



# Frequently Asked Questions about Cadet and Swan Manufacturing and Fruit Valley Neighborhood Cleanup

From Ecology's Toxics Cleanup Program, Southwest Regional Office

The **Department of Ecology** has created this document to summarize questions and answers that were discussed during the March 6, 2007 Fruit Valley Neighborhood Open House. The questions have been organized by topic and a table of contents was developed to make this document easier to read. Ecology worked with the **Washington State Department of Health** to answer questions related to health concerns.

We hope you will find this document helpful in answering your questions and addressing your concerns. If you need more information about the site, please contact a staff member listed below.

- For **technical questions** related to this cleanup,  
Contact Craig Rankine at (360) 690-4795 or [cran461@ecy.wa.gov](mailto:cran461@ecy.wa.gov)
- For **health related** questions,  
Barbara Trejo at 1-877-485-7316 (toll free) or [Barbara.Trejo@doh.wa.gov](mailto:Barbara.Trejo@doh.wa.gov)
- For **public involvement** information,  
Meg Bommarito at (360) 407-6255 or [mbom461@ecy.wa.gov](mailto:mbom461@ecy.wa.gov)

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**WE WANT YOUR INPUT!** If you are interested in becoming part of a focus group or participating in a short phone survey, please let us know. Send your name, phone number and email address to Meg Bommarito, Public Involvement Coordinator at 360-407-6255 or [mbom461@ecy.wa.gov](mailto:mbom461@ecy.wa.gov). Your input is extremely valuable to us!

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## SITE HISTORY

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**Q: When the soil was removed at the Swan site as part of the initial cleanup, they hauled off soil as hazardous waste. Is this true?**

No, this is incorrect. About 14,000 cubic yards of contaminated soil were removed from the former Swan site by Philips Environmental. That soil was stockpiled, covered and treated on site before it was used as clean fill for the Port's Terminal 4 development.

The contaminated soil was cleaned using heated air and a vacuum system. Pipes were placed throughout the pile of soil – some blew heated air to loosen contaminants and others were used to vacuum vapors out of soil. These solvent vapors were then sent through a carbon filtration system and captured. Clean air was discharged.

**Q: Swan moved to Cadet in 1964, any idea how many gallons of TCE were dumped?**

It is very difficult to determine exactly how much TCE was released at the two sites 40 years ago. Regardless of how much was released, we are now focused on two main goals:

- Determining the full extent of current contamination
- Determining the best way to reduce and finally eliminate levels of solvent in the environment.

Our greatest concern is always human health and the environment and our priority is reducing the potential risk to residents.

**Q: Were all 10 chemicals discontinued at the same time?**

When Cadet Manufacturing stopped using TCE as a degreaser, they also stopped using related chemicals. After its release to the environment, TCE (and any PCE and TCA associated with the TCE) has been slowly breaking down into other compounds chemicals. We have also been analyzing for these breakdown chemicals.

**Q: When was the use of chemicals stopped?**

At the Swan site, use of TCE was stopped when they moved to the Cadet site in 1964. Cadet, at its current site, stopped using TCE in bulk as a degreaser in 1976.

## SITE CLEANUP

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**Q: What is the hazard ranking for these sites? What does this mean?**

Both the Swan and Cadet Sites have a hazard ranking of 2. The hazard rank score refers to the relative health and environmental risk each site poses. Sites are ranked on a scale of 1 to 5. A score of 1 represents the highest level of risk and 5 the lowest. The higher the risk, the greater the potential for human health or environmental impacts and the greater the need to have the site cleaned up. Cleanup of both sites is a priority for Ecology.

**Q: If it's a priority, then why has it taken 7 years?**

On large and complex sites, like Swan and Cadet, it takes time to completely evaluate the nature and extent of contamination. Every cleanup undertaken by Ecology must follow standards outlined by the Model Toxics Control Act (70.105D RCW). Cleanup work is done in phases, each building on what was determined by earlier work. A large area of contamination will require a greater number of work phases.

Each phase requires a work plan which must be reviewed by Ecology. Each plan is revised, reviewed, finalized and then implemented. This level of review is required to make sure testing methods, results and the risk assessment are accurate and appropriate. This review process repeats itself all the way through the cleanup.

Please see Figure 1 (page 16) for an outline of the cleanup process.

**Q: Testing done by AMEC was not acceptable? Levels came out "low" but maybe they're not low? Maybe because you are not the health department, that's why the levels are low?**

Ecology's role is to make sure that the best test methods are used and data are of the highest quality. Before any testing is done, a work plan is prepared and reviewed by Ecology to make sure the methods used to collect and analyze samples are appropriate and accurate. After the results come back from the laboratory, they are checked for accuracy in a rigorous review process. This is necessary so we can best protect human health and the environment.

**Q: I thought the 2006 health report said that there has been no activity at the site for a while?**

Cleanup work has been ongoing and has made steady progress since 1998. The type of work has changed over time as the project has moved forward. We are still working to investigate the site, conduct interim actions and determine the best final cleanup options.

The Port of Vancouver, under oversight from Ecology, is continuing to investigate site contamination and reduce immediate risk to human health and the environment. The Port of Vancouver's actions include:

- Drilling of subsurface borings to collect soil and groundwater samples
- Removal and treatment of contamination
- Installation of groundwater monitoring and soil gas wells
- Regular sampling and analysis of groundwater and soil gas
- Collection and analysis of indoor and outdoor air samples.

The field work is mostly complete and we are in a data evaluation phase right now. Final reports on the investigations to determine the extent of contamination are being reviewed by Ecology and Department of Health. After this stage is complete, Ecology will begin to assess and then select the final cleanup remedies. The current estimate for selecting the final cleanup remedy is 2009.

**Q: How much TCE contamination do you anticipate there is? Is the amount already removed, 90 lbs, 30% of it? 60% of it?**

We have made steady progress in reducing contamination to lower the potential risk to human health. A very rough estimate of the amount of contaminants removed so far is 30 - 40 % of the total amount. However, without knowing the amount of solvents released, it is very difficult to accurately determine the percent of contamination removed to date. Evaluation of cleanup effectiveness is being determined by monitoring the reduction of contaminant concentrations in groundwater, soil and air. The 90 pounds is an estimate of the amount of contamination removed from below the Cadet building.

The areas with the highest levels of contamination, Cadet and Swan sites, have been or are being treated through interim actions. Interim actions are taken to reduce immediate human health and / or environmental risks as quickly as possible to prevent further spread of contamination. It may take decades to get close to 100% of the contamination removed. However, we will continue to work towards reduction and eventual elimination of potential human health and environmental risks.

**Q: Why wasn't soil excavated the same way at both Cadet and Swan sites? Interim actions were taken to excavate soil at the Swan site but not the Cadet site. Why is that?**

The Cadet Manufacturing and Swan Manufacturing sites presented two very different situations and therefore – two different methods of treatment. Excavation was possible at the Swan site because there was no structure on it.

