

Health Consultation

Sylvan Way Property
Seattle, King County, Washington

March 20, 2000

Prepared by

**The Washington State Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry**



FOREWORD

The Washington State Department of Health (WDOH) has prepared this Health Consultation in cooperation with the Agency for Toxic Substances and Disease Registry (ATSDR). ATSDR is part of the U.S. Department of Health and Human Services and is the principal federal public health agency responsible for health issues related to hazardous waste. This Health Consultation was prepared in accordance with methodologies and guidelines developed by ATSDR.

The purpose of this Health Consultation is to identify and prevent harmful human health effects resulting from exposure to hazardous substances in the environment. The Health Consultation allows DOH to respond quickly to a request from concerned residents for health information on hazardous substances. It provides advice on specific public health issues. DOH evaluates sampling data collected from a hazardous waste site, determines whether exposures have occurred or could occur, reports any potential harmful effects, and recommends actions to protect public health.

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BACKGROUND AND STATEMENT OF ISSUES

The Washington State Department of Health (WDOH) has prepared this health consultation at the request of several West Seattle residents who live near the Sylvan Way Property to evaluate whether waste materials disposed at the property pose a threat to human health, especially during construction of proposed housing units at the property and later when the property is occupied by residents.

The Sylvan Way Property is located at 7001 Sylvan Way Southwest in West Seattle, a community in the southwest portion of the City of Seattle (Figure 1). The undeveloped property is approximately 15 acres.¹ It is bounded by Sylvan Way Southwest to the north; a green belt to the east; Southwest Othello Street to the south; and 28th Avenue Southwest and a residential area to the west (Figure 2). Cemetery property is located immediately north of Sylvan Way; a residential area is located immediately south of Southwest Othello Street.

The property has been owned by the Sylvan Way Land Company since the 1960s.² It was mined for sand from the early 1950s to 1973.² Following the sand mining operation, the property was periodically used to dispose of various types of waste.^{1,3} No documents exist about the source, type, or quantity of wastes disposed on the property.¹ However, residents who lived in the vicinity of the property report that sludge, batteries, construction debris, and other suspicious materials were disposed at various locations throughout the property.^{1,3}

Specific locations where waste disposal reportedly occurred include the north central portion of the property where the contents of barrels were observed being disposed in a deep trench (the barrels were reported to have been removed from the site after the contents were dumped); the northern portion of the site where batteries were disposed and large volume storage tanks were washed out and the waste water disposed on the ground surface; and the southern end of the property where sludge disposal occurred.^{2,4} Figure 2 shows the areas of suspected battery and sludge disposal. Residents also report that some community members used the property to dispose of household and yard wastes.⁵

Jefferson Properties, a developer, is proposing to construct approximately 150 housing units on the property which is zoned residential.^{1,6} Approximately 750 people live within one quarter of a mile.² The property reportedly is used by children and adults for recreation and exercising pets; teenagers also reportedly congregate there.²

Information obtained from the environmental investigations conducted at the property indicate that fill ranging from zero to more than eighteen feet thick underlies the property.^{1,7} Based on visual observations recorded during the investigations, it appears that a large portion of the fill observed at the property contains construction debris such as wood, concrete, asphalt, pipe, bricks, and metal debris in a soil matrix.^{1,7} Soil fill without construction debris was also observed.^{1,7} Petroleum-like odors were identified in some of the fill.¹

Geotech Consultants, the developer's geotechnical consultant, recommended that building foundations not be placed on the fill because it is not structurally suitable for foundation support.⁷ No foundation design plans are available for the proposed construction. Therefore, the depths of cuts and fills that will be required to prepare the property for construction are unknown.

Residents located adjacent to the property have expressed concerns about potential human health effects from exposure to the wastes disposed at the property since 1989.⁵ A meeting between WDOH and residents on May 14, 1999, confirms their ongoing concerns.⁴

Site Visit

On May 17, 1999, WDOH staff visited the property to observe site conditions.⁸

Access to the Sylvan Way Property is unrestricted. A number of unpaved roads and tracks which appear to have been traveled by off-road vehicles such as bikes, motorcycles, and trucks cut across the property. A few people with their dogs were encountered on the property during the site visit.

In general, the property slopes towards the northeast except in the northwestern corner where it slopes to the southeast (Figure 3). A steep slope is located along the western portion of the property. A few areas of ponded water were observed across the property during the site visit but no visible sheens were observed on the water surfaces.

The northern portion of the property has scattered areas of vegetation. A number of these vegetated areas contain mounds of fill. At one of these areas in the east central portion of the property, grass-covered mounds of fill with dead scotch broom plants were observed. Adjacent fill areas contain grasses with lush scotch broom. This suggests that variable types of fill may have been disposed in the area. The southern portion of the property is more heavily vegetated than the northern portion.

