Spokane River PCB Source Survey

Quality Assurance Project Plan

by
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Washington State Department of Ecology

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Background

The Asarco Tacoma Smelter is located in Ruston and Tacoma (Figure 1). The smelter operated from 1890 until 1986, first as a lead smelter, and later as a copper smelter that processed ores containing high levels of arsenic (EPA, 1991). Smelting operations were discontinued in 1985 and the facility closed permanently in 1986. During the time it operated, the Asarco Smelter used high temperature furnaces to melt the metals away from raw materials. The smelter stack and other parts of the plant released dust particles containing arsenic, lead, and other metals into the air. Much of the dust settled onto soils throughout Ruston and north Tacoma. Most of the dust that fell on land remains in the soil today (EPA, 1991). Contamination at the facility has been addressed by several federal Superfund projects.

After the smelter closed, studies were conducted to determine the extent of nearby soil contamination. In 1988 Ecology collected 288 soil samples from an area approximately 950 acres surrounding the smelter. This area included about 1,800 housing units and 4,300 residents. Asarco agreed to remove contaminated topsoil from 11 publicly accessible properties, replacing the contaminated soil with clean soil. In 1989 EPA collected 222 additional samples. EPA concluded that the highest levels of arsenic and other contaminants are generally found on properties located closest to the smelter, with concentrations decreasing with distance from the smelter. Test results showed that the amount of arsenic in surface soils in the Ruston and north Tacoma residential study area ranged from 2 to 3,000 parts per million (ppm - EPA, 1991). The MTCA Method A soil cleanup level for arsenic is 20 ppm for residential areas, uncontrolled use.

Most previous soil monitoring efforts had concentrated on the Asarco Smelter site and nearby surrounding area, the highest known arsenic concentration near University Place was 166 ppm on the eastern end of Fox Island. A recent study of surface soil samples from undisturbed locations in University Place shows significant aerial deposition of arsenic from the Asarco Smelter there. The study took place after significant lead and arsenic were found at a site owned by Tacoma Water where two water tanks had been sandblasted (City of Tacoma and Glass, 1998). It was suspected that aerial deposition from the Asarco Smelter may have been the primary source of arsenic found at the site. An area background study was conducted to determine the concentrations of arsenic and lead in surficial soils from 64 samples at 7 sites in and near University Place (City of Tacoma and Glass, 1999). The area background clearly showed elevated arsenic and lead concentrations in relatively undisturbed soils. Maximum values were 281 ppm and 1,175 ppm for arsenic and lead, respectively. The MTCA Method A soil cleanup level for lead is 250 ppm. Statistical analyses were performed according to Ecology guidance, resulting in calculated background values of 265 ppm and 561 ppm for arsenic and lead, respectively, under the Model Toxics Control Act (City of Tacoma and Glass, 1999).

Introduction

Fish and sediment samples collected from the Spokane River by Ecology in 1990-92 showed unusually high concentrations of polychlorinated biphenyls (PCBs - Johnson, 1994; Serdar et al., 1994). Results on fish and sediment samples did not indicate important sources of PCBs above Post Falls, Idaho (Toxics Investigations Section, 1995). PCB contamination of soils at the Kaiser Trentwood facility was discovered in 1991 (Toxics Investigations Section, 1995). A broad study of the area that included sampling of river water east of Spokane in 1994 was unable to detect PCBs at the Barker Road sampling station located upstream of Kaiser Trentwood and the Spokane Industrial Park (SIP). Kaiser discharges treated industrial wastewater to the Spokane River. The SIP discharged treated industrial wastewater to the river until December, 1993. PCBs were found at detectable levels at Plante's Ferry, downstream of the Kaiser and SIP outfalls. Total suspended solids (TSS) concentrations were lower at Plante's Ferry than at Barker road, indicating that the PCBs in the water downstream came from a source other than sediment entrained in the water column. The same study found significant concentrations of PCBs in Kaiser lagoon sediments and skimmings(Toxics Investigations Section, 1995). The study recommended that data on the final effluent from the Kaiser 001 outfall be obtained by Ecology to determine if the effort by Kaiser to cleanup PCBs was successful.

