

# **TCE CONTAMINATION AND THE FORT HALL MINE LANDFILL**

**By, Jacqueline Harvey Fall, 1999**

- This is a summary of a longer research paper
  - For an overview with figures, visit: <http://www.poky.srv.net/~jschmidt/PEC/hotspot.htm>
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## **I. INTRODUCTION**

In 1991 Trichloroethylene (TCE) was discovered in a number of water wells at the base of Fort Hall Mine Canyon - the current location of the Fort Hall Mine Landfill. Monitoring wells associated with the landfill and private residential wells appeared to be affected. The logical conclusion? TCE dumped at the Fort Hall Mine Landfill must be entering the Pocatello Aquifer. Unfortunately, attempts to prove or disprove this fact, as well as characterize the full extent of the threat to Pocatello's drinking water supplies, have been slow in coming. Resolution has been impeded by the morass of laws and publicity surrounding the issue, and by the lack of cooperation amongst the involved parties.

The County of Bannock as the current owner and operator of the landfill is held to be the responsible party at this time. As such the County is considered liable for the full cost of site and groundwater remediation. The United States Environmental Protection Agency, the Idaho Division of Environmental Quality, the City of Pocatello, and numerous affected landowners have been in dispute with the County for a number of years as to it's responsibilities. Despite numerous studies by different environmental consulting firms, and both actual and threatened lawsuits, there have been no attempts at remediation to date. Instead the plume continues to spread through the aquifer unimpeded.

## **II. SITE LOCATION**

Fort Hall Mine Landfill is located in Bannock County, Idaho in the Inkom Quadrangle, and lies six miles south of the City of Pocatello. The property consists of 480 acres falling within Section 7, Township 7 South, Range 35 East of Fort Hall Canyon. The Canyon acts as a watershed for Fort Hall Spring and Munn Spring as well as for seasonal precipitation. One and three quarter acres of surface drainage from this area collects at the canyon mouth and then proceeds onto the floodplain and into the Portneuf River. Surface topography creates a natural funnel down to the canyon mouth which narrows to only 300 feet wide.

The landfill site overlies a segment of the Pocatello Aquifer. The aquifer matrix consists largely of interlayered basalts and sediments. It is relatively unconfined, and displays variable hydraulic conductivity. Average groundwater flow rate is 1 mile/year. Groundwater flow in the region follows the course of the Portneuf River, trending north/northwest. Recharge to the aquifer occurs from surface drainage throughout the area - including that of the Fort Hall Canyon watershed. The Pocatello Aquifer is the sole-source drinking water aquifer for the City of Pocatello (which is downgradient from the canyon mouth). Additionally, this aquifer supplies the private water well demands of numerous landowners in the valley.

The primary area of concern is currently located at the mouth of Fort Hall Canyon and extends into the floodplain between Fort Hall Canyon and neighboring Mink Creek Canyon. Groundwater in this region is contaminated with several species of chlorinated solvents. Pollutants appear in the aquifer at the mouth of Fort hall Canyon and downgradient - no such compounds have been detected

upgradient.

### III. CONTAMINANTS OF CONCERN

The current contaminants of concern at the Fort Hall Mine site are all anthropogenic solvents. Primary pollutants are trichloroethylene (TCE) and tetrachloroethylene (PCE). Both of these chemicals are chlorinated, aliphatic hydrocarbons. The solvents are manufactured via industrial halogenation processes, and are used for a number of purposes such as degreasing and dry cleaning. TCE and PCE may be ubiquitous to the environment of the industrialized nations.

Both compounds exist in gaseous and liquid phases. TCE and PCE are both VOCs. They have characteristically high Henry's Law constants, and vaporize readily. As liquids they are hydrophobic. They are DNAPLs, and sink towards the bottom when introduced into an aquifer. These chemicals are extremely recalcitrant - due to diffusional limitations as well as limited biodegradability. As such they are exceedingly difficult to remediate.

TCE and PCE are toxic to humans. They are known carcinogens under conditions of chronic exposure. They are also acutely toxic, and are powerful central nervous system depressants. Due to their potential threat to human health the Environmental Protection Agency (EPA) has set the Maximum Contaminant Level (MCL) for TCE and PCE at 5.0 ppb.

TCE and PCE have recently been discovered contaminating the municipal wells of the City of Pocatello and numerous private residential wells. Concentrations of both species are well in excess of the established MCLs.

### IV. SITE BACKGROUND

One of the main difficulties with this issue is determining who is ultimately responsible for the solvent contamination, and where its source may be. There are a number of potentially responsible parties (PRPs), and several possible sources as evidenced by the complexity of the landfill's history of operations.

