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Memorandum

From: Dave Dilks, Tim Towey
Date: April 17, 2013
Project: SRRTTF
To: Spokane River Regional Toxics Task Force
CC:

SUBJECT: Data Request Memorandum in Support of PCB and Dioxin Control

Summary

The Spokane River and Lake Spokane have been placed on the State of Washington's 303(d) list of impaired waters because of concentrations of polychlorinated biphenyls (PCBs) that exceed water quality standards. The most common regulatory response to waters on the 303(d) list is development of a total maximum daily load (TMDL). In lieu of proceeding immediately with TMDL development, the Department of Ecology (Ecology) is pursuing a direct-to-implementation strategy that included the establishment of a Spokane River Regional Toxics Task Force (SRRTTF) to identify and reduce PCBs and dioxins at their source in the watershed.

LimnoTech has been hired by the SRRTTF to serve as a technical advisor to assist in review of data, studies, and control measures. This document represents an initial step in LimnoTech's support, corresponding to preparation of a technical memorandum listing all of the information required to define existing PCB and dioxin sources, loads and sinks. The body of this memorandum divides data needs into categories of: 1) Direct Loading Sources, 2) Nonpoint Sources, and 3) Environmental Processes. Each section lists approaches that can be used to estimate the magnitude of all components, as well as types of information required to support the assessment. An integrated list of data needs is provided in tabular form as an appendix, which also lists all data that has already been obtained, as well as other known and potential sources for satisfying each data need.

Direct Loading

This category consists of direct surface water discharges from municipal and industrial treatment facilities, tributaries, stormwater discharges, and combined sewer overflow discharges. Loading rates from direct sources will be primarily estimated directly from monitoring data. The data necessary to estimate these loads consist of measurements of flow and pollutant concentration. Other supplemental information may also be available from these sources, including:

- Suspended solids concentrations from all sources, to support environmental fate assessment
- Sediment pollutant concentrations measured in stormwater catch basins
- Wastewater influent pollutant concentrations
- Sample type and laboratory methods

Nonpoint Source Loading

Several categories of nonpoint sources have been identified as potentially important contributors of PCBs and dioxin. These consist of:

- Old industrial areas (which previously actively used PCBs)
- Atmosphere

- Building demolition and remodeling
- Recycling facilities
- PCBs still in use
- Illegal disposal
- Manufacturing
- Incineration
- Railroad right-of-ways
- Groundwater

Old industrial areas (which previously actively used PCBs)

Historical industrial activities may have caused contamination of soils with PCBs. This contaminated soil can ultimately be eroded and delivered to the Spokane River. The magnitude of loading from this source can be estimated several ways:

- Direct measurement of runoff volume and PCB concentration
- Measured soil PCB concentration multiplied by an assumed erosion rate
- Simple models and literature values

The type of information requested necessary to conduct the above assessments include soil PCB concentration, soil characteristics, erosion studies, number and size of petroleum refineries, number and size of demolition sites, land use in 1950s).

Atmosphere

Atmospheric sources can be important contributor of PCBs and dioxins. It will be important to distinguish between local and non-local atmospheric sources, as future pollution control efforts will only be able to remediate local sources. The magnitude of loading from this source can be estimated several ways:

- Direct measurement of absorption and deposition
- Measurement of gas phase PCB concentrations
- Simple models and literature values

The type of information requested necessary to conduct the above assessments include regional air quality monitoring, smokestack monitoring of major incinerators, local precipitation, number and size of incinerators, number and size of smelters, yard waste burning studies, fire-fighting reports, and vehicle registrations.

Building demolition and remodeling

Building demolition and remodeling can release PCBs into the environment that were previously contained in commercial products such as caulks. The magnitude of loading from this source can be estimated several ways:

- Direct measurement of runoff volume and PCB concentration near recent demolition sites
- Measured soil PCB concentration multiplied by an assumed erosion rate
- Simple models and literature values

The type of information requested necessary to conduct the above assessments include soil PCB concentration, soil characteristics, erosion studies, number and footprints of buildings built between 1950 and 1980, and sampling of caulk on commercial buildings (if dating from 1950-1980).

Recycling facilities

Recycling facilities can reintroduce to the environment PCBs that were previously contained in commercial or industrial products. The magnitude of loading from this source can be estimated several ways:

- Direct measurement of runoff volume and PCB concentration near recent recycling facilities
- Measured soil PCB concentration multiplied by an assumed erosion rate
- Simple models and literature values

The type of information requested necessary to conduct the above assessments include soil PCB concentration; soil characteristics; erosion studies: and numbers and sizes of auto dismantlers, computer and electronics recyclers, transfer stations, landfills, metal recyclers, and white goods recyclers.

