

## **Political and Legal Responses to Transboundary Pollution in the Columbia River**

### **Introduction**

In the United States, the Columbia River is often thought of as a river that runs through the states of Oregon and Washington. It makes its course through Washington and creates the boundary between Oregon and Washington as it travels to the Pacific Ocean, but it is important to recognize its Canadian origins. The Columbia River's headwaters lie in British Columbia and a significant amount of the river's mileage winds through the Canadian province before crossing the United States border into Washington state. The relevance of the Columbia River as an international river is largely a legal and political one.

As an international river, the Columbia River falls under two different set of jurisdictions with different standards of environmental quality. The best example of the conflict that can arise in such a situation is that of the case of the Trail, B.C., smelter, which has served as a world renowned model of international environmental litigation.

### **History**

The lead-zinc smelter in Trail, British Columbia was originally built in 1902 and controlled by the Canadian Pacific Railway, until the formation of The Consolidated Mining and Smelting Company of Canada (CM&S) in 1906. The CM&S changed its name to Cominco in 1966 and twenty years later started a partnership with Teck that was finalized in 2001 (Teck). The resulting company, Teck Cominco Ltd., maintains control

of the operations at Trail and is the target of much environmental criticism regarding the emissions of contaminants into the environment.

Since the Trail smelter is located only 10 miles north of the United States border, it pollutes not only Canadian air, soil, and water, but that of the United States, primarily Washington, too. This type of pollution is classified as transboundary pollution:

any intentional or unintentional pollution whose physical origin is subject to, and situated wholly or in part within the area under, the national jurisdiction of one State and which has effects in the area under the national jurisdiction of another State (Magraw 4).

In 1935, Canada and the United States reached a settlement, “Canada-United States: Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail, B.C.,” based on the Boundary Waters Treaty of 1909, that became the historical precedent for how to resolve international transboundary pollution disputes.

In order to facilitate the legal process, there must be scientific evidence to support it. There must be evidence of contamination downstream from the smelter, proof that the Trail smelter is responsible for it, and convincing data that demonstrates a risk created by such contamination in order to call upon international law. In this case, there is substantial evidence of metallic toxicity in the upper Columbia River and Lake Roosevelt that poses health risks and can be linked to the Teck Cominco Ltd. smelt in Trail.

### **Metallic Toxicity Levels and Health Effects**

Since 1902 the Teck Cominco Ltd. lead-zinc smelter in Trail, British Columbia has been “the primary source of metals contamination,” in the Franklin D. Roosevelt Lake and the United States’ portion of the upper Columbia River in Washington state

(Era and Serdar,1). In 2001, the Washington State Department of Ecology conducted a study to assess the toxicity levels in the 151 mile stretch of the river. Specifically, the study measured levels of arsenic, cadmium, copper, lead, mercury, and zinc. The study collected data from nine sites: four in the upper Columbia River and five in the lower Lake Roosevelt and contrasted the results against a reference site upstream of the Trail smelter in Canada (Fig.1).

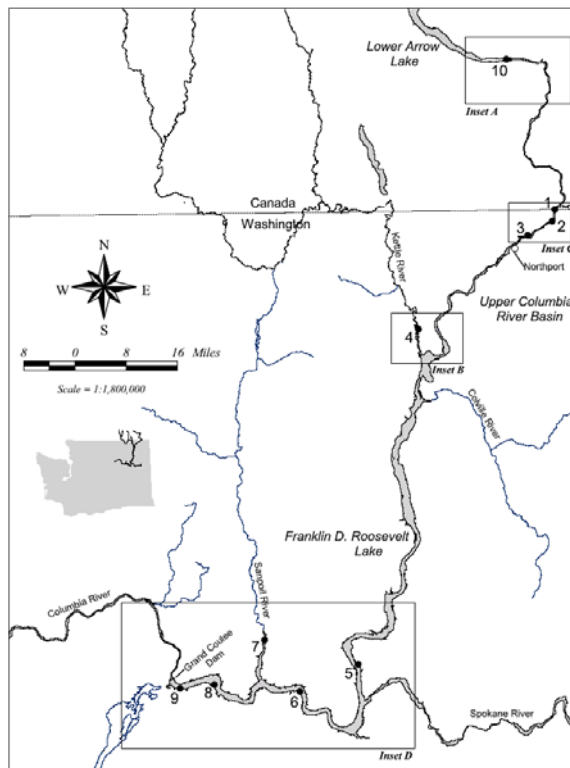


Figure 1. Sampling Site Locations in Lake Roosevelt and the Upper Columbia River, May 2001.