The Fort Hall Mine Landfill began operations in 1955. Initially the Parks Family owned the property. They operated the landfill under the company name Parks & Sons Intermountain, Inc., and contracted with the City of Pocatello to accept its wastes. An area on the eastern slope of the canyon was used for waste disposal. This slope is also the location of the now defunct Fort Hall Mine. The outlet for the mine drainage pipe lies downslope from the disposal site.

The Parks built an access road to the disposal area. The road was of compacted dirt and therefore frequently impassable in poor weather. Former employees and area residents claim that when the road was closed, the Park family permitted wastes to be deposited over the hill behind their home - located on the western side of the access road at the mouth of the canyon.

In 1973 the City of Pocatello purchased the entire property from Parks & Sons Intermountain, Inc. The City's Sanitation Department then assumed operation of the landfill until 1976. Waste disposal continued on the Canyon's eastern slope throughout this period.

Legislation enacted by the Idaho Legislature during 1976 required all solid waste disposal facilities to come under County level control. Thus in 1976, the landfill property was purchased by Bannock County. Landfill operation was contracted to the Snake River Sanitation Company until 1979 at which time Bannock County Highway Department assumed control, and retained control until 1993.

In response to the requirements of the 1984 Subtitle D amendments to the Resource Conservation

and Recovery Act (RCRA) Bannock County developed a new landfill site on the western slope of the Fort Hall Canyon. All aspects of the design and construction of the Subtitle D location were in full compliance with RCRA. A fully lined site with a leachate collection system and numerous monitoring wells were incorporated into the design as per the requirements of RCRA. On October 3, 1993 the old landfill site was closed and capped. The Subtitle D landfill began operating on October 4, 1993 with the newly created Bannock County Solid Waste Department as the responsible agency. Presently (1998) the Solid Waste Department continues to be responsible for landfill operations, and all potentially harmful solid wastes are disposed of in the Subtitle D area. The old site has remained closed.

## **V. CONTAMINANT SOURCE**

Numerous generators of TCE and PCE contaminated wastes sent these compounds to the Fort Hall Mine Landfill for disposal at the original site. This began in 1955 with the opening of the eastern slope disposal area, and continued until the early 1980s when the land disposal of hazardous wastes was prohibited. Past landfill employees and other witnesses claim that the liquid solvents were most commonly poured straight into the ground. Contaminants sent to the site in storage containers were punctured, drained, and then crushed so as not to take up too much space at the dumpsite.

In addition, (as mentioned above) while the Parks family ran the landfill they permitted dumping in the canyon behind their home during times of inclement weather. It is not conclusively known however if any TCE or PCE wastes were disposed of at that location.

A third potential source of the pollutants is located on private property to the southwest of the canyon mouth on Hillside Lane. Old wells on the Bunker and Gardner properties may have been used as disposal sites for liquid waste injection into the subsurface. However, as with the dumping near the Parks Residence, it is unclear if TCE or PCE was disposed of at these locations.

Thus there is currently one definite and two potential areas where chlorinated solvent disposal occurred. Due to the nature of surface drainage in the Fort Hall Canyon, and the direct connection to the aquifer it is currently believed that one or more of these disposal areas is the source of the TCE and PCE in the Pocatello groundwater. Although it has been difficult to pinpoint an exact location within the landfill site, 95 studies to date all indicate the landfill area as the definitive source.

## **VI. CONTAMINANT DISCOVERY**

### **A. IDAHO DEPARTMENT OF WATER RESOURCES**

In 1989 the Idaho Legislature passed the Groundwater Quality Protection Act. This law authorized the Idaho Department of Water Resources (IDWR) to begin compiling a database of statewide water quality. In 1991 the Department sampled a well located at the Church of Jesus Christ of Latter Day Saints on Portneuf Road. Groundwater from this well was found to be contaminated with 15.5 ppb of TCE. In 1992 the Department representatives sampled the residential well located on the Nelson property. Groundwater from this well was found to contain 30 ppb of TCE. These findings were reported to both DEQ and EPA.

### **B. THE COUNTY**

From 1988 to June of 1991 Bannock County conducted sporadic water quality testing of

groundwater and surface water in the Fort Hall Canyon. Sampling of Munn Spring, leachate from the mine disposal pipe, three monitoring wells at the mouth of the canyon (MW1-3), and the Cornelison residence well gave no indication of water quality degradation.