Excavation was not possible on the Cadet site since it was an active business with buildings on the property. However, an equally effective interim action was used to remove solvents at the Cadet site; a soil treatment process called air sparging and soil vapor extraction. This system is currently operating and has been effectively reducing the amount of solvents in both soil and groundwater since its installation. Both methods have been effective in reducing contamination levels.

**Q: Has the Cadet site been monitored for soil contamination?**

Yes, analysis of soil samples taken at the Cadet shows that solvent contamination exists in soil beneath the facility building and on the east side of the Cadet building. Soil in these areas was in direct contact with process water containing high concentrations of solvent.

**Q: How do we know how widespread the contamination is?**

Using groundwater monitoring well samples, we have been able to determine how far the groundwater contamination reaches, horizontally and vertically. We also know the recent past and current areas of soil contamination. We are monitoring soil vapors and indoor air to find out how far the contamination reaches and to ensure that human health and the environment are protected.

Figures 2 through 5 (pages 17-20) show the extent of shallow groundwater contamination from 2002 through 2006. These are results from data collected from groundwater and soil vapor monitoring wells.

**Q: But we're not just dealing with the inside air but also the soil outside our homes?**

Soil contamination (where solvent sticks to soil grains) is found only at the Cadet and Swan Manufacturing sites and to the east of the Cadet building. Soil at these source areas had direct contact with solvent in its liquid form or process water containing high concentrations of solvent.

The solvent in the source areas dissolved into the groundwater and traveled east to the Fruit Valley Neighborhood. Solvent vapors from the groundwater migrate up through the soil. If soil has solvent vapors in its air spaces and is disturbed, solvent vapors are released into the open air. The amount of vapor released to open air is small (since there is little space in the soil) and the vapor is immediately diluted by outdoor air.

Figure 6 (page 21) demonstrates the pathway of contamination from the source area into the Fruit Valley Neighborhood.

**Q: Are you testing 24 hours a day, 7 days a week?**

Air samples are taken from both indoor and outdoor air. We are not monitoring air seven days a week. Samples are collected over 24 hours during each sampling event and during each season. This gives us the data we need to determine trends in the amount of solvent vapor detected and the potential risk to homeowners. All sampling schedules are carefully planned and based on the most effective and appropriate methods to give us the best possible data.

**Q: Why should we pay for cleanup? Aren't there superfund funds available for this project?**

These sites are being cleaned up under Washington State's Model Toxic Control Act regulations. The Port of Vancouver is the liable party and received money through a settlement agreement to cleanup the Cadet site. Both Ecology and the Port are funding the remaining cleanup so the sites do not qualify for Federal Superfund money. Our state cleanup laws, Model Toxics Control Act, are as or more strict than federal cleanup laws.

**Q: Were there any disciplinary actions taken against Cadet?**

Ecology has not taken any disciplinary actions against Cadet. Ecology Toxics Cleanup Program's role is to work with the liable parties to remove the contamination. Liable parties are required to take responsibility for cleanup activities (including all associated costs). The Port is the current owner and did pursue measures to recoup cleanup costs from Cadet.

**Q: Are there other disciplinary measures that should be contemplated?**

Ecology is focused entirely on the cleanup process and making progress on removal of the contamination to protect human health and the environment. The Port is working with Ecology under an agreed order to complete the site investigation and to develop a cleanup action plan so there is no reason to pursue disciplinary measures.

**Q: Is the current owner taking action against Cadet?**

The Port of Vancouver currently owns both the Cadet and Swan Manufacturing sites and is responsible for both cleanup areas. Since the contamination occurred when Cadet owned both properties, the Port sued Cadet in bankruptcy court to recover costs for investigation and cleanup of the Swan site. The Port and Cadet settled that lawsuit and the Port obtained ownership of the Cadet property and building as part of the settlement.

**Q: Is the data (that Ecology and DOH presented March 6) new or a rehash of what was out in last year's report?**

Information presented during the March 6 public meeting was a combination of all data collected to date. This included new data collected after last year's report. Each time we meet with Fruit Valley Neighborhood residents we will be sharing the most recent data.

**Q: Who funds the Port?**

The Port is a public agency and is funded through tenant leases, wharfage and dockage revenue, equipment leases, bonds, federal and state funding and property taxes. For more information call Katy Brooks, Community Relations Manager for the Port of Vancouver, at (360) 693-3611.

**Q: I keep hearing rumors of Cadet disposing of their chemicals improperly – I wonder how much of the stuff is floating around. How much chemical was purchased and was use?**

We are not aware of any illegal or inappropriate chemical disposal at the Cadet Manufacturing site. If you suspect such activity is occurring, you can contact Ecology's Hazardous Waste and Toxics Reduction program at [http://www.ecy.wa.gov/programs/spills/forms/nerts\\_online/SWRO\\_nerts\\_online.html](http://www.ecy.wa.gov/programs/spills/forms/nerts_online/SWRO_nerts_online.html) to report it or call the Southwest Regional Office at (360) 407-6300.

**Q: What is the projected completion date?**

We are estimating that final groundwater cleanup action selection will be no later than 2009. To clean the contaminated groundwater down to Model Toxics Control Act (MTCA) cleanup standards will take decades.

However, the potential risk to human health has already been greatly reduced through the use of interim actions in the source areas beneath the Cadet and Swan facilities and in the North Fruit Valley Neighborhood. Overall solvent levels in groundwater are decreasing and so has the potential risk to human health. Risk will continue to decline over time, even more as the final cleanup activity begins.

## VAPOR INTRUSION AND INDOOR AIR TESTING

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**Q: Are homes right behind Cadet at greater risk? Are some homes more likely to have vapor migration than others?**

Because homes along Weigel Avenue were so close to the Cadet source area, Ecology took steps early in the investigation process to determine if these residents were at a greater potential risk. We tested indoor air in most of the homes several times. We did not find higher concentrations of solvents in indoor air compared to other homes in the neighborhood. Based on current data, the potential risk to human health does not appear to be higher in these homes.

There are several factors that affect vapor movement into homes including, soil composition, varying levels of contamination and home foundation type. Vapor migration depends, in part, on the size and nature of the particles that make up soil. Solvent vapors can move most easily when they are in soils that have larger spaces between particles. Fine-grained material, silt and clay, appears to limit the ability of solvent vapors to move since there is less space between soil grains for solvents to move through. Even a small amount of fine-grained material in the soil can reduce the movement of solvent vapors. Soils with more sand (as opposed to clay or silt) have more room for solvent vapors to travel through.

We believe that soil type beneath homes is why some of the homes with elevated solvent groundwater levels are impacted and others are not. Soil data taken throughout the neighborhood does not indicate large differences in soil types. We believe only slight changes in the amount of fine material can prevent or reduce vapor movement through soil and into homes.

