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Engineering-Science, Inc., Boise, ID

Prepared for

Environmental Protection Agency, Seattle, WA

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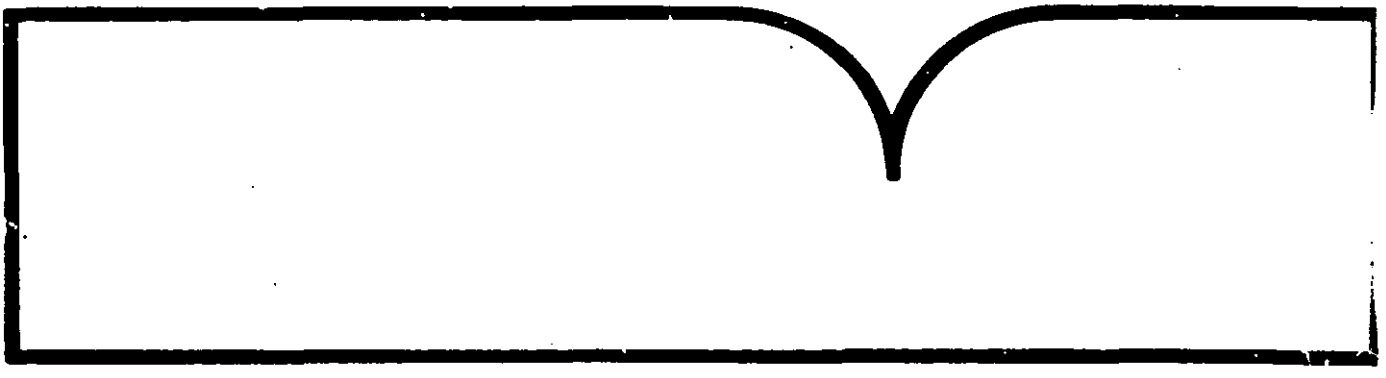

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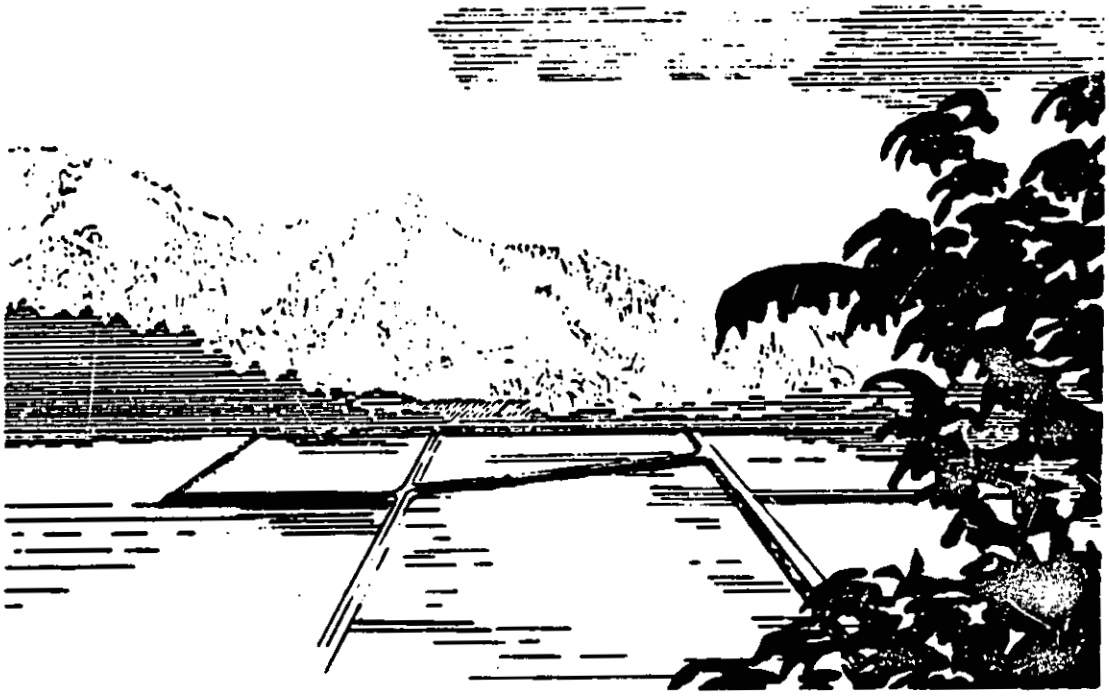
AIR TOXIC EMISSIONS FROM SELECTED NON-TRADITIONAL SOURCES IN THE PUGET SOUND REGION