In July of 1991 Bannock County hired the environmental consulting firm of Brown and Caldwell to conduct a feasibility study of the area in preparation for construction of the new Subtitle D landfill. This was a necessary step to obtaining water quality clearance pursuant to the Subtitle D regulations. Brown and Caldwell constructed a fourth monitoring well (MW4) at the mouth of the canyon as a part of their studies. Water quality testing by the company in October 1991 and July 1992 revealed the presence of TCE and PCE in the groundwater culled from monitoring wells 1-4. Concentrations of both contaminants were in excess of the 5.0ppb MCL. Subsequent testing revealed severe TCE and PCE contamination in the private well located at the Thomas residence. TCE concentrations were as high as 250ppb. The County installed a Granular Activated Carbon (GAC) absorption system at the Thomas' wellhead in an attempt to treat the problem. Bannock County then contracted with Brown and Caldwell to complete a Phase I Preliminary Assessment (PA) of the problem.

Testing in September and October of 1992 revealed TCE and PCE concentrations well in excess of the MCLs in 7 other private wells of area residents - almost all of which were located on Hillside Lane. Due to the widespread nature of the pollution, the County removed the GAC at the Thomas wellhead, closed all private wells, and began supplying the affected residents with bottled Culligan Water. The Phase I PA was completed and on December 17, 1998 Bannock County submitted their findings to the Idaho Division of Environmental Quality (DEQ) as an official report of MCL exceedances.

### **C. THE CITY**

The 1987 amendments to the Safe Drinking Water Act (SDWA) required that all purveyors of public water supplies must institute rigorous and regular water quality testing. Pursuant to these regulations the City of Pocatello conducted its first series of tests in 1988. Sampling of municipal wells revealed low levels of TCE in municipal well #33. At this time contaminant levels were well below the MCL.

Repeated testing showed increasing TCE levels. In 1993, the contaminant concentration exceeded the MCL and municipal well #33 was closed. Water quality testing in November and December of 1993 led to the closure of municipal well #14 due to TCE concentrations in excess of the MCL. Well #33 remained closed and ten other municipal wells displayed low concentrations of TCE in their groundwater.

### **D. PRIVATE LANDOWNERS**

The affected residents at the mouth of Fort Hall Canyon were unaware that a problem existed until Brown and Caldwell began testing residential wells as part of the Phase I Preliminary Assessment. At this time, the landowners were informed of the presence of solvents in their wellwater, and were requested to comply with sampling and testing procedures.

## **VII. COURSES OF ACTION**

### **A. DIVISION OF ENVIRONMENTAL QUALITY**

The Idaho Division of Environmental Quality was made aware of the existence of the solvent contamination due to the reports made by the IDWR. A potential source of the pollutants was

undetermined at this time. With the submission of Bannock County's Phase I study it became clear that the landfill was the source. This focused EPA attention on the area. EPA conducted a site assessment to determine if the landfill qualified for placement on the National Priorities List (NPL). After consideration of the findings, EPA ruled that the site did not qualify for the NPL, thus Federal action was unwarranted. Instead EPA charged the DEQ to resolve the issue and ensure clean up.

On May 24, 1993 Bannock County entered into a Consent Order with the Idaho Department of Health and Welfare wherein they accepted responsibility for the problem and for its resolution. Upon signing the order Bannock County was requested by DEQ to complete a full-scale investigation of the extent of contamination, and a full site characterization. As the enforcing agency for the Idaho Department of Health and Welfare DEQ has had complete oversight and jurisdiction over all stages of this situation.

## **B. THE COUNTY**

In June of 1994 Brown and Caldwell completed a Phase II study of the problem as per the terms of Bannock County's Consent Order. Testing of landfill monitoring wells and domestic wells showed increasing levels of TCE and PCE in the groundwater. The Phase II report was finished on June 23, 1994. This study was intended to be used to construct a Phase III remediation plan which was to be submitted to DEQ. Although Brown and Caldwell finished this draft work plan, Bannock County did not submit it to DEQ. Instead all activity on the part of the County ceased.

On October 31, 1997 the Attorney General's Office issued a warning to Bannock County regarding their non-compliance. The state threatened to seek injunctive relief on numerous counts in court if the County did not submit a draft work plan to DEQ for review by November 18, 1997. The possibility of legal action appeared to inspire the County and they completed a rudimentary draft plan on November 17, 1997, and a more complete plan on December 15. DEQ rejected their plan and requested that a new plan be constructed. A July 1, 1998 deadline for completion was established.