Source: Era, Brandee and Dave Serdar. "Reassessment of Toxicity of Lake Roosevelt Sediments." Washinton State Department of Ecology. 01-03-043 (Dec. 2001)

The primary purpose of the study was "determine if these sites should remain on the federal Clean Water Act Section 303(d) list of impaired waterbodies" since the criteria for inclusion were changing in 2002. The difference between the previous policy and the new one resides in the number of toxicity hits per segment of the river. According to the

previous policy, one toxicity hit per site was enough to place it on the 303(d) list but after 2002, a segment would have to have three toxicity hits to be on the list. Out of the nine sites tested in this study, eight of them would have qualified for the previous list but none met the standards for the new policy. The definition of a segment in the Clean Water Act Section is “a grid 2,460 feet longitude by 3,650 feet latitude,” for open waters and “the portion of the waterbody lying within the section of a township and range,” for rivers and streams. According to these definitions, the testing sites are not close enough together to reach the three toxicity hits standard for inclusion on the list. Although the results of the study do not qualify any of the sites in the Upper Columbia River or Lake Roosevelt to be on the 303(d) list, the data regarding the toxicity instills concern about the safety of the water (Era and Serdar).

This particular study measured levels of arsenic, cadmium, copper, lead, mercury, and zinc. It attributes the majority of the metal pollutants to the smelter but also recognizes that mining activity is another source of contamination. By comparing the levels of each of the aforementioned metals at each of the sites with the Freshwater Sediment Quality Values (FSQVs) for metals in Washington State and the Consensus-Based Threshold Effects Concentrations (TECs), it is clear that the metal pollution of the Upper Columbia River and Lake Roosevelt is a health risk. Minimal risk levels (MRLs) established by the Agency for Toxic Substances and Disease Registry (ATSDR) also serve as an indicator of the dangers presented by such metals in the sediments and ground water (Era and Serdar).

Arsenic, according to the ATSDR, has a MRL of 0.005 mg/kg/day for acute exposure and 0.0003 mg/kg/day for chronic exposure. However, in the Toxicological

Profile of Arsenic, the ATSDR claims that “natural levels of arsenic in soil usually range from 1 to 40 mg/kg, with a mean of 5 mg/kg.” At all of the sites in this study, the levels of arsenic lie within this range of 1 to 40 mg/kg and exceed neither the FSQVs for metals in Washington State nor the Consensus-Based TECs. The levels of arsenic present do not pose a health risk at any of the sites tested (Era and Serdar).

Cadmium poses a high health hazard as it exceeds the TECs at every site and the FSQVs at six out of the nine sites. The highest concentration of cadmium is at Auxiliary Gage, site 2, with 18.0 mg/kg dw. The MRL for chronic exposure to cadmium is 0.0002 mg/kg. The effects that cadmium can have on human health include damage to the kidneys, lungs, and intestines (Agency). Long term exposure to cadmium can also lead to fragile bones and it is reasonable to anticipate cadmium and its compounds as carcinogens. The upper Columbia River area is not the only region affected by high levels of cadmium. In fact, “Smelting of nonferrous metal ores has been estimated to be the largest anthropogenic source of cadmium released into the aquatic environment” (Agency).

The levels of copper also pose a health risk although they do not exceed FSQVs or TECs as consistently as the levels of cadmium do. The levels of copper exceed both the FSQVs and the TECs at the three sites closest to the Trail smelter. They exceed only the TECs at three of the remaining sites. However, two of the sites that do not exceed the recommended levels are located on tributaries of the Columbia that are not directly influenced by the smelter and the other site that did not exceed recommended levels of copper is at Grand Coulee Dam, which is located furthest away from the smelter. The high level of 2210 mg/kg dw of copper was found at both Auxiliary Gage and Goodeve

Creek. Downstream on the Columbia, levels of copper varied between 66-76 mg/kg dw. The short term human health risks associated with copper include nausea, vomiting, and diarrhea while long term exposure can lead to liver and kidney damage or death (Era and Serdar).

Lead is a more commonly known risk to human health. Lead poisoning has been a significant issue in the upper Columbia River area, especially in children because children are more vulnerable than adults. Childhood exposure to high levels of lead can lead to anemia, neurological impairment, renal alterations, colic, and impaired metabolism of vitamin D. There is not an established MRL for lead because a threshold for some sensitive effects has not been identified (Agency). In the study area, lead levels exceeded TECs at all points downstream of the smelter except at the Grand Coulee Dam. None of the sites reported levels that exceeded the FSQVs (Era and Serdar).