Contamination levels in groundwater vary throughout the neighborhood. Groundwater carries contamination as it moves to the east from the Cadet site and then turns south as it nears the railroad tracks. There is a line along this route where the highest concentration of solvents in groundwater have been found in samples from groundwater monitoring wells. That line goes beneath W 27th and W 28th Streets. Contamination levels decrease to the north and south, away from the line of highest contamination. The contamination levels also decrease, as you move eastward away from Cadet. Generally, the lower the solvent concentration levels in groundwater, the lower the solvent vapor levels are in soil vapor.

The home's foundation type also affects vapor movement indoors if there is an open pathway to soil for the solvent vapors to move through the foundation. These pathways can usually be found and sealed.

**Q: Is there a seasonal difference in groundwater or indoor air contamination levels?**

We have sampled during all four seasons and have not detected a seasonal difference in groundwater or indoor air contamination levels.

**Q: Would the weather affect it?**

Weather can affect solvent vapor movement through the soil. That is why indoor air samples have been collected throughout the year. In general, the results for indoor air samples collected in the Fruit Valley Neighborhood do not show significant seasonal differences.

In the winter, the water table (water closest to the ground surface) is closer to the surface due to rain soaking into the ground. Therefore, solvent vapors from the groundwater have less distance to move to reach the ground surface. Houses are also closed up more during winter months and have less ventilation, possibly allowing more solvent vapor to accumulate in the house.

At the same time, the rain can fill the open spaces between soil grains and prevent solvent vapor from rising as quickly as during drier weather. Even though houses are closed up more during the winter, the vapors may not be moving to the ground surface as fast. As a result, there may be less contaminant vapor available to move into homes.

In the summer, the water table is lower and solvent vapor must travel a greater distance to get to the surface of the ground. There is also more ventilation in homes during warmer months, which may reduce solvent vapor inside the house. The warmer weather helps to dilute the solvent vapor much more quickly when it does reach the surface.

**Q: How does surface area affect vapor release?**

A change in the soil surface area may have an effect on the amount of solvent vapor released from the soil. We have found that vapor release from the soil is primarily influenced by:

- Amount of fine-grained material in the soil (silt and clay).
- Concentration of solvent in shallow groundwater beneath an area.

The rate and concentration of solvent vapor that may move from the ground varies throughout the neighborhood because soil type and groundwater solvent levels vary throughout the neighborhood.

Solvent vapor moves through the soil in very small open spaces between soil grains so it moves slowly and in very small amounts. When the vapor enters open air it is dramatically diluted. If the soil surface area is increased on a soil that allows vapor movement, the amount of vapor leaving the ground could increase, but only in small amounts.

**Q: So there could be times when the amounts would rise to give off a smell?**

The levels of solvent detected in indoor or outdoor air are much lower than levels that you would be able to smell. If you smell something, it is not from groundwater contamination or vapors from that groundwater.

**Q: I recently bought my home. How can I find out results from testing that might have been done in the past?**

We recently sent out air sampling data packets to all the homes where indoor air samples were collected. If you are still unsure whether your home was sampled, please contact the Department of Ecology's site manager Craig Rankine at (360) 690-4795 or [cran461@ecy.wa.gov](mailto:cran461@ecy.wa.gov).

**Q: Those of us who don't have the vacuum systems and only had the two air samples does this mean we don't get any further evaluation or sampling?**

We are currently working on the development of a long term indoor air monitoring schedule for indoor air sampling. We are focusing indoor air testing in homes where we have seen higher indoor air levels of solvents. Initial sampling helped us to determine which homes had greater levels of solvent in indoor air and needed monitoring more often. We are also reviewing foundation information to find homes that may need more sampling. Homes that have foundations with cracks or openings to soil have a greater chance for vapor movement (into indoor air).

Homes with indoor air solvent levels close to levels in outdoor air are less likely to be re-sampled because there is a lower chance for vapor migration. We will continue to collect indoor air samples at homes where potential risk is higher.

**Q: Why does it take so long to get air testing results back?**

We are working to streamline the process of reporting data results in order to get you this important information more quickly. Once samples are taken by the consulting firm, it takes about two months to receive results, check them for accuracy and then send them to Ecology. After this, all data must be formatted to be sent to residents and notification letters developed. We are addressing the issue and anticipate the next set of data will be sent to residents in a more timely manner.

**Q: How does  $\mu\text{g}/\text{m}^3$  to parts per billion (ppb)? How can I convert that?**

You can convert  $\mu\text{g}/\text{m}^3$  to parts per billion (ppb), please see page 22 for information about unit conversion. At room temperature, 5.46 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) of TCE is equal to one part per billion (by volume). For PCE, one part per billion is  $6.90 \mu\text{g}/\text{m}^3$ . To help you understand how small a ppb is - one ppb is about one second in 30 years or one inch in 15,000 miles.

**Q: Do you have a range of outdoor chemical levels in other areas of town to compare it to Fruit Valley Neighborhood?**

Outdoor air samples have been collected from areas both inside and outside the area where groundwater contamination has been found. TCE outdoor air levels in the Fruit Valley Neighborhood are similar to levels found in outdoor air across the nation, when compared to data reported by the Environmental Protection Agency.

According to the National Research Council's Committee on Human Health Risks of TCE, the average level of TCE in ambient air across the United States was  $0.37 \mu\text{g}/\text{m}^3$  in 2004 (range of 0 –  $6.32 \mu\text{g}/\text{m}^3$ ). Average concentrations vary depending on land use and were reported as:

- $1.84 \mu\text{g}/\text{m}^3$  in commercial areas
- $1.54 \mu\text{g}/\text{m}^3$  in industrial areas
- $1.08 \mu\text{g}/\text{m}^3$  in agricultural areas
- $0.89 \mu\text{g}/\text{m}^3$  in residential areas.

**Q: Who do I contact if I have filtration system and sump pump problems?**

If you have a soil vapor vacuum system at your home, you should be contacted or visited monthly by technicians working for the Port of Vancouver. Talk with them when they schedule an appointment to check your system or call Richard Roché at the Port's consultant company, Parametrix, at (360) 694-5020. If you have immediate questions, please contact Craig Rankine at (360) 960-4795 or [cran461@ecy.wa.gov](mailto:cran461@ecy.wa.gov) and he will assist you.

**Q: What should we do when we see unmarked people (not in uniform) going into the groundwater well control houses at 9 pm at night?**

You should call the police. Staff members are instructed to wear some form of identification and only visit control sheds during working hours 8 am to 5 pm, Monday through Friday.

## **HEALTH CONCERNS**

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**Q: Will my family have respiratory problems or get sick breathing the levels of chemicals found in indoor air in Fruit Valley Neighborhood homes?**

Based on the indoor air sampling results that we have reviewed to date, the levels of chemicals found in Fruit Valley Neighborhood homes are considered low and below levels where we would expect people to get sick or have respiratory problems.

**Q: Are there health thresholds (levels of chemicals that indicate people might get sick) for short-term exposures?**

Yes, there are health thresholds available to indicate whether the chemicals found in indoor air in the Fruit Valley Neighborhood might pose a short-term health threat. None of the chemicals found in indoor air exceed those short-term levels. As a result, we do not think community members will get sick.