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This report was prepared for developing emission estimates for several selected non-traditional sources in the Puget Sound Region. The investigation consists of five source categories: Publicly Owned Treatment Works(POTW); Industrial Wastewater Treatment Plants; Superfund Clean-up Sites; Municipal Landfills; and Hazardous Waste Treatment Storage and Disposal Facilities (TSDFs). To ensure a broad review of non-traditional sources, emissions were to be estimated for facilities from each category. In evaluating emissions, no selected or limited list of toxic materials was used; however, almost all available analyses of waste waters were prepared to evaluate the presence of EPA's priority pollutant list.

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DETERMINATION OF AIR TOXIC EMISSIONS FROM NON-TRADITIONAL SOURCES IN THE PUGET SOUND REGION

Prepared for

The U.S. Environmental Protection Agency
Region 10
Seattle, Washington

and the

Puget Sound Air Pollution Control Agency
Seattle, Washington

Prepared by

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Boise, Idaho

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DETERMINATION OF AIR TOXIC EMISSIONS FROM NON-TRADITIONAL SOURCES IN THE PUGET SOUND REGION

SUMMARY

In the past few years there has been increasing interest in identifying the potential public health problems resulting from the emissions of toxic air contaminants for which ambient air quality standards do not currently exist. A key element in assessing the effects of these so-called toxics is determining the quantity of emissions of contaminants of concern. As with criteria pollutants there are both point and area sources of such contaminants requiring a review of a broad variety of potential sources. The Puget Sound Air Pollution Control Agency in 1983 began an air toxic inventory program addressing traditional point sources to quantify toxic emitters. As this inventory was nearing completion, it was becoming clear through research by EPA and others that a number of non-traditional air pollution sources may in fact be important sources of toxic air pollutants. To help identify and understand the scope of such emissions of air toxics, Puget Sound Air Pollution Control Agency requested assistance from EPA Region 10 in developing emission estimates for several selected non-traditional sources. The resulting plan established five source categories for investigation: Publicly Owned Treatment Works (POTW); Industrial Wastewater Treatment Plants; Superfund Clean-up Sites; Municipal Landfills; and Hazardous Waste Treatment Storage and Disposal Facilities (TSDFs). To ensure a broad review of non-traditional sources, emissions were to be estimated for facilities from each category. Because details of processes and wastes handled are critical to potential emissions, site visits were planned to key representative facilities within each of the source groups. Where appropriate and beneficial, considering available resources, field samples or measurements were to be taken to allow improved emission estimation. The facilities eventually visited within each source category are listed below:

Publicly Owned Treatment Works

METRO West Point Treatment Plant
METRO Renton Treatment Plant
Everett Wastewater Treatment Plant
Chambers Creek Wastewater Treatment Plant

Industrial Wastewater Treatment

Weyerhaeuser - Everett
Scott Paper - Everett
Wyckoff

Superfund Clean-up Site

Tacoma Tar Pits

Municipal/Public Landfills

Hidden Valley
Cedar Hills

Hazardous Waste Treatment, Storage and Disposal Facilities

Chemical Processors, Inc. - Georgetown
Lilyblad Petroleum

The information garnered as a result of these visits was used to augment and refine emission estimates prepared for similar facilities within each category.

