage

Pollutant	2007 Existing Conditions Kg/year	2030 No Project Kg/year	2030 with Project Kg/year	Change in Emissions due to Project	
				Compared to 2007	**Compared to 2030 No Build**
Volatile Organic Compounds (VOC)	683	235	239	-65%	+2%
Carbon monoxide (CO)	9,255	5,552	5,667	-39%	+2%
Nitrogen oxide (NOx)	994	235	240	-76%	+2%
Carbon dioxide (CO2)	263,500	273,164	268,185	+6%	+2%
Total Emissions per year	**274,432 kg**	**279,185 kg**	**284,989 kg**		
Miles driven per Year	**480,550**	**480,550**	**490,540**		

Source: Data on the Miles per year is for 2004 and 2011and comes from Jenny Bagby, City of Seattle Public Utilities. It is assumed that mileage for 2007 and 2030 (the current year and the design year) will be very similar to that for 2004 and 2011. Emissions derived from Mobile6.2 emission model from input files supplied by Sally Otterson, Dept. of Ecology.

Concentrations of Carbon Monoxide at Intersections

Carbon monoxide is the pollutant emitted in the largest amounts by motor vehicles. Congested, high volume, signalized intersections are a common feature of most urban and suburban areas and are the locations where the highest CO concentrations are found. Carbon monoxide is also the only pollutant emitted by motor vehicles for which EPA has developed refined predictive computer models. For these reasons a project's impacts to air quality at congested signalized intersections (with a Level of Service (LOS) of "D" or worse) are routinely analyzed to predict future CO concentrations with and without the project. The Transportation technical report (Heffron Transportation 2008) determined that no signalized intersections received sufficient project traffic to reduce their LOS to "D". Consequently "hot spot" modeling for CO was not needed.

Emissions from Queued Vehicles

Queued vehicles stopped at a light (or a weight scale or pay booth) contribute more to nearby pollutant concentrations than do those same vehicles when passing through the intersection on a green light. When vehicles are stopped or moving very slowly in a queue their engines operate at a low rpm, burn little fuel and thus they produce less pollutants per hour or minute than when traveling at usual roadway speeds. However, because the vehicles are barely moving the concentration of the emissions can be much higher per length of queue than if they moving on the street.

It is anticipated that the design to be developed for the proposed NRDS will increase the current number of inbound and exit lanes, thus expediting the entrance process and vehicle movement and reducing the time vehicles are idling in a queue before reaching the tipping building. The quality of air surrounding the queued vehicles and the NRDS staff in the weight station will improve as a result. The reduction of queuing time will help to offset the effects of commercial and self-haul traffic at the design year 2030.

The Proposal will reduce the amount of diesel smoke emitted and decrease the concentrations of fine particulate matter and other components (including mobile source air toxics) by reducing the amount of time trucks spend queued at the entrance and exit scales.

Odor Impacts

Design details of specific design details have not been determined at this time. However the proposal will likely reduce the occurrence of odors that impact adjacent residential neighborhoods by replacing the existing tipping building with improved designs with an active ventilation system. With these types of systems, the interior of the building can produce a slight negative pressure relative to the outdoors (thus retarding the escape of odors and fine particulate matter) and exhausting the ventilation air through a rooftop stack.

The new tipping building would likely have solid sidewalls with large openings in the end walls for vehicle access and egress. A ventilation system would draw air through the building from the outside. The dusty and odorous air inside the building would be drawn to the ceiling, then be vented to the atmosphere at rooftop height. The creation of an airflow moving from the tipping floor to the fan would reduce odors migrating offsite and would enhance the dispersion and dilution of smells, resulting in less odor problems compared to current conditions.

The City's policies of diverting organic waste from disposal will increase the amount of organic waste coming to NRDS for transfer to an organics processing facility. Proper handling of this material will minimize the generation of odors. Other changes proposed for the site, such as a consolidated recycling area are unlikely to generate odors. Good management practices will be integral to the new facility, including:

- Noting when strong odors are apparent and taking action to reduce those odors and instituting controls. Organic matter from restaurants or small scale food and fish processing plants can cause odor problems and may require special handling to minimize odors.
- Minimizing dust by keeping the operational yard clean by periodic washing and/or sweeping;
- Minimizing the time that tractor-trailer units spend idling as they are being loaded;
- Minimizing the amount of time that organic materials are kept on site before being hauled to an off-site organics processing facility.

Impacts from Greenhouse Gases

There is broad agreement from the scientific community regarding the climate-changing impacts of current and future world-wide greenhouse gas emissions. However, there is not consensus about the impacts to specific elements of climate in the Pacific NW or Puget Sound. Consequently, it is not possible to describe specifically the impacts on regional climate of the greenhouse gases emitted by Seattle's solid waste handling system or by NRDS. In any case, it is anticipated that re-construction of the NRDS will reduce greenhouse gas emissions, aside from those generated during construction of the facilities. In general, however, increases in emissions of greenhouse gases will occur as the vehicle-miles generated by vehicles serving the solid waste system increase in response to rising population. Offsetting this to some degree is the fact that decreases in greenhouse gas emissions can occur when a greater proportion of the City's solid waste stream is recycled and especially so when some of it is reused rather than being hauled to and disposed of in landfills.