PCBs still in use

PCBs still in use are another potential source to the Spokane River. The information required to estimate the potential magnitude of this source consists of the number and size of totally enclosed applications (e.g. large scale transformers and capacitors) and spill reports associated with those applications.

Illegal disposal

Illegal disposal of contaminated products can be an important source of pollutants, although the nature of the activity makes direct measurement infeasible. Police reports documenting arrests and/or reports of illegal dumping could help estimate the magnitude of this source.

Manufacturing

Certain manufacturing processes produce dioxins as a by-product. The information required to estimate the magnitude of this process includes number and size of relevant industrial operations (i.e. pesticide manufacturing, pulp bleaching, PVC manufacturing and petroleum refining.)

Incineration

Waste incineration can contribute dioxins and, to a lesser extent, PCBs to the environment. Records of the number, size, and type of incineration activities are needed to estimate the magnitude of this contribution.

Railroad Right-of-Ways

A study conducted in San Jose, California concluded that some of the highest concentrations of PCBs were found in sediments from railroad track right-of-ways. Locations of railroad tracks, soil PCB concentrations, and erodibility information are needed to estimate this source.

Groundwater

Groundwater is a potential source of dissolved-phase PCBs to the Spokane River. Groundwater flow information and PCB concentrations in groundwater are needed to estimate the magnitude of this pathway.

Environmental Processes

Environmental processes control the fate of PCBs and dioxins delivered to the Spokane River, and can serve as important sinks. The key processes of concern consist of:

- Advection
- Settling to bottom sediments

- Resuspension from bottom sediments
- Deep burial
- Volatilization
- Photolysis
- Microbial degradation in bottom sediments

Advection

Advection consists of movement of pollutants in the water column via currents. The magnitude of this fate process can be estimated several ways:

- Direct measurement of river flows and PCB/dioxin concentrations
- Linked hydrologic and water quality models
- Simple models and literature values

The type of information necessary to conduct the above assessments include measurement of river flows, water column PCBs concentrations, water column dioxin concentrations, suspended solids concentrations, particulate and dissolved organic carbon concentrations, existing hydrologic and or water quality model applications.

Settling to Bottom Sediments

PCBs and dioxin both have a physical-chemical affinity to particulate matter, and can be removed from the water column when they adsorb to particles that settle out of the water column. The magnitude of this fate process can be estimated several ways:

- Direct measurement of suspended solids concentration combined with assumed settling rate
- Linked hydrologic and water quality models
- Sediment trap measurements

The types of information necessary to conduct the above assessments include measurements of suspended solids concentrations, sediment trap measurements, and existing hydrologic and or water quality model applications.

Resuspension

PCBs and dioxins that had historically settled can be re-suspended into the water column when conditions exist to provide sufficient turbulence at the sediment-water interface. It can either be measured in the laboratory or estimated via the scientific literature or simple models. The information necessary to conduct the above assessments consists measurements of bed sediment porosity, sediment density, bed sediment PCB concentration, bed sediment dioxin concentration, bathymetry, and sediment organic carbon content.

Deep Burial

Deep burial represents net sedimentation and can essentially mitigate the effects of historical sediment contamination by covering older contaminated sediments with a layer of cleaner sediment. The magnitude of this fate process can be estimated by:

- Estimate as the difference between calculated settling and resuspension
- Infer from measurements of isotope profiles

The types of information necessary to conduct the above assessments (beyond the above information necessary to calculate settling and resuspension) consist of burial velocity measurements and isotope profiles.

Volatilization

Volatilization represents the loss of dissolved pollutant from the water to the atmosphere. It can either be measured in the laboratory or estimated via the scientific literature or simple models. The information necessary to conduct the above assessments consist of wind speed and air temperatures.

Photolysis

Photolysis is the chemical degradation of a pollutant due to solar radiation. It can either be measured in the laboratory or estimated via the scientific literature or simple models. The information necessary to conduct the above assessments consists of light absorption rates, photolysis rate constants, ambient solar radiation, cloud cover).

Microbial Degradation

Microbial degradation represents the chemical breakdown of pollutants by microbes in the bottom sediments. Although typically a very slow process, it can be a significant loss of pollutant due to long residence times of bottom sediments. Alternate ways to estimate magnitude of process include laboratory measurements of rates, literature values, and calibration of site-specific pollutant fate and transport models. The only type of information needed that has not been addressed previously is measurement of degradation rates in the bottom sediments.

