

United States Environmental Protection Agency
Region VIII
POLLUTION REPORT

Date: Monday, December 24, 2007
From: Kerry Guy

Subject: Initial POLREP
Billings PCE
715 Central Avenue (origin), Billings, MT
Latitude: 45.7700000
Longitude: -108.5333000

POLREP No.:	1	Site #:	08-ME
Reporting Period:	07/00/2006 - 12/07/2007	D.O. #:	
Start Date:	10/12/2007	Response Authority:	CERCLA
Mob Date:	10/2/2007	Response Type:	Time-Critical
Demob Date:		NPL Status:	Non NPL
Completion Date:		Incident Category:	Removal Action
CERCLIS ID #:		Contract #	
RCRIS ID #:			

Site Description

1.1 Site Background & Description

The Billings PCE Site consists of a PCE contaminant plume in shallow groundwater, extending from a source area at 715 Central Avenue, east-northeast, through a residential neighborhood, into downtown Billings, MT. The contaminant plume likely results from historic PCE (a dense, non-aqueous phase liquid or 'DNAPL') releases from the old dry cleaning facility at 715 Central Avenue. The contaminant plume (defined by the 100 ug/l PCE isopleth), extends approximately 8,000 feet from the source area to the distal end, spreads, in one area, to a width of 1,000 feet, and underlies 298 residential, 8 condominium, and 179 commercial properties.

The underlying aquifer primarily consists of saturated Pleistocene alluvial material that was observed to be about 28 to 32 feet thick. The aquifer overlies shale bedrock that is reported by the MBMG to be greater than 250 feet thick. Core samples show 9-16 feet of finer-grained silt, sand, and clay overlying sandy gravel and silty-sandy gravel. The depth to groundwater is approximately 12-14 feet. Groundwater flows east-northeast through the Site.

The Montana Department of Environmental Quality (MDEQ) completed a Preliminary Assessment (PA) of the Site in 1992-1993. Although subsurface contamination was identified at the time, MDEQ concluded the PA with a "no further action" determination since the affected aquifer was not then being used as a drinking water source by anyone in the area. Subsequently (1999-2001), MDEQ completed a (CERCLA) Site Investigation (SI) and determined that indoor air contaminant concentrations, within structures overlying the plume, may exceed levels promoting adverse health affects for building occupants. Since July 2006, the OSC has continued documenting plume characteristics and evaluating direct-exposure health risks due to vapor intrusion into structures overlying the plume.

1.2 Site evaluation

1.2.1 Subsurface

The groundwater investigation included the identification of and sampling from 30 existing wells in the plume area as well as the installation of and sampling from 65 new groundwater monitoring wells. Analytical results from samples collected were used to map and characterize the plume. Subsurface core samples, collected during the well installation, were also used to examine subsurface lithology and determine various groundwater contours. In addition, 24 locations were sampled with a membrane interface probe (MIP) so as to investigate the amount of volatile organic compounds (VOC) or 'soil gas' in various subsurface locations. A July 2007 soil gas survey along the storm sewer line, in the same general vicinity as the MIP survey, revealed that the highest PCE concentrations were

near the junction of the 715 Central Avenue drain pipe and the storm sewer, with the concentrations decreasing east ('downstream') of the junction.

(Data collected during the MIP investigation revealed the highest VOC levels are under and adjacent to a pipe connecting a floor drain in the building at 715 Central Avenue to the adjacent city storm sewer. A liquid sample collected from underneath the pipe had a PCE concentration of 316 ppm, indicating the probable presence of 'free' product in the vicinity. The contamination interval extended from approximately six feet below ground surface (bgs) (below the drain pipe) to 16 feet bgs (at the fine-grained sand-gravel interface).)

The results of these various studies indicated the aerial extent of the plume, within the 100ug/l isopleth 'footprint', is approximately 140 acres.

1.2.2 Surface Structures

Analyses of the relationship between indoor air and sub-slab or groundwater PCE concentrations were used to estimate the area likely to be impacted by detrimental vapor intrusion. These analyses suggested that groundwater PCE concentrations above 100ug/l isopleth, especially where sands and gravels underlie the buildings, or sub-slab VOC concentrations exceeding 10,000 ug/m³, may result in indoor air PCE concentrations above EPA's target level of 41ug/m³. There are 298 residential, 8 condominium, and 179 commercial properties overlying groundwater concentrations above 100ug/l.