Bannock County contracted with the Boise firm MAXIM to begin work on a remediation scheme. A new draft plan was submitted by the deadline. DEQ reviewed the work plan and rejected it as incomplete. The County was requested to re-draft their plan by October 30, 1998. The new plan had to address the following issues: methods of removal, treatment and disposal; sampling/testing methods; required clean up levels; better site characterization; time frame for treatment; and a Health & Safety Plan for all involved workers.

## **C. THE CITY**

In 1994 the city hired the consulting firm CH2MHILL to study contamination of the municipal wells. The consulting firm established 10 monitoring wells at the south end of the study area (at the southern city limits). Samples were collected from these wells and from all municipal wells throughout March 30 to April 17, 1994. Test data were used to plot contaminant concentration gradients. This data made it possible to delineate the shape of the plume and its direction of migration. The results of the CH2MHILL report showed a definite plume of TCE contamination approximately 5 miles long and extremely narrow in the Pocatello aquifer. Based on the direction of migration, the consulting firm concluded that the source of this plume was the Fort Hall Mine Landfill:

"The fact that this plume is well defined by observed concentration gradients...it has the following three profound implications: 1) it is fueled by a continuous source along the SW side of the valley. 2) the extent to which the TCE contamination is delineated indicates we are observing the leading edge of a significant plume. 3) TCE concentrations will probably not decline in the foreseeable

future." (from the CH2MHILL report)

CH2MHILL suggested several possible treatment options with their report, which was completed in December 1994. In response to this study the city began design of a remediation scheme. Two extraction wells were constructed at the southern city boundary in preparation for a full-scale aeration tower treatment system. Unfortunately limited funds as well as lack of agreement on what the towers were actually supposed to be treating stalled the project.

Once the results of the CH2MHILL report were compiled, the City of Pocatello began to meet with Bannock County in an attempt to resolve the situation. The City requested that the County reimburse them for monies spent on the extraction wells, as well as pay for the remaining construction of the aeration towers. Bannock County refused on the grounds that it was impossible to determine that the landfill was the source of the TCE - despite the Consent Order they signed and their admission of responsibility in private meetings with the City and with the affected residents.

The County based their disclaimer on a key issue - the fact that a significant area between the base of Fort Hall Canyon and the city limits had not been studied. The County's studies went only as far as the mouth of Fort Hall Canyon while the City's studies went only as far as the southernmost city limits. This left a large region that was uncharacterized hydrogeologically, and untested for solvent contamination. Thus the County claimed that the City had no conclusive proof that the TCE in the municipal water was coming from the landfill.

On November 20, 1995 however Terry Bailey, a Bannock County Engineer, made an indirect admission in the Idaho State Journal that the Fort Hall Mine Landfill was the likely source of the TCE contamination in the Pocatello water. This opened a tort claim window for the City and on October 31, 1997 the City of Pocatello filed an official Tort Suit against Bannock County to recover costs. . In an official response, Bannock County again denied responsibility. The case never went to trial. In private meetings the County agreed to work with the City to seek resolution, and the City put their suit on hold.

#### **D. PRIVATE LANDOWNERS**

Affected residents discussed the possibility of bringing a citizen's class action suit against Bannock County. The high costs of litigation were a deterrent however, and the residents decided not to sue. An agreeable compromise was reached during 1995 at meetings with Bannock County and the City of Pocatello wherein the County agreed to spend \$600,000.00 to connect the landowners to the municipal water supply lines.

### **VIII. CURRENT STATUS**

At the present time the City's municipal well #33 remains closed. The Pocatello Golf Course has obtained operation permission from the City for well #14. Water from this well is used to irrigate the course. Periodic sampling shows increasing TCE concentrations in the other affected municipal wells. All monitoring wells at the Fort Hall Mine site have TCE and PCE concentrations above the MCLs. All of the affected private wells in the area remain closed with contaminant concentrations also in excess of MCLs.

At the most recent City Council meeting members voted to halt construction on the aeration towers. It was decided that a more effective use of funds would be to combine the City's efforts with those of the County, and to construct a treatment system closer to the actual source of the pollution. Currently the County appears to be cooperating with the City of Pocatello, as both of these parties attempt to find a joint resolution to the problem.

An alternate treatment method being considered by the City of Pocatello is the construction of a lava riprap lined canal from the existing extraction wells to the Portneuf River. The treatment rationale is that contaminated water will be sufficiently aerated so as to volatilize the chlorinated solvents prior to discharge into the river. The point of compliance for regulatory purposes would be where the canal empties into the Portneuf, and would be regulated by a NPDES permit. The City of Pocatello has not addressed the environmental impacts of releasing these toxic volatiles into the already poor atmosphere of Pocatello.