**Q: Some of the children at the Fruit Valley Elementary School are sick and the Clark County Health Department called the school and asked about symptoms. Why are they calling and is this related to the contamination?**

The calls from the Clark County Health Department were made to the school to get information about the spread of contagious flu-like diseases. Community members should contact the Clark County Health Department at (360) 397-8000 if they need further information.

**Q: Why did the Washington Department of Health tell us not to dig in the soil?**

The Washington Department of Health did not tell community members not to dig in the soil. However, we did say that exposure to solvents moving from groundwater could increase when excavating soil during construction activities. Community members can contact the Washington De-

partment of Ecology or the Washington Department of Health if they intend to dig and enter an excavation to learn what steps can be taken to reduce or prevent possible exposures.

## HEALTH EVALUATION

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**Q: Is the Washington Department of Health only concerned about chemicals found in indoor air that might cause cancer?**

The Washington Department of Health evaluated all the chemicals detected during the indoor and outdoor air sampling in the Fruit Valley Neighborhood. That included evaluating chemicals that might cause cancer as well as chemicals associated with other health effects.

**Q: Were children considered when evaluating health risks?**

Yes, children and other sensitive individuals, such as the elderly, were considered when evaluating potential health risks.

**Q: What does short-term exposure mean?**

Short-term exposure usually means exposure occurring for less than 1 year.

**Q: What does long-term exposure mean?**

Long-term exposure usually means exposure occurring for more than 1 year.

**Q: Is there enough data to evaluate long-term exposures?**

There is currently enough data to begin evaluating long term exposures. The Washington Departments of Health and Ecology, and the Port of Vancouver, are in the process of evaluating this data. The results of the Washington Department of Health's findings will be presented in a health consultation report later this year.

**Q: When you talk about multiple exposures, does that mean short-term exposure?**

The term "multiple exposures" means exposure to more than one chemical. Multiple exposures can be short- or long-term.

**Q: Can the Washington Department of Health use one standard health benchmark for all the chemicals?**

Health benchmarks are generally specific to a particular chemical or group of similar chemicals and reflect a level of chemical where we do not expect to see health effects in people. Health benchmarks were available for all the chemicals tested in indoor air in the Fruit Valley Neighbor-

hood. These health benchmarks were used by the Washington Department of Health when evaluating the indoor air results.

**Q: Why have no community members been tested to determine if they have been exposed to the solvents found in groundwater?**

Community members can only be exposed to the solvents found in groundwater if those chemicals evaporate, move up through the soil, and enter indoor air through cracks or opening in foundations. The levels of solvent found in indoor air in the Fruit Valley Neighborhood are low. No community members have been tested because these low indoor air levels would not be expected to result in body levels different than what would be expected in the general population.

**Q: Some of the health information used by the Washington Department of Health was obtained from an agency called ATSDR. Who is ATSDR?**

The Agency for Toxic Substances and Disease Registry, also known as ATSDR, is part of the Center for Disease Control (also known as the CDC). The CDC is part of the U.S. Public Health Service.

## **PAST EXPOSURES**

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**Q: Is there any risk assessment planned for past exposed populations?**

We are unable to characterize past exposures that may have resulted from evaporation of chemicals found in groundwater and their movement through the soil and into indoor air. Because of this lack of information, no risk assessment can be conducted for past exposures.

**Q: Why has no study been completed to investigate past exposures?**

There is no data available to evaluate past exposures. Based on what we know about the sources of the contamination and how it entered groundwater, we believe past indoor air chemical levels associated with the contaminated groundwater are not likely to be much different than current levels.

**Q: Has there been any thought to looking at health effects in the generation of elementary students who lived in the Fruit Valley Neighborhood over the last 20 years and who might have been exposed to the solvents found in indoor air in the neighborhood?**

In addition to a lack of information on past possible exposures, the Washington Department of Health has no way to follow-up with people who have moved from the area. Due to the lack of these data, we have no way to look specifically for health conditions among former residents including children who resided in the area.

**Q: There is no indoor air data available for the Fruit Valley Neighborhood community prior to 2002 to determine possible past exposures. We are concerned that past exposures have made us sick. Could this be determined by looking at workers who might have been exposed to trichloroethylene (TCE) while working at either the Swan or Cadet Companies?**

It is unknown what levels of TCE or other solvents, if any, workers might have been exposed to at the former Swan and the Cadet Manufacturing facilities. Because of this uncertainty, we cannot make predictions about residents' health based on possible worker exposures and worker health issues.

## CLUSTER INVESTIGATION

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**Q: Has any government agency done a survey to see how many people have cancer or other illnesses related to the chemicals found in indoor air?**

To investigate possible disease clusters, the Washington Department of Health uses a standardized approach that relies on existing public health data. For cancer, data are available back to 1992. When an investigation is conducted, cancer rates for a specific area are compared to cancer rates for the state. It is important to note that cancer rates fluctuate by year and may be different between communities due to demographics, lifestyle choices, and by random chance alone.

Because of community concerns about past exposures, the Washington Department of Health will be conducting a cluster investigation to assess whether specific cancers associated with TCE and other solvents are higher in the Fruit Valley neighborhood area. A report of the Washington Department of Health's findings will be provided to the community later this year.

The Washington Department of Health has a fact sheet that provides information about cancer and cancer clusters. That fact sheet can be found at on the internet at <http://www.doh.wa.gov/ehsphil/Epidemiology/NICE/publications/CancerClusterFactSheet.pdf>

## CONSTRUCTION AND DEVELOPMENT

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**Q: There is a parcel up for lease that will be excavated and developed for industrial use. What would the exposures be for over 7 acres?**

We are not aware of the development plans for the property adjoining the Cadet facility. If development were to occur, a change in the soil surface or surface area may have no affect on the amount of solvent vapor released from the soil. Please see the answer to "How does surface area affect vapor release?" on page eight for more information.

## DRINKING WATER AND AQUIFERS

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**Q: Where do we get our water from? I know the City of Vancouver, but where does that come from?**

Drinking water comes from groundwater wells at several locations within City of Vancouver limits. The City wells are drawing water from aquifers that are outside the area of contamination below Fruit Valley Neighborhood. You can contact the City of Vancouver (Water Department at (360) 696-8152) to learn which well fields supply water to your neighborhood.

The three closest well fields to the Fruit Valley Neighborhood are:

- Water Station #1 at Water Works Park on the north side of Clark College campus
- Water Station #3 on Washington Avenue between 42 and 43 Streets and
- Water Station #4 at the south end of Blandford Drive before reaching Highway 14.

**Q: We have received water reports from the City of Vancouver that there is PCE/TCE getting into the water? Is this from the Cadet site?**

The chlorinated solvent compounds in City of Vancouver water are not associated with groundwater contamination from the Cadet and former Swan Manufacturing facilities. City wells are drawing water from outside the area of contamination below the Fruit Valley Neighborhood. Please contact the City of Vancouver Water Department for further information at (360) 696-8177.