Pieces of black plastic were observed in surface soils in the north central portion of the property near the north property line. A significant amount of concrete, brick, and asphalt debris was observed in the southeastern portion of the property. Large pieces of concrete debris was observed in the southwestern portion of the property.

Natural Resource Use

Groundwater

A dense, glacial, outwash sand underlies the fill located at the Sylvan Way Property.^{1,2} Groundwater was encountered under unconfined conditions in this sand unit from 55 to 90 feet below the ground surface during an investigation conducted by the developer's environmental consultant, Hart Crowser, in October 1998.¹ Groundwater flows generally from west to east toward the Longfellow Creek drainage which is located east of Sylvan Way SW (Figure 3).¹ According to Ecology and Environment, the Environmental Protection Agency's (EPA's) consultant, there are no public water supply wells or irrigation wells within 4 miles of the site and no domestic wells within 3 miles of the site.² Ecology and Environment also indicate that the property is not in a wellhead protection area.² Groundwater from the sand unit was reported to discharge along the eastern slope of the green belt above Longfellow Creek.^{1,2} The groundwater from this sand unit likely discharges into the Longfellow Creek drainage.

Surface Water

The Longfellow Creek drainage is located east of the Sylvan Way property. Most of the surface water found at the Sylvan Way property appears to seep into the soil and recharges groundwater.² Some standing water, however, has been observed at various locations on the property.^{1,8} A portion of the surface water in the southeastern portion of the property reportedly flows from the property into a drainage ditch which discharges into a drain pipe that is located under Sylvan Way SW (Figure 4).² This surface water eventually discharges to Longfellow Creek.²

Ecology and Environment report that Longfellow Creek is not used as a source of drinking water or commercial food crop irrigation.² It is also not a designated recreation area.² No drinking water intakes are located in Longfellow Creek within 15 miles downstream of the Sylvan Way property.² No fishing is known to occur in the creek.²

Environmental Studies

Environmental data have been collected at the Sylvan Way property to evaluate the nature and extent of contamination in soil and groundwater. Environmental data were also collected to evaluate the nature and extent of the fill placed on the property since the early 1970s.

- Soil samples were collected from thirteen test pits excavated around the perimeter of the property in March 1997 to evaluate general subsurface soil conditions.⁷ Fill thickness was measured and soil types and conditions were noted. The information collected from the study was used to develop preliminary engineering criteria for planning the proposed development.⁷ No soil samples collected during the study were submitted for chemical analysis.

- Additional soil samples were collected from 33 test pits and 25 surface soils (0 to 0.5 feet) locations.¹ A number of the sample locations were reportedly selected based on information provided by local residents about observed waste disposal areas at the property.¹ As in the March 1997 study, general subsurface conditions such as fill thickness and information about the soils were noted. A subset of samples collected during the study were submitted for chemical analysis. Surface soil samples were analyzed for lead; subsurface soil samples were predominantly analyzed for metals and petroleum.¹ A few subsurface soil samples were also analyzed for volatile organic compounds, semi-volatile organic compounds, and polychlorinated biphenyls (PCBs).¹

- Four monitoring wells were installed at the Sylvan Way property as part of the October 1998 study. The wells were monitored to determine groundwater flow directions in the upper most aquifer below the property and sampled to evaluate groundwater quality. With the exception of PCBs, groundwater was analyzed for the same chemicals as soils.

No information was available about how the samples were collected during the studies described above. WDOH assumes that adequate quality assurance and quality control measures were followed with regard to sampling procedures, chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and the conclusions drawn for this health consultation are determined by the availability and reliability of the referenced information.

DISCUSSION

A. Introduction

The public health effects associated with a property depend on two factors: the contaminants of concern and how people come into contact with the contaminants (i.e., exposure pathways). Contaminants of concern are those chemicals found at a property that may cause human health effects. However,

not all chemicals found at a property are chemicals of concern and not all chemicals of concern are a health hazard.

In order for an exposure to a contaminant of concern to occur, all the elements of an exposure pathway must be in place. Exposure pathways are divided into completed and potential pathways and can be current, past, or future exposures.

A completed exposure pathway consists of five elements: a contaminant source; environmental media that transport contaminants from the source (e.g., soil, groundwater, air); a point where people contact contaminated media (e.g., tap water); route of exposure by which a contaminant enters the human body (e.g., inhalation, ingestion, dermal contact or absorption); and a receptor population that is exposed to contaminants. A potential exposure pathway exists when some, but not all, of the five elements are present and the potential exists that the missing element(s) have been present, are present or will be present in the future.