Bannock County submitted their new work plan by the October 30, 1998 deadline established by DEQ. This new work plan is currently under review. At this time the County is considered to be in full regulatory compliance. All lawsuits against the County for failure to act, both City and DEQ, are currently in abeyance.

## IX. CONCLUSION

In my opinion it seems unlikely that this issue will ever be satisfactorily resolved. Discovery of TCE and PCE occurred almost five years ago. Since then absolutely no treatment has been instigated, in spite of repeated assurances from Bannock County that remediation is imminent. For example, Terry Bailey was quoted in the Idaho State Journal on November 20, 1995 as saying, "...then commissioners will approve a date for clean up to start - likely sometime in 1996." It is now November 1998 and a remediation plan has yet to be approved, let alone implemented.

Another problem is with the fact that a successful remediation scheme may be impossible to construct. This is due to a significant data gap in two areas at the mouth of Fort Hall Canyon. Both of these sites are on private land, and the landowners have repeatedly denied access to their property. The first site is downgradient from the canyon along W. Portneuf road. Groundwater entering the aquifer from the canyon turns to join the main flow somewhere in this area. Without delineating the groundwater contours it is impossible to know exactly where this occurs, and so it is unknown exactly where the contaminants are entering the main body of the aquifer. The second site is on Hillside Lane and overlies a possible subsurface fracture. This is extremely significant as the fracture may represent a conduit for contaminant migration into unanticipated zones. Without these crucial pieces of data it will not be possible to determine the most effective interception point for remediation purposes.

Finally, the chemical characteristics of the pollutants themselves also make it unlikely that a treatment protocol will be successful. As previously discussed TCE and PCE are highly recalcitrant compounds. There has been little success with their remediation to date.

Where does all this leave the Pocatello residents at this time? With a plume of TCE and PCE contamination beginning to move through the municipal water supply at a rate of 1 mile/year. Our drinking water supplies are genuinely compromised. This situation represents a definite and immediate threat to human health and the environment. As such, I feel that EPA should reconsider placement of the Fort Hall Mine Landfill site on the National Priorities List. Perhaps if the full weight of CERCLA were to descend on Bannock County and all of the other PRPs some type of resolution might be forthcoming.

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## PARTIAL REFERENCE LIST

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2. Brown and Caldwell Consultants. Preliminary Hydrogeologic Assessment in the Vicinity of the Fort Hall Canyon Landfill Bannock County, Idaho". December 11, 1992.
3. Brown and Caldwell Consultants. Phase II Hydrogeologic Assessment Draft Report Bannock County, Idaho. June 23, 1994.
4. Brown and Caldwell Consultants. Preliminary Remediation Draft Report for Fort Hall Canyon. November 15, 1995.
5. Case No. CVOC-97-01731 A. City of Pocatello, Plaintiff v. County of Bannock, Defendant. COMPLAINT. Tort Suit For Damages Resulting From TCE Contamination. October 31, 1997.
6. Case No. CVOC-97-01731 A. City of Pocatello, Plaintiff v. County of Bannock, Defendant. ANSWER OF BANNOCK COUNTY. Tort Suit For Damages Resulting From TCE Contamination. November 26, 1997.
7. CH2M HILL Consultants. Hydrogeology and Assessment of TCE Contamination in the Southern Portion of the Pocatello Aquifer - Phase I Aquifer Management Plan Final Report. December 1994.
8. Idaho Department of Health and Welfare and Bannock County, Idaho Consent Order in the Matter of Contamination of Ground Water Near Fort Hall Mine Landfill. May 24, 1993.
9. Idaho Division of Environmental Quality Letter to Bannock County Regarding Noncompliance with Consent Order. October 31, 1997.
10. Idaho Division of Environmental Quality Response to Bannock County's Proposed Work Plan for the Remediation/Mitigation of Contamination Near the Fort Hall Mine Landfill. January 5, 1998.
11. Interview and Discussions with Fred Ostler, Water Superintendent, City of Pocatello.
12. Interview and Discussions with Terry Bailey, Bannock County Engineer and Planning director for the Bannock County Planning and Zoning Commission.
13. Interview and Discussions with Tom Mullican, Environmental Hydrogeologist, DEQ.
14. Notice of Tort Claim by City of Pocatello against Bannock County, Idaho for Damages Resulting From TCE Contamination. May 14, 1996.

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