Appendix A. Data Request Summary

Data Category	Known and Potential Data Sources	Contacts for Obtaining Data
Wastewater Treatment Plant Loads – WWTP daily flow design flow, – effluent PCB, – effluent dioxin, – influent PCB influent dioxin, total suspended solids	Municipalities; Inland Empire Paper; Kaiser Aluminum; Ecology; IDEQ; EPA Region 10; Discharge Monitoring Reports; Annual Toxics Management Plan Reports; Environmental Assessment Program projects; Urban Waters Reports; PARIS database City of Post Falls	Ellie Key, Permit Manager, Spokane Liberty Lake Sewer and Water District (LLSWD), Spokane County WWTP, City of Spokane WWTP, Pat Hallinan, Permit Manager, Spokane Inland Empire Paper Company, Kaiser Aluminum Dale Norton, Environmental Assessment Program, Lacey Arianne Fernandez, Urban Waters, Spokane Dan Redline, IDEQ, Coeur d'Alene, ID Brian Nickel, USEPA, Seattle, WA Sandra Phillips, Spokane Regional Health District Mike Neher, City of Post Falls
Stream Flow Information for Spokane River and Tributaries	USGS; Ecology; Spokane County Conservation District; River/Aquifer and In-stream flow studies; DO and other TMDL studies for Spokane River Hangman/Latah; Creek, and Little Spokane River; Washington Water Science Center; National Water Information System	Guy Gregory, Water Resources, Spokane; Jim Ross, Environmental Assessment Program, Spokane; Elaine Snouwaert, Water Quality, Spokane; Greg Perry, USGS
Water column measurements of PCB and dioxin concentrations for Spokane River and tributaries	Ecology, USEPA, STORET, IDEQ, River/Aquifer and In-stream flow studies; DO and other TMDL studies for Spokane River; Hangman/Latah Creek, and Little Spokane River, Environmental; Information Management System, Project Quality Assurance Project Plans; Ecology PCB study for fish hatcheries (Little Spokane River Tributary); EIM database	Dale Norton, Environmental Assessment Program, Lacey

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Stormwater loads – discharge flow, – PCB concentration, – dioxin concentration, – total suspended solids	Stormwater NPDES for City of Spokane, Spokane County, City of Spokane Valley; WSDOT; Urban Waters Report for LLSWD City of Post Falls	Dave Duncan, Municipal Stormwater Permit Manager, Spokane; Lynn Schmidt, City of Spokane; Greg Lahti, WSDOT; Mike Neher, City of Post Falls
Soil Characteristics and Erosion Studies	Soil Survey Geographic Database (SSURGO); Municipal Planning Departments; Spokane River Watershed NPS Reduction Plan; GIS Inventory	Arianne Fernandez, Urban Waters, Spokane; Dave Moore, Wetlands, Spokane; Rob Lindsay, Spokane County
PCBs in stormwater catch basins	City of Spokane; Annual Toxics Management Plan Report; Urban Waters Reports	Arianne Fernandez, Urban Waters, Spokane; Brandy Lubliner, Environmental Assessment Program, Lacey; Lynn Schmidt, City of Spokane; Dave Duncan, Municipal Stormwater Permit Manager, Spokane
Atmospheric gas phase PCB Concentrations	Universities, scientific literature; Ecology White Paper on Atmospheric Deposition; Washington Department of Ecology for Kaiser Aluminum; Spokane Regional Clean Air Source Testing; Reports (Waste to Energy Plant, Inland Empire Paper, Area sources such as oil burners, yard waste)	Arianne Fernandez, Urban Waters, Spokane; Brandee Era-Miller, Environmental Assessment Program, Lacey; Greg Flibbert, Air Quality Program, Spokane; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Measured atmospheric deposition rates for dioxin	Universities, scientific literature; Ecology White Paper on Atmospheric Deposition; Washington Department of Ecology for Kaiser Aluminum; Spokane Regional Clean Air Source Testing; Reports (Waste to Energy Plant, Inland Empire Paper, Area sources such as oil burners, yard waste)	Arianne Fernandez, Urban Waters, Spokane; Brandee Era-Miller, Environmental Assessment Program, Lacey; Greg Flibbert, Air Quality Program, Spokane; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Number and size of smelters	Toxics Release Inventory; Facilities SITES database	Bill Dameworth, Spokane Regional Clean Air Agency