**Q: How far out do aquifers go? I am concerned about sole-source protection label and potential impact on those aquifers**

Aquifers are far reaching both horizontally and vertically below the Fruit Valley Neighborhood. There are essentially two aquifers contacted by monitoring wells below the Fruit Valley Neighborhood:

***Unconsolidated Sedimentary Aquifer***

This aquifer is closest to the ground surface and is hundreds of feet thick, the thickest below the Vancouver lowland lake area. Part of this aquifer was contaminated by historical activities at Cadet and Swan manufacturing sites.

***Troutdale Aquifer***

This aquifer lies below the Unconsolidated Sedimentary Aquifer. It is hundreds of feet thick and has received sole-source designation. This aquifer lies below most of Clark County and some of Skamania County. Contamination from Cadet and Swan sites does not reach water supply units of this aquifer.

**Q: How is plume affecting aquifer? Is it reaching the ocean?**

Current data indicate the plume is not reaching the ocean. See Figures 2 through 5 (pages 17-20) showing the estimated shallow groundwater contamination in 2002, 2004, 2005 and 2006. These figures show the levels and extent of contamination at the beginning of the cleanup and also show how contamination levels have decreased and the extent of contamination is not expanding.

## **APPENDIX**

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**Figure 1. Washington State Model Toxic Cleanup Process**