Mercury is another metal commonly associated with negative health effects. The results of mercury levels are strikingly different from the levels of the other metals measured. The levels of mercury reported from the closest three sites to the Trail smelter did not exceed either the FSQVs or the TECs. Yet, at the next three sites downstream, the levels of mercury exceeded both the FSQVs and the TECs. Mercury can harm the nervous system, especially the brain. Specific brain damage effects can include irritability, shyness, tremors, changes in vision or hearing, and memory problems. Mercury can also damage the kidneys or a developing fetus (Era and Serdar).

Zinc is the other obvious metal contaminant from the lead-zinc smelter in Trail. The levels of zinc exceed both FSQVs and TECs at all sites that are downstream of the smelter. The highest measured level of zinc was at Auxiliary Gage with 16,100 mg/kg

dw of zinc. Compared to the 27 mg/kg dw of zinc measured upstream of the smelter, the immense increase of zinc in the sediment is obvious. Although small levels of zinc are healthy and promote immune system health, high levels can result in negative health effects. Such possible effects include stomach cramps, anemia, and changes in cholesterol level. Contrasted against the health effects of other metals in this study, zinc does not seem too threatening but it is also more prevalent than any of the other metals measured (Era and Serdar).

### **Attributing Metal Pollutants to Trail Smelter**

The high levels of cadmium, copper, lead, mercury, and zinc are unhealthy, but whether or not they can be attributed to the Teck Cominco Ltd. smelter in Trail must still be proved in order to substantiate the transboundary pollution litigation. One method of confirming that the metals are products of the smelter is to compare the levels of each metal downstream of the smelter with the levels from the site upstream of the smelter. Another method is that documented in a report from September 2002 by the United States Geological Survey (USGS). The USGS study, “Vertical Distribution of Trace-Element Concentrations and Occurrence of Metallurgical Slag Particles in Accumulated Bed Sediments of Lake Roosevelt, Washington” measured the distribution of metals in the sediment of Lake Roosevelt and found that “the trace-element profiles reflect changes in historical discharges of trace elements to the Columbia River by an upstream smelter” (Cox et al. 1). Both of these methods point to the smelter at Trail as the source of the metal contaminants downstream.

The first method of comparing the levels of metals in the river upstream of the smelter to those downstream of the smelter is a simple matter of observation. In every

one of the metals measured, the concentration was lower upstream of the smelter than at any of the sites downstream. This shows that something happened between the Lower Arrow Lake site and the Boundary site that caused an increase in the metal concentration. Since the Trail smelter is situated between those two points and releases metals into the environment, it is a logical conclusion that the smelter is responsible for the higher levels of concentration downstream.

The second method of measuring vertical distribution of the metals in the sediment supports the first method. By measuring vertically, the USGS study was able to compare changes in concentration over time. For example, “the decreasing concentrations of trace elements in the upper half of cores from along the pre-reservoir Columbia River showed a pattern of decreasing concentrations similar to reductions in trace-element loading in liquid effluent from an upstream smelter” (Cox 1). The combination of these two methods confirms the undisputed claim that the Teck Cominco Ltd. smelter at Trail is the cause of the increased metal concentrations in the Columbia River sediment.

### **Transboundary Pollution Policy**

Although the Trail smelter emissions create an environmental problem, it is also a political problem because an actor under one set of legislation is adversely affecting a population of a different state and so there must be some sort of communication and negotiation in order to determine how the governments and the international community should respond to such conflicts. If the smelter were 11 miles further south than it is, it would be in the state of Washington and correspondingly under United States federal laws and Washington state laws. Those 11 miles make a huge difference in how the

pollution problem can and should be dealt with legally. International environmental law is an underdeveloped field. The case of the Trail smelter has served as an example of what can be done while also demonstrating the difficulty of solving transboundary pollution problems even between friendly, culturally homogeneous countries. Before discussing the current situation between the United States and Canada on this issue, it is necessary to look at the history of the conflict and evaluate the effectiveness of the agreed-upon solution.

The problem of transboundary pollution on a river can be best demonstrated through game theory. When actors make independent decisions, there are two possible outcomes, that of harmony and that of conflict. In the case of transboundary pollution, there is conflict because the independent decision made by the Trail smelter to pollute the Columbia River led to an undesirable outcome for the tribes and citizens of Washington state in the United States. Specifically, the Trail smelter problem is an “upstream/downstream” problem. Political Science Professor Ronald Mitchell at the University of Oregon describes the problem of upstream/downstream through a game theory table and explanations behind each actor’s behavior. He explains that in upstream/downstream problems, the “upstream states receive no direct benefits from cooperation and probably incur costs to cooperate.” There are also “very strong incentives for upstream states to renege on their commitments after [an] agreement is reached” (Mitchell). The table below demonstrates the problem of upstream/downstream in game theory. The numbers represent the likelihood of what the actor will do given the actions of the other actor with 4 being the highest and 1 the lowest.