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Yard waste burning studies	USEPA dioxin source inventory; Possible Regional EPA air quality studies; Possible USFS dioxin studies	Greg Flibbert, Air Quality Program, Spokane
Number of vehicle registrations	Department of Motor Vehicles; Studies associated with the SRCAA indirect source rule	Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Fire fighting reports	Local Fire Departments; List of Fire Departments from SRCAA; Ecology Spill reports; TSCA Spill Database; Kootenai County Fire & Rescue	Ted Hamlin, Emergency Response Spill Team, Spokane; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency; Warren Merrit, Kootenai County Fire & Rescue
Soil PCB and dioxin concentration	Site specific measurements, scientific literature; Kaiser Aluminum Clean Up project; Other past PCB clean ups; Avista Clean-ups; Possible USFS dioxin studies; ISIS database; *http://www.ecy.wa.gov/programs/tcp/mtca_gen/hazsites.html*; Ecology EIM	Arianne Fernandez, Urban Waters, Spokane; Ginny Darrell, Dave George, Patty Carter, Toxics Cleanup Program, Spokane; Mike LaScuola, SRHD (historic WW discharge sites)
PCB and Dioxin emissions from incineration activities	EPA Dioxin inventory, scientific literature; Spokane Regional Clean Air Source Testing Reports (Waste to Energy Plant, Inland Empire Paper, Area sources such as oil burners, yard waste)	Greg Flibbert, Air Quality Program, Spokane; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Number and size of petroleum refineries	Toxics Release Inventory; Local petroleum facilities; Spokane Aquifer Joint Board (SAJB) Potential Containment Source Inventory (PCSI)	SITES database; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency; Mike Hermanson, Spokane County

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Number and size of incinerators	Toxics Release Inventory; Testing of ash for dioxin; Oil sources at local facilities; Spokane Regional Clean Air Source Testing Reports (Waste to Energy Plant, Inland Empire Paper, Area sources such as oil burners, yard waste); SAJB-PCSI	Arianne Fernandez, Urban Waters, Spokane; Greg Flibbert, Air Quality Program, Spokane; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Number and size of demolition sites	Local government demolition records; Spokane Regional Clean Air Agency for asbestos notifications	Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Number of commercial buildings constructed between 1950 and 1980	US Census Bureau; Other Washington Toxics Assessment reports	Holly Davies, Chemical Action Plan for PCB, Lacey
Land Use Maps for 1950-1980	Municipalities; USDA, GISDATA Map Studio; Local GIS data; Sanborn Maps; Spokane County Assessor Database	Mike Cuttle, Water Quality, Spokane; Richard Darnell, Water Resources, Spokane; Arianne Fernandez, Urban Waters, Spokane; Sandra Phillips, Spokane Regional Health District; Mike Hermanson, Spokane County
PCB content of caulk on commercial buildings	Scientific Literature	Holly Davies, Chemical Action Plan for PCB, Lacey; Sandra Phillips, Spokane Regional Health District http://www.epa.gov/pcbsincaulk/
Numbers and sizes of auto dismantlers, computer and electronics recyclers, transfer stations, landfills, metal recyclers, and white goods recyclers	Local government listings Waste Management Spokane, City of Spokane, Spokane County, Washington Ecycle program; Inland Empire Paper (paper recycling); Pacific Steel Washington Ecycle database InfoUSA (Spokane County)	Ted Hamlin, Water Quality/Urban Waters, Spokane; Mike LaScuola and Sandy Phillips, Spokane County Regional Health District; Doug Krapas, Inland Empire Paper; Mike Hermanson, Spokane County