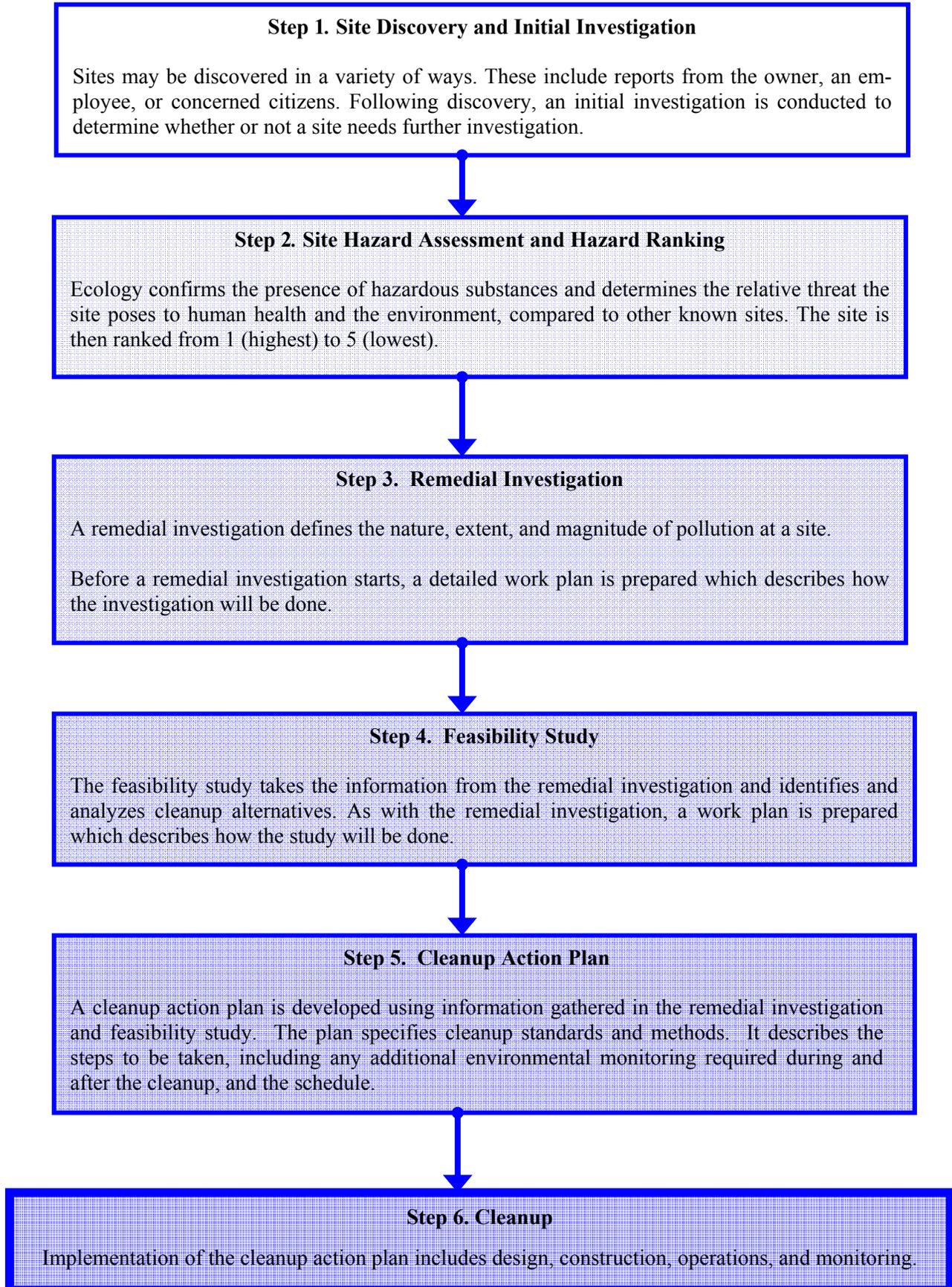


Figure 2. TCE Plume January - March 2002

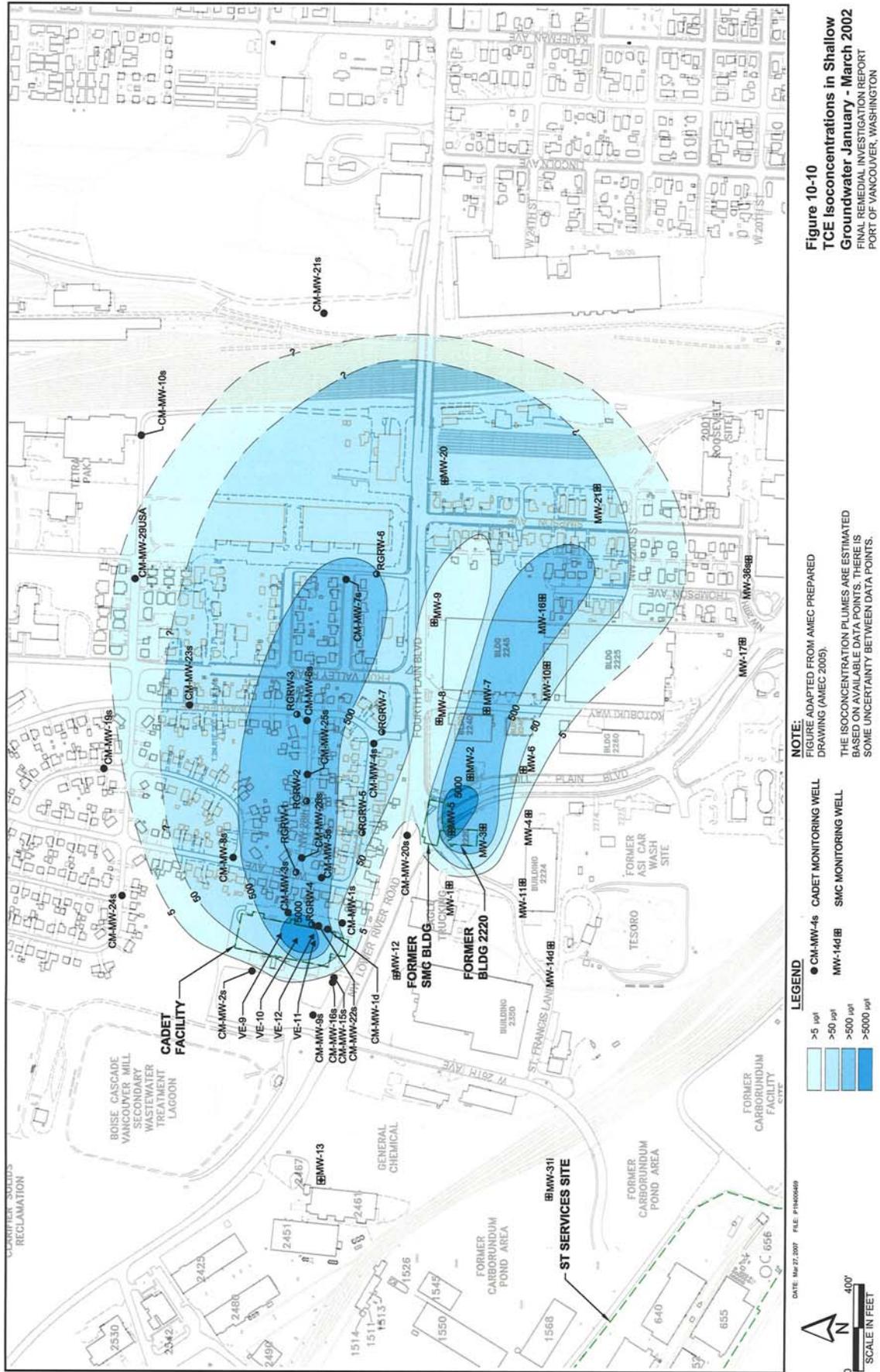


Figure 3. TCE Plume January - February 2004

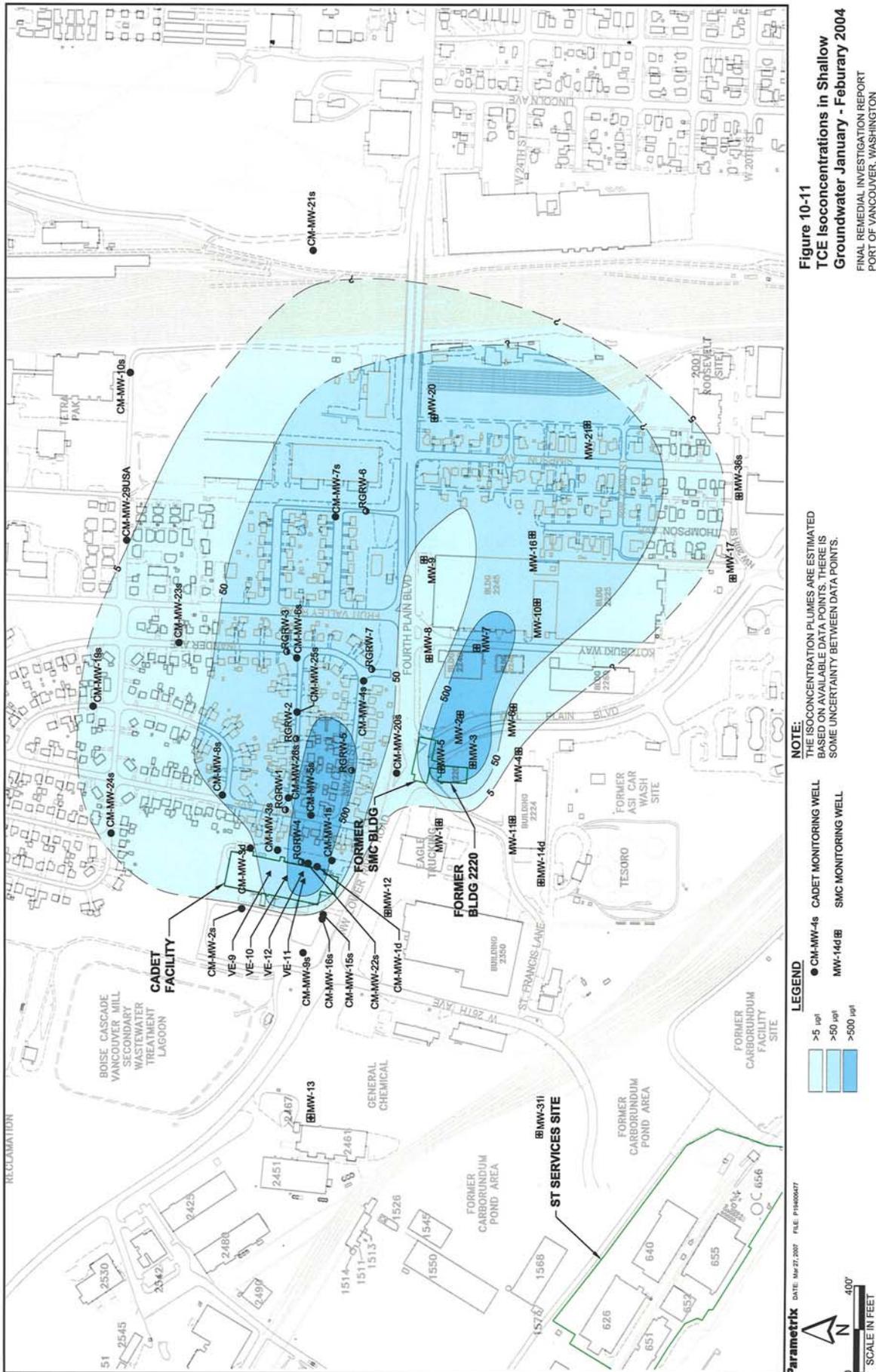