Completed and potential exposure pathways at the Sylvan Way property are described below and summarized in Tables 1 and 2, respectively.

B. Completed Exposure Pathways

A completed exposure pathway exists for children and adults who frequent the Sylvan Way Property (trespassers) and are exposed to surface soil or surface water contaminants through the inhalation, ingestion, or dermal exposure pathways. A completed exposure pathway also exists for community members who may be exposed to contaminated sediments in the drainage located east of the property. The following sections summarize the potential health effects associated with these exposures.

B.1. Surface Soils

Fill from unknown sources has been disposed across the surface of the property since 1973 except in the northwestern portion of the Sylvan Way property where native soils are encountered.

Twenty-five surface soil samples were collected by the developer's environmental consultant in October 1998 to evaluate whether contaminants were contained in surface soils.¹ The analysis of the surface soil, however, was limited to lead.¹ Although lead is a chemical of concern because of reports of battery and construction debris disposal, it is not considered the only potential chemical of concern given the waste disposal history at the property.

Lead was detected in the surface soil samples from less than 5.4 up to 500 milligrams per kilogram (mg/kg)¹ Twenty of the twenty-five surface soil samples collected for lead analysis were located in the northern half of the property.¹ Five samples were collected in the southern half of the property.¹ However, four of the five samples collect in the southern half of the property were located in a relatively small area. The highest lead concentrations were detected near the northeastern boundary of the property.

Lead occurs naturally in the environment. However, most lead found in the environment comes from human activities. In the past, lead was released into the environment through the use of leaded gas. Other sources of lead in the environment include the burning of fuels such as coal and oil, industrial processes, and lead-based paints.⁹

Children and adults who frequent the Sylvan Way Property are exposed to the lead in the surface soils through the inhalation of fugitive dust, ingestion, or dermal contact with contaminated surface soils. Exposure to lead can be particularly dangerous for unborn children and young children because of their greater sensitivity during development.⁹ Lead exposure may reduce intelligence and the growth of young children.⁹

Because only two small surface soil areas in the southern half of the property were tested for lead, WDOH was unable to evaluate potential human health effects associated with exposure to lead in this portion of the property. To evaluate the potential human health effects from exposure to lead in surface soils in the northern half of the property, blood lead levels were estimated for children exposed to the average lead concentration found in this portion of the property (243.6 mg/kg).¹⁰ It was found that the estimated blood lead levels did not exceed the Environmental Protection Agency (EPA) and Centers for Disease Control (CDC) guidelines.^{11, 12} Therefore, the lead levels found in the surface soils in the northern portion of the site are not considered a health concern.

B.2. Surface Water

Ponded surface water has been observed at various locations across the property and as noted above, a portion of the surface water in the southeastern portion of the property appears to flow off the property.

Because no surface water data are available for the southeastern portion of the property, WDOH could not evaluate the potential human health effects associated with this exposure pathway. Surface water data were available, however, for some of the ponded surface water areas at the property. The analysis conducted on the ponded surface water samples, like the surface soil

analysis, was limited. However, the limited analysis is not considered a significant data gap because there is likely little or no exposure to surface water at the property.

The greatest opportunity for human contact with ponded surface water at the property would occur in the warmer summer months. However, precipitation in the Seattle area in the summer months is typically low and ponded water is expected to be found infrequently during this time of the year.

B.3. Sediments

Sediments located downstream of the eastern portion of the property where surface water from the property discharges may contain contaminants. Community members who encounter the sediments could be exposed to contaminants through dermal contact. No samples were collected to evaluate sediment quality. As a result, WDOH is unable to evaluate potential human health effects associated with the exposure.

C. **Potential Exposure Pathway**

Potential exposure pathways exist for construction workers at the property and residents located adjacent to the property who could potentially be exposed to contaminants during construction. Once housing units are completed, residents who occupy the units and maintenance workers could also potentially be exposed to contaminants that are not properly managed or disposed at the property. Exposures to contaminated media (e.g., soil, surface water, groundwater) could occur through inhalation of fugitive dust or ingestion or dermal contact with contaminated media. The following sections summarize the potential human health effects associated with these potential exposures.

C.1. Surface Soils

Surface soil conditions at the Sylvan Way Property are likely to change in the future as a result of the proposed housing construction. Whether construction workers, adjacent residents, future residents at the property, and/or maintenance workers will potentially be exposed to surface soils contaminants will depend on the type of soils placed on or near the ground surface.