Table 1. Upstream/Downstream Game Theory (U.S., Canada)  
 Source: Mitchell, Ronald B. "Lecture #2: Types of Problems." University of Oregon. 31  
 March 2005.

Upstream state(Canada) ==> Downstream (U.S.) --vvv--	Contribute to pollution reduction	Don't contribute to pollution reduction
Contribute to pollution reduction	4,1	2,3
Don't contribute to pollution reduction	3,1	1,3

As the table above demonstrates, the United States will likely contribute to pollution reduction regardless of what Canada does because it is in the United States' best interest to maintain a nontoxic river and lake. Conversely, Canada will not likely contribute to pollution reduction because it is not affected by the pollution. This table of game theory clearly shows the necessity for a solution of cooperation that gives Canada a reason to contribute to pollution reduction since one does not naturally exist.

The existing agreement between the United States and Canada is the "Convention for Settlement of Difficulties Arising from Operation of Smelter at Trail, B.C." According to the convention, the governments agreed that Canada would pay the United States \$350,000 for the "damage which occurred in the United States, prior to the first day of January, 1932, as a result of the operation of the Trail Smelter." The remainder of the article focuses on the creation and role of a Tribunal to decide if the Trail smelter had caused further damage since January of 1932, how much, and the appropriate penalty. The Tribunal would have a chairman, who is from neither the United States nor Canada, representatives from both countries, and optional scientists to assist them.

According to this convention, both governments would send reports to each other, and then go through a sort of trial process under the authority of the Tribunal. At the end of the process, the Tribunal will report its findings to the governments. In the end, the governments must comply with the Tribunal's decision and also cover the costs of the case.

The problems with the convention lie in the lack of follow up required. It says that the governments need to comply with the Tribunal's findings, but it does not contain any methods for measurability or consequences for failing to comply. These are the main problems with the convention. It does not explain how the governments will be held accountable for following through with the orders of the Tribunal. It would be helpful to create another body that would monitor the enforcement of the Tribunal's decisions or give enforcing powers to the Tribunal itself. Creating another monitoring body would be preferable in order to maintain the neutrality of the Tribunal.

Although the arbitration regarding the Trail smelter responded to sulfurous gas pollution in the air, it set two important precedents for international environmental law and thus the issue of metal pollutants in the Columbia River. The first precedent it set was appointing "an international tribunal to investigate a case concerning transboundary pollution damages" (Caldwell 151). The second was the legal principles it invoked that were later "recognized at the Stockholm Conference of the Human Environment in 1972" (Caldwell 151). The situation seems to have been settled peaceably and effectively as Canada paid the United States the designated amount of money, except the problem still exists today.

Currently, “the EPA (Environmental Protection Agency) has demanded that the Trail smelter submit to its jurisdiction to clean up the Columbia-Lake Roosevelt area, and has attempted to apply the Superfund laws extraterritorially”(Parrish). This demand and the demands of the Colville Confederated Tribes that the Trail smelter conforms to their environmental standards of operation were not received well by Teck Cominco Ltd. The Canadian company “has volunteered to take certain clean-up measures, including offering \$13 million for studies and remediation, it refuses to bend to either the EPA's or the Colville Tribes' demands” (Parrish). Their refusal is understandable because, as a Canadian company under Canadian jurisdiction, they are not accountable to the United States government. The EPA’s attempt to apply domestic United States laws to a Canadian company also demonstrates blatant disrespect for the sovereignty of Canada and likely made the situation worse through insult. It seems that the current United States government has lost sight of its previously modeled behavior of cooperating with Canada in order to reach an agreement rather than forcing its regulations extraterritorially. As the Trail smelter dispute is one of many points of transboundary pollution problems along the Canada-United States border, there is a definite need for a standard legal process to address international environmental issues.

### **Recommendations**

While national adjudication is not an effective way to solve the problem of transboundary pollution, it is difficult to create the ideal solution. Austen L. Parrish provides a couple “missed opportunities” of legal mechanisms available to

the United States to gain cooperation from Canada. The first recommendation is the use of the Boundary Water's Treaty of 1909. The second is to revisit the original Trail smelter arbitration. Overall, the United States should turn to international arbitration as the means to gain cooperation from Canada, despite the fear of losing its sovereignty.