Figure 4. TCE Plume November 2005

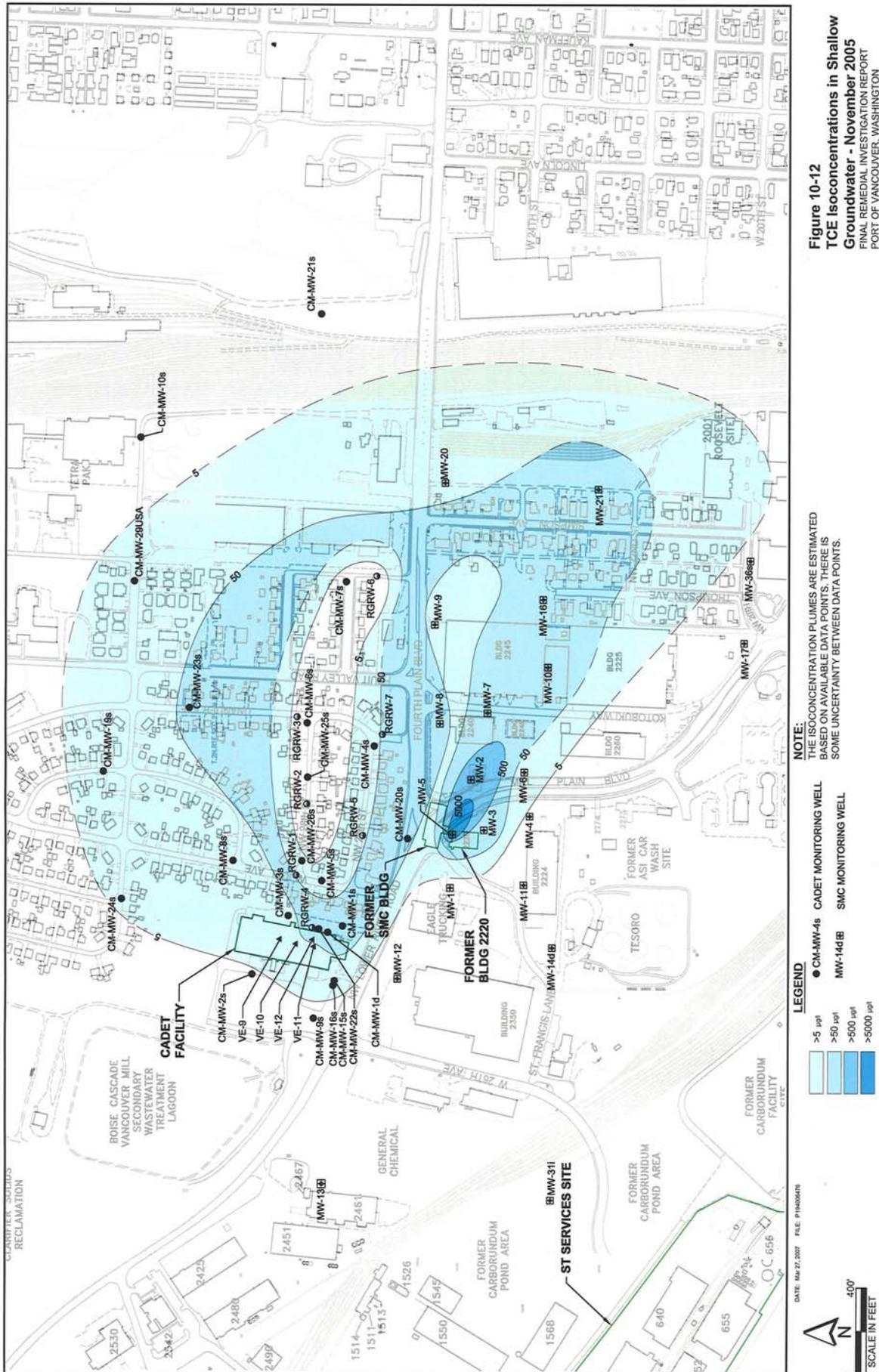


Figure 10-12  
TCE Isoconcentrations in Shallow  
Groundwater - November 2005  
FINAL REMEDIAL INVESTIGATION REPORT  
PORT OF VANCOUVER, WASHINGTON