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Results of survey of industrial practices	Spokane River Urban Waters Team; Source control studies and activities; WWTP Toxics Management Plans and reports	Arianne Fernandez, Urban Waters, Spokane Ellie Key, WWTP Permit Manager, Spokane; Pat Hallinan, Industrial Permit Manager, Spokane; Dave Duncan, Municipal Stormwater Permit Manager, Spokane; Dale Norton and Lynn Schmidt, City of Spokane; Mike LaScuola and Sandy Phillips, Spokane County Regional Health District
Large Scale Transformers and capacitors	EPA Database; Avista, Inland Power, Modern Electric, Vera Water & Power	Holly Davies, Chemical Action Plan for PCB, Lacey; Kevin Booth, Avista
Illegal dumping reports/arrests	Local Police Departments; Ecology Spills and Emergency Response Team Reports; Post Falls Police Department	Ted Hamlin, Urban Waters/Spill Team/Water Quality Spokane; Scott Haug, Post Falls Police Department
Number and size of pesticide manufacturing, pulp bleaching, PVC manufacturing operations	Toxics Release Inventory and local government listings; SITES database; Panhandle Health District SAJB PCSI	Lora Whalen, Panhandle Health District Mike Hermanson, Spokane County
Dam Release Information	Avista; USGS; FERC FEIS for Spokane and Post Falls; 401 Water Quality Certification documents and reports	Guy Gregory, Water Resources, Spokane; Meghan Lunney, Avista; Steve Ashe, Avista; Kevin Booth, Avista
Spokane River and tributary water column measurements: – temperature, – suspended solids, – and particulate and dissolved organic carbon concentrations	Ecology, Region 10, STORET, IDEQ Spokane River and tributary Assessment reports for toxics, metals, and dissolved oxygen Dissolved Oxygen Use Attainability Analysis EIM Database	Dale Norton, Environmental Assessment Program, Lacey; Jim Ross, Environmental Assessment Program, Spokane;

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Tributary watershed boundaries	National Hydrography Dataset WRIA Webpages Spokane River Water Resource Inventory Areas 54, 55, 57 City of Spokane GIS stormwater database	Adriane Borgias, Water Quality, Spokane; Arianne Fernandez, Urban Waters, Spokane;
USGS (2007) groundwater flow/model	Already obtained In-stream flow studies, historic datasets	Guy Gregory, Water Resources, Spokane;
Other groundwater flow information/models	Literature, site specific investigations	Guy Gregory, Water Resources, Spokane;
CE-QUAL-W2 water quality model	Already obtained	
Other hydrodynamic and/or water quality models	Ecology, IDEQ DO TMDL water quality model modifications; Environmental Assessment Program reports; Toxics Clean up reports (Kaiser Aluminum and others)	Dave Moore, Spokane; Dale Norton, Environmental Assessment Program, Spokane; Ginny Darrell, Dave George, Toxics Cleanup Program, Spokane; Andy Dunau, Spokane River Forum
River/Lake bed sediment properties (density, porosity, organic carbon content)	Site specific measurements, model calibration reports scientific literature; 401 Water Quality Certification documents and reports relating to Lake Spokane; Fish studies and bass model; IDEQ	Arianne Fernandez, Urban Waters, Spokane; Meghan Lunney, Avista for Lake Spokane; Andy Dunau, Spokane River Forum, Daniel Redline, IDEQ
River/Lake bed sediment PCB and dioxin concentration	Ecology; USEPA Region 10; STORET; IDEQ; Core sediment data from Lake Spokane; Upriver Dam Clean up	Dale Norton, Environmental Assessment Program, Lacey; Ginny Darrell, Dave George, Toxics Cleanup Program, Spokane; Daniel Redline, IDEQ

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Sediment Trap measurements	Ecology; USEPA Region 10; STORET; IDEQ; Spokane River studies; EIM Database; Stormwater studies	Dale Norton and Brandee Era Miller, Environmental Assessment Program, Lacey; Arianne Fernandez, Urban Waters, Spokane; Daniel Redline, IDEQ
Climate data (precipitation, air temperature, solar radiation, wind speed)	NOAA-NCDC Local weather patterns, studies associated with agricultural burning and forest fire air quality MesoWest; Bureau of Reclamation	National Weather Service, Spokane does local weather models and forecasts; Bill Dameworth, April Westby, Spokane Regional Clean Air Agency
Sediment isotope profiles	Ecology; USEPA Region 10; STORET; IDEQ; Core sediment data from Lake Spokane	Dale Norton, Environmental Assessment Program, Lacey; Daniel Redline, IDEQ
Pollutant specific degradation rates in bed sediments	Scientific literature	Dale Norton, Environmental Assessment Program, Lacey; Holly Davies, Chemical Action Plan for PCB, Lacey
PCB/dioxin concentrations in groundwater	EIM database	Ginny Darrel, Ecology Toxics Cleanup Program; Guy Gregory, Ecology Water Resources Program
Railroad locations	USDA, GISDATA Map Studio; Local GIS data; Sanborn Maps	
City of Spokane Combined Sewer Overflow Events	http://www.spokanewastewater.org/csoupdate.aspx#Monthly	Lynn Schmidt, City of Spokane

Data Category	**Known and Potential Data Sources**	**Contacts for Obtaining Data**
Identified contaminated sites, cleaned up sites with residual concentrations	Ecology Toxics program	Ginny Darrel, Ecology Toxics Cleanup Program