Impacts from All Aspects of the Facility's Operations

Because operational best practices would be adopted as part of the project, there would be no significant adverse impacts to air quality due to the operation of the project.

Impacts from Construction

The construction phase of the Proposal will include numerous tasks each generating a variety of pollutants. Table 6 summarizes these tasks and emissions.

Table 6. Pollutants Generated by Construction Activities

Construction Task	Source of Emissions	Emissions
Demolition of Existing buildings	Backhoe, excavator, track/wheel loaders, cranes, bulldozer, haul trucks	CO, PM10, PM2.5, NOx, SO, fugitive dust, MSATS
Removal of concrete & paved surfaces	Track /wheel loaders, excavator, bulldozer, haul trucks	Same as above
Recycling of concrete debris	Haul trucks, excavator, primary crusher, aggregate screens)	Same as above
Re-grading of sites	Track /wheel loaders, bulldozer, grader	Same as above
Trenching for new utilities	Backhoe, excavator, gravel trucks	Same as above
Construct new tipping and other buildings	Concrete trucks, vehicles of construction workers	Same as above
Pave roads & work surfaces	Concrete trucks, asphalt trucks, asphalt rollers	CO, PM10, PM2.5, NOx, SO, fugitive dust, odorous compounds, MSATS
Stripe roadways, paint buildings	Paint spray equipment	odorous compounds, MSATS
Landscape site, add topsoil & mulch	Mulch spray equipment	fugitive dust

As Table 6 indicates, the primary emissions for most tasks are particulate matter, either PM10, PM2.5 or fugitive dust. Mitigation measures will focus upon those emissions.

The Puget Sound Clean Air Agency has specific regulations pertaining to fugitive dust contained in Sections 9.11, 9.15 and 9.20 of their Regulation 1 which require the use of best available control technology (BACT) to control fugitive dust emissions. Because these practices would be adopted by SPU as part of the project, construction of the proposed project would not result in significant adverse impacts to air quality.These techniques include:

- Spraying water over the debris during demolition of buildings, as necessary to minimize dust
- Keeping the soil damp during excavation and grading operations, as necessary to minimize dust
- Providing paved or rip-rap exit aprons for haul trucks
- Cleaning vehicle undercarriages and tires before they exit onto public streets
- Covering truck loads of soil, or spraying them with water, to prevent wind-blown dust
- Maintaining all construction machinery in good working order and operating equipment within load limits and engine RPM levels to minimize exhaust smoke
- Sweeping adjacent streets whenever soil from excavation and grading is visible

- If contaminated soil is excavated or otherwise generated, it must be handled according to state regulations to minimize the spread of contamination.

Because these practices would be adopted as part of the project, there will be no significant adverse impacts to air quality due to the construction of the project.

Indirect Impacts

When the NRDS is closed for approximately 20-28 months (beginning in 2012) during the construction phase, truck and automobile traffic could be temporarily sent to the South Recycling and Disposal Station (SRDS), resulting in the temporary increase of emissions due to additional vehicle miles traveled, and additional emissions at the SRDS location. The increase in vehicles is projected to total 1378 per day in 2012. When the bus yard's vehicle trips (which will be vacated and used for SRDS) are deducted the net daily increase is only 328 vehicles. An examination of the effects upon air quality from traffic focuses upon peak hour traffic volumes; the maximum peak hour increase at any intersection near SRDS is only 44 vehicles, thus no air quality impacts are expected.

Cumulative Impacts

The project adds almost no additional vehicle trips or additional heavy equipment compared to its current configuration. Thus it has almost no cumulative effect upon air quality. It will increase automobile trips but reduce truck trips and the air quality impacts of onsite equipment will remain very similar to what is currently occurring.

MITIGATION MEASURES

Construction Impacts Mitigation

Design details of specific project elements have not been determined at this time. However, the construction must adhere to certain regulations and construction practices to reduce air quality impacts. No additional mitigation is required.

Operational Impacts Mitigation

Design details of specific project elements have not been determined at this time. However, the design of the Proposal would likely incorporate features that will reduce air quality impacts. No additional mitigation is required. Some design features that contribute to lower emissions of pollutants or lower concentrations offsite, include:

Indirect Impacts Mitigation

When self-haul customers are directed to the SRDS during construction of the NRDS, no significant adverse impacts are anticipated for the region or at the SRDS location, and no additional mitigation is required associated with this project.

Cumulative Impacts Mitigation

Because the project has almost no cumulative effect upon air quality, no additional mitigation is required.

Significant Unavoidable Adverse Impacts

Significant impacts are defined as levels of pollutants, which are higher than federal, state or regional standards. The Proposal is unlikely to have significant unavoidable adverse impacts to air quality at the NRDS facility. Significant unavoidable adverse impacts to air quality are not predicted to occur on the transportation routes serving any of these facilities.

References

Associated General Contractors of Washington and the Fugitive Dust Task Force, "Guide to Handling Fugitive Dust from Construction Projects"

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