The Kaiser outfall is between Barker Road and Plante's Ferry, as was the former outfall from the SIP Wastewater Treatment Plant (WWTP). A follow-up study in 1995 confirmed the finding of measurable concentrations of PCBs in the Kaiser Trentwood discharge (0.025 µg/L – 0.034 µg/L – Golding, 1996). With the relative large discharge rate from the 001 outfall (17.9MGD –18.1MGD), PCB loading to the Spokane River during the study period was estimated to be 1.7 – 2.3 g/day total PCBs (Golding, 1996). The 1994 and 1995 studies identified other potential sources of PCBs to the Spokane River: decomissioned SIP WWTP, the City of Spokane WWTP, the Liberty Lake WWTP, and the Post Falls WWTP. SIP wastewater has been routed to the City of Spokane sewer system since 1993 (Toxics Investigations Section, 1995).

Project Description

The objective of this survey study is to asess concentrations of polychlorinated biphenyls (PCBs) in the six mile stretch of the Spokane River between Barker Road and Plante's Ferry (Figure 1). Additional river water samples for PCB analyses will be collected downstream of the Plante's Ferry site, downstream of the Argonne Road bridge in the Upriver Dam Reservoir. The results of this survey may give an indication of whether PCB contaminated groundwater or surface water are entering the Spokane River in this vicinity. Groundwater recharge to the river provides a larger share of total flow during the summer season. Recent advances in equipment and methods allowing water samples to be analyzed to a practical quantitation limit (PQL) of one part per trillion or below will be used.

River water samples will be collected from six points along the Spokane River (Figure 1). Samples will be collected upstream of the Kaiser and historic SIP outfall (Barker Road bridge) and downstream of both facilities (Plante Ferry Site Park Centennial Trail pedestrian bridge and further downstream near Argonne Road). These samples will be collected from mid-river in a well-mixed area of strong current so as to be representative samples of the river water at these points. The Barker Road sample will represent a background sample upstream of both Kaiser and the historic SIP discharge points. Sampling will also take place at three additional points along the river between these two sampling locations. These three sampling locations will be along the north bank of the Spokane River, where potential contaminated groundwater discharging to the river from industrial facilities north of the river may have an impact on river water PCB concentrations.

Samples will also be collected from the Kaiser Trentwood main discharge point (outfall 001) to evaluate if a cleanup effort has resulted in reduced or undetectable PCB concentrations at the outfall. The samples will be collected as grab samples on two consecutive days.

Spokane River sampling stations listed upstream to downstream:

1. Barker Road bridge
2. Downstream of Spokane Industrial Park (SIP) historic outfall
3. Just upstream of Kaiser 001 outfall
4. Downstream of Kaiser 001 outfall (just upstream of railroad crossing)
5. Plante Ferry Site Park pedestrian bridge
6. Downstream of the Argonne Road Bridge in the Upriver Dam Reservoir

Project Organization

Client:	John Roland, Eastern Regional Office, TCP Section
Project Manager:	Steven Golding, E.A. Program, Watershed Ecology Section
Field Assistance:	Norm Glenn, E.A. Program, Watershed Ecology Section
Laboratory Services:	Stuart Magoon, Ecology Manchester Environmental Laboratory

Project Schedule

Field Work:	August 13 - 15, 2000
Laboratory Analysis:	October, 2000
Draft Investigative Report:	November, 2000
Final Investigative Report:	January, 2001
EIM Data Entry	March 2001

Laboratory Costs

$3,864 total estimated laboratory budget (based on discounted lab price of $78 per PCB analysis multiplied by two for low PQL analysis)

Data Quality Objectives

This project is not intended to be a thorough investigation of potential sources of PCBs to the Spokane River in the vicinity of Spokane. PCB analyses will be conducted so as to obtain the lowest possible Practical Quantitation Limits (PQLs). It is anticipated that PQLs as low as 1 ng/L (part per trillion -- pptr) or lower may be achieved. A PQL of 1 ng/L or lower will provide valuable information concerning river PCB concentrations. In a previous study, Ecology estimated that PCB concentrations in portions of the Spokane River may be approximately 1 pptr (Toxics Investigations Section, 1995). State water quality standards aquatic life criteria for total PCBs are 2 µg/L (2,000 pptr) acute, 0.014 µg/L (14 pptr) chronic (WAC 173-201A). EPA National Toxics Rule Human Health Standards are 0.00017 µg/L (0.17 pptr) for water from which there is water or fish ingestion (EPA, 1999). With current laboratory methods, a PQL of 0.17 ng/L (pptr) cannot be obtained from a whole water sample. In summary, in order to meet the objectives of this study, to screen a section of the Spokane River for PCBs and to compare the results with other studies, a PQL for PCBs of 1pptr or lower is desired.