The Boundary Waters Treaty of 1909 contains three overriding principles or guidelines that should govern the interaction between the United States and Canada regarding their bordering waters. The first is "that each country has exclusive jurisdiction and control over the use and diversion of waters in its territory" (Parrish). Second, it does not allow "the interference or diversion of the waters' natural flow" (Parrish). Third and finally, the treaty prohibits the pollution of boundary waters. In order to enforce these guidelines, the treaty created the International Joint Commission (IJC) with powers to give nonbinding and binding recommendations to both countries. The Boundary Waters Treaty created a framework in which the United States and Canada could form the Convention to resolve the transboundary pollution from the Trail smelter almost 30 years later.

For the current dispute regarding water pollution from the Trail smelter, it seems only logical that an international model should be followed to reach an agreement between the two countries. The United States does not have the right to impose on Canada's sovereignty by demanding that Teck Cominco Ltd., a Canadian company operated in Canada, follow EPA standards. At the same time, the two countries have a long-standing agreement that prohibits transboundary

pollution through waterways that Canada needs to respect. To settle this dispute, an international body is necessary for mediation. Such a body must be given authority by both countries to make unbiased decisions and have the means to enforce the decisions made. Without international organization, the two countries will find it almost impossible to reach an acceptable resolution that will be enforced appropriately.

### **Conclusion**

The Trail smelter case is just one of many examples of the transboundary pollution problem worldwide. It is also only one of the many examples of legal controversies along the Columbia River. Like the issue of transboundary pollution, most of the legal issues along the Columbia River are complicated and involved many different levels of governmental agencies. As it is, there is no overruling body that all environmental legal issues fall under so confusion and a lack of accountability results. In order to move toward effective solutions in all areas of water and environmental laws, the United States needs to create one governing agency responsible for all environmental legal matters. One agency would lead to more accountability because it would be clear who was responsible and it would also make negotiations with Canada easier because there would be one body to communicate with. From there, it would be easier to form an international body that could regulate environmental issues between sovereign states. By creating clearer, more logical and more inclusive governing bodies, the United States and Canada would benefit from enhanced communication which would lead to more effective results. Such an example of coordination would set

a great example for other bordering states and ultimately lead to a safer and healthier world.

#### Works Cited

Agency for Toxic Substances and Disease Registry/Department of Health and Human Services. Home Page. 10 Nov 2005. < <http://www.atsdr.cdc.gov/>>.

Caldwell, Lynton Keith. International Environmental Policy: From the Twentieth to the Twenty-First Century. Durham and London: Duke University Press, 1996.

Cox, S.E., P.B. Bell, J.S. Lowther, and P.C. VanMetre. "Vertical Distribution of Trace-Element Concentrations and Occurrence of Metallurgical Slag Particles in Accumulated Bed Sediments of Lake Roosevelt." U.S. Geological Survey: Scientific Investigations Report. 2004.5090. (Sept 2002). 1-70.

Era, Brandee and Dave Serdar. "Reassessment of Toxicity of Lake Roosevelt Sediments." Washinton State Department of Ecology. 01-03-043 (Dec. 2001)

Knox, John H. "The Flawed *Trail Smelter* Procedure: the Wrong Tribunal, the Wrong Parties, and the Wrong Law." Transboundary Harms in International Law: Lessons From the *Trail Smelter* Arbitration. Eds. Rebecca Bratspies and Russell Miller., forthcoming 2005.

Magraw, Daniel Barstow. International Law and Pollution. Philadelphia: University of Pennsylvania Press, 1991.

Mitchell, Ronald B. "Lecture #2: Types of Problems." University of Oregon. 31 March 2005.

Teck Cominco Ltd. A Brief History of Teck and Cominco. 10 Nov 2005. <<http://www.teckcominco.com/company/history.htm>>.

#### Works Consulted

Caponera, Dante A. The Law of International Water Resources. Rome: Food And Agricultural Organization of the United Nations, 1980.

Goodarzi, F., H. Sanei, R. Garrett, W. Duncan. "Accumulation of trace elements on the surface soil around the Trail smelter, British Columbia, Canada." Environmental Geology. 43:1-2 (Dec 2002):29 – 38.

---. "Sources of lead and zinc associated with metal smelting activities in the Trail area, British Columbia, Canada." Journal of Environmental Monitoring. 4:3 (2002):400 - 407

"Tribe Files Suit Against Teck Cominco in Lake Roosevelt Dispute." E&MJ: Engineering & Mining Journal. 205.8 (Aug 2004):4.