C.2 Subsurface Soils

Subsurface soil sampling and analyses were conducted as part of the studies conducted at the property. Elevated pH levels and a number of organic and inorganic contaminants were identified.¹

Although analyses were conducted on a number of subsurface soil samples, it was not sufficient for characterizing contaminant concentrations. As a result, a number of data gaps exist. For example, only two subsurface soil samples in the northern half of the property were analyzed for metals other than lead and no samples from the northern half of the property were analyzed for organic compounds other than petroleum. To limit the subsurface soil analysis to lead and petroleum is inappropriate given the lack of information about the fill source.

The nature and extent of the fill in the southern portion of the property has not been fully determined. This is also a significant data gap. Only three to five subsurface soil samples in this portion of the property were analyzed for various organic compounds other than petroleum. Three to five samples are insufficient for characterizing the potential organic contaminant concentration of subsurface soil considering the likely variability of the fill disposed at the property. Other data gaps also exist such as the lack of chemical data available for the upper fill units.

Construction workers, adjacent residents, and future residents and maintenance workers are the potential receptors of the contaminants found in subsurface soils at the Sylvan Way Property. Whether they will be exposed to subsurface soil contaminants depends on the soils encountered during construction and where the contaminated soils are deposited during the development of the property.

C.3. Groundwater

City water is currently available at the property. Potential future groundwater use at the property, therefore, would likely be limited to irrigation. Low levels of a few organic and inorganic contaminants were detected in groundwater. However, only one sampling round was conducted. Additional sampling rounds would be required to evaluate potential human health effects that may occur to future residents or maintenance workers who could potentially be exposed to groundwater contaminants through inhalation and dermal contact.

The results of the additional groundwater sampling and analysis is also necessary to evaluate potential human health effects that may occur to members of the community who contact groundwater that discharges on the adjacent green belt or in the Longfellow Creek drainage.

C.4. Surface Water

Surface water conditions at the Sylvan Way Property are likely to change in the future as a result of the proposed housing development. Whether construction

workers, future residents or maintenance workers at the property will potentially be exposed to contaminants through the dermal routes of exposure is unknown.

D. Child Health

The potential for exposure and subsequent adverse health effects are often increased for young children when compared with older children or adults. For example, children ingest more soil per body weight than do adults and therefore, receive higher exposures than adults. In addition to the potential for higher exposures of young children, the risk of adverse health effects is also increased. ATSDR and WDOH recognize that children are susceptible to developmental toxicity that can occur at levels much lower than those causing other types of toxicity.

WDOH evaluated the likelihood that young children exposed to lead in surface soils and contaminants in surface water at the property would experience adverse health effects. The above discussion summarizes those findings. Child exposure to surface soil contaminants other than lead may also be occurring but there is no data to evaluate this scenario. Child exposures to contaminants may also occur in the future during the construction of the housing units and when the units are occupied by residents.

CONCLUSIONS

1. An indeterminate public health hazard exists for surface soils because insufficient information is available to characterize surface soil contaminants.
2. No apparent public health hazard exists for surface water ponded on the property because exposures are either non-existent or very limited.
3. An indeterminate public health hazard exists for surface water that drains from the southeast portion of the property and sediment in the adjacent drainage ditch because no data are available to characterize sediment or water quality.
4. An indeterminate public health hazard exists for future exposure scenarios at the property because it is unknown whether people may potentially be exposed to soil, surface water, and groundwater contaminants.

RECOMMENDATIONS

1. Restrict access to the property until it is determined that potentially contaminated surface soils do not pose a threat to human health.
2. Prevent surface water from discharging off the property until it is determined that potential contaminant concentrations do not pose a threat to human health.
3. Conduct further studies to better characterize the potential contaminants in the various media (surface and subsurface soils including the fill, groundwater, surface water, and sediments) found at or adjacent to the property.
4. Develop a contingency plan to ensure that contaminated media (e.g. soil, surface water, sediment, groundwater) and waste materials (e.g. concrete debris, metal) are handled, managed, used, and disposed properly during construction.

WDOH is available to review plans and reports generated as a result of the above recommendations.