Because this project calls for a minimum possible quantitation limit, the precision of PCB analytical results cannot be specified prior to the analyses. Analytical results will allow an estimate of the precision of results to be made.

Sampling Schedule

The following samples will be collected for the parameters listed:

Location	Date	Sample	Field Parameters	Lab Parameters
Barker Road	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(mid-river)	08/13/00	Field replicate		PCB
Below SIP Outfall	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(near north bank)	08/13/00	Field replicate		PCB
Upstream Kaiser 001	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(near north bank)	08/13/00	Field replicate		PCB
Downstream Kaiser	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(near north bank)	08/13/00	Field replicate		PCB
Plante Ferry Park	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(mid-river)	08/13/00	Field replicate		PCB
Argonne Rd	08/13/00	Grab sample	Temp., Conductivity	PCB, TSS, TDS
(mid-river)	08/13/00	Field replicate		PCB
Kaiser 001 (at outfall)	08/14/00	Grab sample	Temp., Cond., Flow	PCB, TSS, TDS
	08/14/00	Field replicate		PCB
	08/14/00	Transfer Blank		PCB
	08/15/00	Grab sample	Temp., Cond., Flow	PCB, TSS, TDS
	08/15/00	Field replicate		PCB
	08/15/00	Transfer Blank		PCB

Sampling Procedures

All sampling locations will be located with a GPS receiver and the latitude and longitudes recorded.

Samples of river water will be collected by hand from a boat. One-gallon jars will be dipped directly into the river, placed upstream of the boat and with the jar mouth pointed upstream. The collection jars will be organic free glass jars with Teflon-lined lid, each supplied with a Certificate of Analysis. The samples downstream of the SIP historic outfall, just upstream of the Kaiser 001 discharge, and downstream of the Kaiser 001 discharge will be collected from near the north bank of the river. Samples at Barker Road, Plante Ferry Site Park, and below Argonne Road in the Upriver Dam Reservoir will be collected at mid-river. River samples will be collected as single grab samples. Two samples will be collected at each river location, the second sample serving as a field replicate.

Samples from the Kaiser Trentwood 001 discharge will be collected manually at the point where the discharge spills over a weir. The samples will be collected as grab samples directly into 1-gallon organic free glass jars. Samples will be collected on two consecutive days. A second sample will be collected each day to serve as a field replicate. Each day a transfer blank of laboratory-supplied deionized water will be poured into a 1-gallon sample jar to serve as a transfer blank, a total of two transfer blanks collected during the two days of sampling at Kaiser.

Because samples for PCB analysis will be collected directly in 1-gallon jars, it will not be practical to obtain split samples. Kaiser will be notified of the sampling dates several weeks before sampling so that Kaiser representatives can collect sample concurrently with Ecology if they desire.

Nitrile disposable gloves will be worn by personnel during sampling. Sample containers will be placed in ice chests and chain of custody procedures will be followed to ensure security of the samples.

Analytical Procedures

Samples will be analyzed for both PCB congeners and aroclors. Analyses for congeners will provide for data comparisons with the data from past studies. Analyses for aroclors will provide a more detailed description of the nature and signatures of any PCBs found. Analyses will be by EPA SW846, Method 8082A. The samples will first be extracted by Method 3510B. Analyses will be performed by the Manchester Environmental Laboratory. Four initial demonstration (IDC) samples will be prepared in the laboratory.

Two spike and two spike duplicate samples will be analyzed in the laboratory to determine the extent of any interference affecting results. Laboratory duplicates will be expected to provide an estimate of precision.

Quality Control Procedures

Transfer blanks will be prepared as a check for PCB contamination during sampling. One transfer blank will be prepared at the sampling site each of the two days of sampling at Kaiser.

One field replicate PCB sample will be collected for each river sample. The sample and field replicate sample will be collected within minutes of each other in the same river location. Samples and field replicate samples from the Kaiser 001 outfall will be collected within one minute of each other. Differences in results between each sample and its field replicate sample will reflect variability in collection and analysis. Analytical variability will be determined from the results of laboratory duplicates.

Spike samples will be analyzed in the laboratory to determine the extent of any interference affecting results. Spike duplicate samples will provide for the calculation of variability of the spike sample results.

Data Reduction, Review, and Reporting

A report prepared by the Department of Ecology will describe the findings of this project. The report will show the location of all samples. Analytical and field results will be presented and discussed. Any analytical problems will be described. If PCBs are found in the Spokane River samples, the significance of the results will be assessed with respect to spatial distribution and possible sources of PCBs.

References

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