Four (seasonal) rounds of indoor air sampling for VOCs were conducted in 2006-2007. Of the structures overlying or immediately adjacent to the plume footprint (more than 400 residential and commercial), 45 (approximately 10%) were sampled so as to determine indoor air VOC concentrations. Sampling locations included 36 single-family residences, one two-family dwelling, one motel (with long-term residents), two apartment buildings, a school, and a commercial office building. Of the residences sampled, 4 residences had indoor air PCE concentrations exceeding 41ug/m³, and the commercial building had indoor air PCE concentrations ranging from 42 to 130ug/m³.

Sub-slab or crawlspace samples were also collected from most of the properties from which indoor air samples were collected. The highest sub-slab PCE concentration was 1,800,000 ug/m³, and the highest residential sub-slab sample concentration was 160,000 ug/m³. Analytical results from sub-slab samples collected just outside the plume footprint to the northeast indicate some residential structures peripheral to the 100ug/l isopleth may also be adversely impacted by vapor intrusion.

1.3 Threat Determination

PCE and its daughter products, TCE, DCE, and vinyl chloride (chlorinated ethylenes) are hazardous substances as defined by 104(14) of CERCLA. Chlorinated ethylenes, DNAPLs, have low solubility and are heavier than water. Accordingly, when DNAPLs are released into the subsurface, they move downwards to, and collect in fissures and pockets in, bedrock underlying the area. If the DNAPLs encounter an underlying aquifer or saturated layer above the bedrock, contaminant fractions will dissolve into the water column and be carried downstream with the aquifer flow. In addition, DNAPLs collected on the bedrock will serve as source material for continuing downstream, dissolved-phase contamination.

There have been no previous Removal Actions at this Site. The ACTION MEMORANDUM for this Removal was approved on October 12, 2007.

Current Activities

2. Current Activities

2.1 Operations

Other than the removal assessment and associated sampling activities discussed in this document, there are no Removal actions currently underway at this Site. EPA has requested technical assistance from ATSDR.

The EPA/Emergency Response Team (ERT) and Response Engineering and Analytical Contract (REAC) developed a flow and contaminant transport model for the Site to simulate various groundwater remediation alternatives. The software MODFLOW - rev 4.2 was used to construct the flow model, and the software package MT3D was used to construct the contaminant transport model. (The groundwater flow model simulates steady-state flow in 50,600 acres of the Billings Basin, which includes the 140-acre Site plume footprint). Groundwater flow and contaminant transport simulations were completed for

ambient conditions. Model results show that if contamination from the source area is stopped via source-area contaminant removal (i.e., excavation/treatment/containment), and a down-gradient permeable reactive barrier is installed approximately 2,000 feet down-gradient (along 5th Street West), the resultant, downstream plume concentrations of less than 100ug/l could be reached within 5 years.

Planned Removal Actions

2.2 Plans

The Removal currently anticipated for the Site consists of several steps intended to remediate PCE plume concentrations to below 100ug/l within 3-5 years. These anticipated steps include:

- Source area removal, in the vicinity of 7th Street West, with excavation and removal of PCE-contaminated soils in the 'dry' zone
- Contaminant removal from the unsaturated zone below two commercial buildings adjacent to the main source area using a soil vapor vacuum
- In-situ chemical oxidation of source area in the saturated zone below the excavated area.
- Source area containment and downstream plume remediation by construction of up to three 0-valent iron permeable reactive barriers
- Direct contaminant extraction.

Next Steps

2.3 Project Schedule

Sub-slab venting of from 1 to 4 residents may be initiated in November-December 2007. Source area containment, to be initiated as early as February 2008, will be completed by April 2008. Source area excavation is targeted for Spring-Summer 2008. Placement of the first in-situ Chemical Oxidation device is targeted for Summer-Fall 2008.

Estimated Costs *

	Budgeted	Total To Date	Remaining	% Remaining
Extramural Costs				
Intramural Costs				
USEPA - Direct (Region, HQ)	\$5,000,000.00	\$0.00	\$5,000,000.00	100.00%
Total Site Costs				
	\$5,000,000.00	\$0.00	\$5,000,000.00	100.00%

* The above accounting of expenditures is an estimate based on figures known to the OSC at the time this report was written. The OSC does not necessarily receive specific figures on final payments made to any contractor(s). Other financial data which the OSC must rely upon may not be entirely up-to-date. The cost accounting provided in this report does not necessarily represent an exact monetary figure which the government may include in any claim for cost recovery.

response.epa.gov/BillingsPCE

POLREP #1 Last Updated 5/23/2008