Figure 5. TCE Plume September 2006

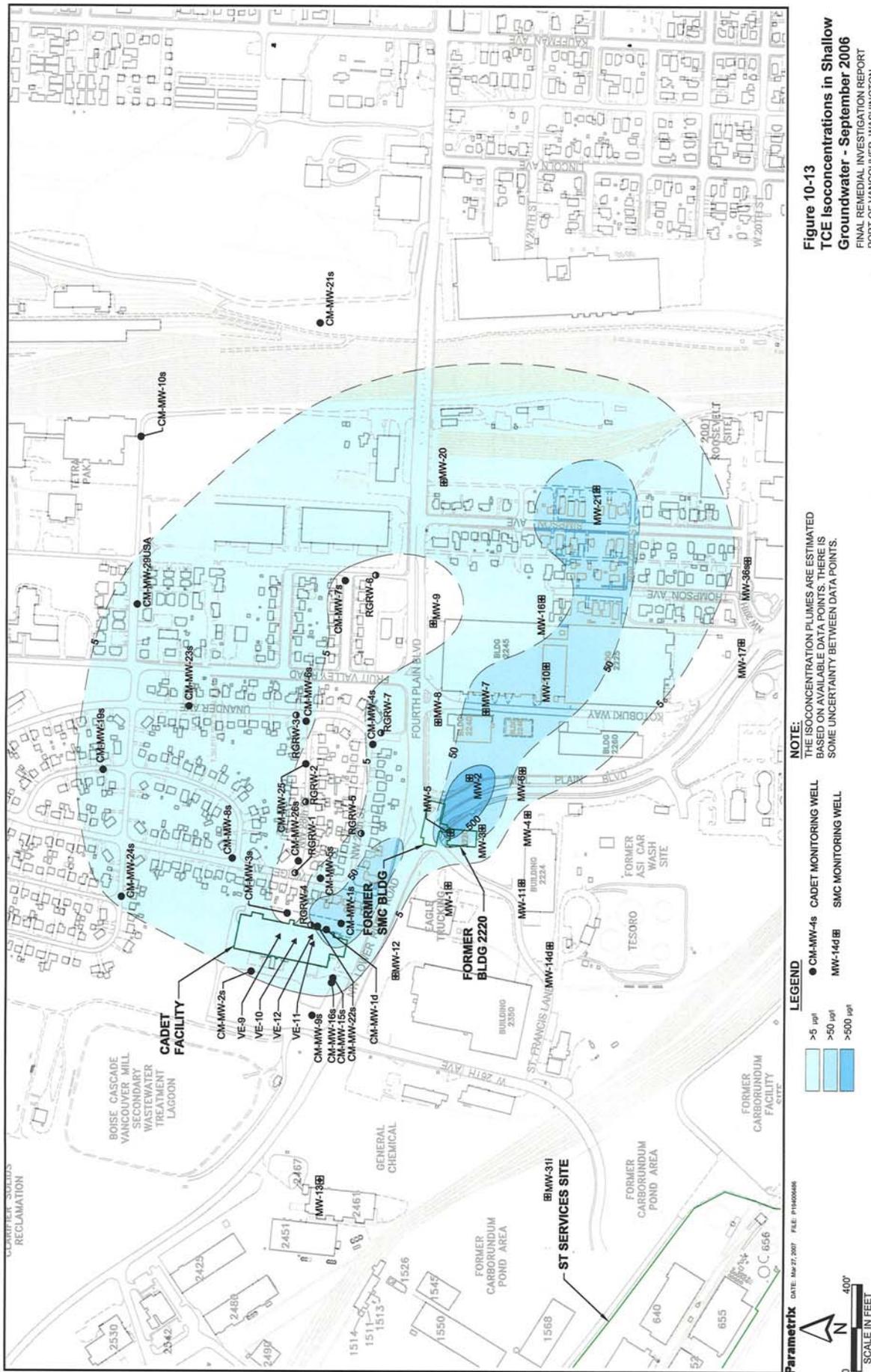
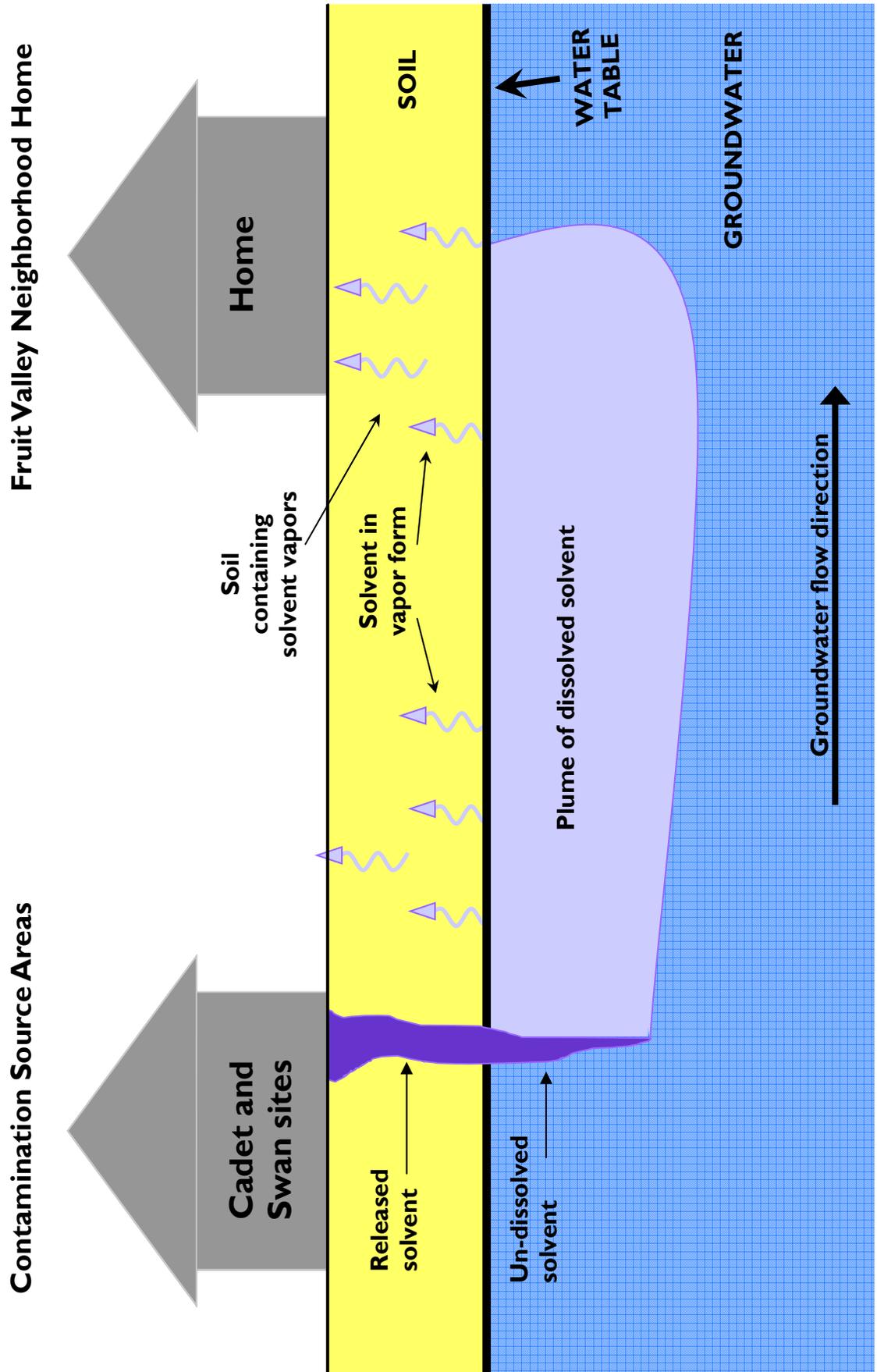


Figure 6. Vapor Intrusion Pathway

**Potential Pathway for Vapor Intrusion into Homes in Fruit Valley Neighborhood\***  
*\*This diagram represents the potential pathway. This is not the situation in all of the homes in the Fruit Valley Neighborhood.*



## Conversion Factors for Gas Concentration Units

The following formula can be used to convert gas concentrations in units of micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) to units of parts per billion volume (ppbv).

ppbv =

$$\frac{\text{Concentration of compound } (\mu\text{g}/\text{m}^3) \times 24.04 \text{ (ideal gas constant at } 68^\circ\text{F}/20^\circ\text{C)}}{\text{Molecular Weight of compound (grams per mol [g/mol])}}$$

OR

Concentration of compound x Conversion Factor for Compound

*For example: If the concentration of the compound TCE equals  $0.14 \mu\text{g}/\text{m}^3$ , then*

$$0.14 \mu\text{g}/\text{m}^3 \text{ TCE} = \frac{0.14 \mu\text{g}/\text{m}^3 \times 24.04}{131.4 \text{ g/mol}} = 0.026 \text{ ppbv}$$

OR

$$0.14 \mu\text{g}/\text{m}^3 \text{ TCE} = 0.14 \times 0.1830 = 0.026 \text{ ppbv}$$

### Compound Molecular Weights and Conversion Factors:

Compound	Molecular Weight (g/mol)	Conversion Factor (multiply $\mu\text{g}/\text{m}^3$ by conversion factor to determine ppbv)
1,1,1-Trichloroethane (1,1,1-TCA)	133.4	0.1802
1,1-Dichloroethane (1,1-DCA)	99.0	0.2429
1,1-Dichloroethene (1,1-DCE)	96.9	0.2480
1,2-Dichloroethane (1,2-DCA)	99.0	0.2429
cis-1,2-Dichloroethene (cis-1,2-DCE)	96.9	0.2480
Chloroethane	64.5	0.3726
Tetrachloroethene (PCE)	165.8	0.1450
Trichloroethene (TCE)	131.3	0.1830
trans-1,2-Dichloroethene (trans-1,2-DCE)	96.9	0.2480
Vinyl chloride	62.5	0.3846

#### Other gas units conversions:

1 milligram per cubic meter ( $\text{mg}/\text{m}^3$ ) =  $1000 \mu\text{g}/\text{m}^3$

1 cubic meter ( $\text{m}^3$ ) = 1000 liters

#### Liquid units conversions:

1 milligram per liter ( $\text{mg}/\text{l}$ ) = parts per million (ppm)

1 microgram per liter ( $\mu\text{g}/\text{l}$ ) = parts per billion (ppb)

1 ppm = 1000 ppb

1  $\text{mg}/\text{l}$  = 1000  $\mu\text{g}/\text{l}$