In evaluating emissions, no selected or limited list of toxic materials was used; however, almost all available analyses of waste waters were prepared to evaluate the presence of EPA's priority pollutant list. Although this list includes many materials of low volatility, it was found that several of these are being emitted as air toxics. However, their low volatility does aid in limiting emissions in cases where direct evaporation is a dominant emission

mode such as chemical process losses and conditions of surficial evaporation where there is little restriction due to diffusion. Table S-1 lists the largest sources of toxic air contaminants identified as a result of the estimates made here. As may be seen, industrial and publicly-owned wastewater treatment works can show substantial emissions though this is closely tied to the presence of volatile contaminants combined with aerated treatment. In addition, it is important to note that the estimates for wastewater treatment are conservative since they give no credit to other removal modes such as removal by biological action or adsorption on solids. In addition, VOCs in POTW effluents may still be emitted from receiving waters. Landfills also are significant sources mainly due to bio-gas flux which carries with it trace quantities of toxic components. Actual fluxes have not been measured at Puget Sound landfills, however, and these estimates are based on landfill gas production models which are admittedly imprecise estimators of overall amounts. Another important caveat regarding the accuracy of landfill estimates results from uncertainties regarding the effectiveness of flaring. No data exist of flare gas flow rates and destruction efficiencies for most landfills in the area. In addition, flares tend to self-extinguish. Records for relighting which helped assess outage periods were available for three landfills only.

Analysis of hazardous waste handlers and Superfund sites showed relatively small emission potential. Hazardous waste treatment, storage, and disposal sites reviewed here simply did not handle large quantities of toxic material making overall emissions relatively small except for the listed solvent recyclers. In addition, much of the very large tonnage associated with listed organic wastes (ignitables or waste solvents) results from large percentages of water in the combined waste. Superfund sites analyzed were, for the most part, those considered most critical with the largest potential for emissions. In each case, however, volatiles with the greatest emissions potential were found at low concentration in soils scheduled for removal (most volatiles probably left before or shortly after the waste got into the soil). Material remaining at high concentration were largely heavier volatiles (toluene, xylene and derivatives), polycyclic aromatic hydrocarbons, oily wastes, and metals.

TABLE S-1

SUMMARY OF COMBINED TOXICS EMISSIONS[a]
FOR THE LARGEST SOURCES EVALUATED
WITHIN DESIGNATED SOURCE CATEGORIES

Facility	Source	Emission Estimate (Ton/Year)
Weyerhaeuser Kraft	Aeration Lagoon	35 - 492[b]
Scott Paper Kraft	Secondary wastewater treatment	18.2
Simpson Tacoma Kraft	Wastewater treatment	2.3
Kent Highlands Landfill	Landfill gas/flares	11.3
Hidden Valley Landfill	Landfill gas/flares	12.3
Cedar Hills Landfill	Landfill gas/flares	10.8
Olalla Landfill	Landfill gas/flares	3.1
Lilyblad Petroleum	Solvent Recovery	1.4
Northwest Enviro Services	Oily/Solvent Water treatment	2.4
Chemical Processors	All	1.1
METRO-Renton POTW	All	8.6
Everett POTW	All	1.2
Chambers Creek POTW	All	0.8
Puyallup POTW	All	0.7
Brownsville POTW	All	0.5
METRO-West Point POTW	Primary Sedimentation	0.4

[a] The above estimates include the following compounds: Acetone, Benzene, Carbon Tetrachloride, Chloroethane, Chloroform, Dichloroethane, Dichloroethylene, Methylene Chloride, Naphthalene, Phenol, Tetrachloroethylene, Toluene, 1,1,1,-Trichloroethane, Trichloroethylene, among others. For a compound-by-compound breakdown see pages 35-52 and A1 through A24.

[b] The high value of this range is based upon a single sample of wastewater taken during what is believed to have been a batch release of chemicals. Weyerhaeuser emission estimates are discussed on page 41.

Clearly industrial wastewater treatment presents a potentially significant source group of toxic emissions. It also is a group for which only limited information is available, usually a one-time effluent analysis to determine compliance with discharge permit regulations. These sources will require detailed investigations to prepare improved estimates of alternative removal mechanisms and validate surface impoundment and treatment tank emission rates.

In general, refinement of the values in Table S-1 will require further field testing to verify critical concentrations and quantities. For example, it is suspected the large emissions attributed to Weyerhaeuser may be due to a batch release of bleach chemicals rather than an average value. This on-going analysis and inventory development should be directed primarily at refining industrial wastewater treatment and landfill emission values.