REFERENCES

- 10 Environmental Assessment, Sylvan Way Property, Seattle, Washington, Hart Crowser, December 22, 1998.
- 20 Preliminary Assessment, Sylvan Way Land Company ASand Pit@ Site, Seattle, Washington, Ecology and the Environment, March 1999.
- 30 Preliminary Assessment Petition to the Environmental Protection Agency, Region 10, Sunrise Heights Neighborhood Association, September 1, 1998.
- 40 WDOH Meeting with Residents, May 14, 1999.
- 50 Fairfield Way Subdivision Comment Letters, City of Seattle, Department of Construction and Land Use, May 4, 1999.
- 60 Environmental Checklist, Fairfield Housing, 7001 Sylvan Way SW, Seattle, Washington, Kato & Warren, June 1998.
- 70 Preliminary Geotechnical Engineering Study, Proposed 200-Unit Housing Complex, Sylvan Way Southwest, Geotech Consultants, April 2, 1997.
- 80 May 10, 1999 Site Visit Summary, Sylvan Way Property, prepared by Barbara Trejo, WDOH.
- 90 Toxicological Profile for Lead, Draft, Update, February 17, 1998.
- 100 Integrated Exposure Uptake Biokinetic Model for Lead in Children, EPA, March 8, 1994.
- 110 The IEUBK, Introduction, EPA Technical Review Workgroup for Lead (TRW) Website, June 24, 1999.
- 120 Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, EPA, OSWER Directive 9200.4-27P, PB98-963244.

Table 1: Complete Exposure Pathways for the Sylvan Way Development

Pathway Name	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Population	Time
Surface Soil	Sylvan Way Property	Surface Soil	Sylvan Way Property	Inhalation Dermal Ingestion	Trespassers , Site Workers	Past Present
Surface Water	Sylvan Way Property	Surface Water	Sylvan Way Property and adjacent properties	Dermal	Trespassers , Community Members	Past Present
Sediments	Sylvan Way Property	Sediment	Green Belt	Dermal	Community Members	Past Present

Table 2: Potential Exposure Pathways for the Sylvan Way Development

Pathway Name	Source	Environmental Media	Point of Exposure	Route of Exposure	Exposed Population	Time
Soil	Sylvan Way Property	Surface and Subsurface Soil	None	Inhalation of Fugitive Dust, Dermal Ingestion	Construction /Maintenance Workers, Adjacent and On-Site Residents	Future
Groundwater	Sylvan Way Property	Groundwater	None	Dermal Inhalation	Residents, Community Members	Future
Surface Water	Sylvan Way Property	Surface Water	None	Dermal	Construction / Maintenance Workers, Residents, Community Members	Future

Glossary

Aquifer	An underground formation composed of materials such as sand, soil, or gravel that can store and/or supply groundwater to wells and springs.
Agency for Toxic Substances and Disease Registry (ATSDR)	The principal federal public health agency involved with hazardous waste issues, responsible for preventing or reducing the harmful effects of exposure to hazardous substances on human health and quality of life. ATSDR is part of the U.S. Department of Health and Human Services.
Contaminant	Any chemical that exists in the environment or living organisms that is not normally found there.
Dose	A dose is the amount of a substance that gets into the body through ingestion, skin absorption or inhalation. It is calculated per kilogram of body weight per day.
Environmental Media Evaluation Guide (EMEG)	A concentration in air, soil, or water below which adverse non-cancer health effects are not expected to occur. The EMEG is a <i>comparison value</i> used to select contaminants of potential health concern and is based on ATSDR's <i>minimal risk level</i> (MRL).
U.S. Environmental Protection Agency (EPA)	Established in 1970 to bring together parts of various government agencies involved with the control of pollution.
Exposure	Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). Exposure may be short term (acute) or long term (chronic).
Groundwater	Water found underground that fills pores between materials such as sand, soil, or gravel. In aquifers, groundwater often occurs in quantities where it can be used for drinking water, irrigation, and other purposes.
Hazardous substance	Any material that poses a threat to public health and/or the environment. Typical hazardous substances are materials that are toxic, corrosive, ignitable, explosive, or chemically reactive.
Inorganic	Compounds composed of mineral materials, including elemental salts and metals such as iron, aluminum, mercury, and zinc.
Media	Soil, water, air, plants, animals, or any other part of the environment that can contain contaminants.
Monitoring wells	Special wells drilled at locations on or off a hazardous waste site so water can be sampled at selected depths and studied to determine the movement of groundwater and the amount, distribution, and type of contaminant.

No apparent public health hazard	Sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.
Organic	Compounds composed of carbon, including materials such as solvents, oils, and pesticides which are not easily dissolved in water.
Indeterminate public health hazard	Sites for which no conclusions about public health hazard can be made because data are lacking.
Risk	The probability that something will cause injury, linked with the potential severity of that injury. Risk is usually indicated by how many extra cancers may appear in a group of people who are exposed to a particular substance at a given concentration, in a particular pathway, and for a specified period of time. For example, a 1%, or 1 in 100 risk indicates that for 100 people who may be exposed, 1 person may experience cancer as a result of the exposure.
Route of exposure	The way in which a person may contact a chemical substance that includes ingestion, skin contact and breathing.