

# Health Consultation

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MILL VIEW/MILLVILLE SUBDIVISION  
(a/k/a PORT ST. JOE MILLVIEW ADDITION)

PORT ST. JOE, GULF COUNTY, FLORIDA

EPA FACILITY ID: FLN000407304

MAY 22, 2003

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
Agency for Toxic Substances and Disease Registry  
Division of Health Assessment and Consultation  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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## FOREWORD

This document summarizes public health issues for the Millville or Mill View subdivision in Port St. Joe, Florida. It is based on a site evaluation prepared by the Florida Department of Health (DOH). A number of steps are necessary to do such an evaluation:

**Evaluating exposure:** Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is found on the site, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. We rely on information provided by the Florida Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency (EPA) and other government agencies, private businesses, and the general public.

**Evaluating health effects:** If there is evidence that people are being exposed—or could be exposed—to hazardous substances, Florida DOH scientists will determine whether that exposure could be harmful to human health. Their report focuses on public health; that is, the health impact on the community as a whole, and is based on existing scientific information.

**Developing recommendations:** In the evaluation report, Florida DOH outlines its conclusions regarding any potential health threat posed by a site and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason, the evaluation report will typically recommend actions to be taken by other agencies, including the EPA and Florida DEP. If, however, a health threat exists or is imminent, Florida DOH will issue a public health advisory warning people of the danger, and will work to resolve the problem.

- **Soliciting community input:** The evaluation process is interactive. Florida DOH starts by soliciting and evaluating information from various government agencies, individuals or organizations responsible for cleaning up the site, and those living in communities near the site. Any conclusions about the site are shared with the groups and organizations providing the information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public. *If you have questions or comments about this report, we encourage you to contact us.*

*Please write to:*

Health Education Program Manager  
Superfund Assessment and Health Education  
Bureau of Environmental Epidemiology/Florida Department of Health  
4052 Bald Cypress Way, Bin # A-08  
Tallahassee, FL 32399-1712

*Or call us at:*

(850) 245-4299, or toll-free during business hours: 1-877-798-2772

## Background and Statement of Issues

The Florida DOH evaluates the public health significance of hazardous waste sites through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) in Atlanta, Georgia. In this health consultation, Florida DOH evaluates the public health threat from chemicals found in the soil/groundwater samples collected by Florida DEP in late 2001 and early and mid-2002 (Florida DEP 2002).

In 1938 the St. Joe Paper Company began its Gulf of Mexico paper mill operations, settling in Port St. Joe, Florida (Figure 1). From the 1940s to the early 1950s the St. Joe Paper Company filled a “sock-shaped” canal/wetlands area east of the paper mill with paper mill wastes (Figure 2). These wastes included tree bark, boiler ash, “lime grits” (small pieces of limestone) and slag. In the mid-1950s St. Joe Paper Company sold properties, including this filled area, for what became the 100-acre Mill View Subdivision West (Figure 3). Some Mill View residents told Florida DOH they added soil to their properties to fill holes, to raise the level of the land before building, and to grow lawns. During the 1980s St. Joe Paper Company filled a second wetlands area with limey clay, soil, and wood chips. The second phase of the Mill View residential development, Mill View Subdivision East, was built over part of this second filled area (Figure 4). But before long, subsidence in these two areas caused cracked walls (Photograph 11) and broken sewer lines in some homes. To avoid the risk of an explosion from a gas line breaking, the gas company disconnected gas service to one subsiding home (ATSDR 2001a).

In 1990, the Florida Department of Environmental Protection (DEP) found arsenic and solvents in groundwater beneath the Apalachicola Northern Railroad property, just south of Mill View Subdivision West (Figure 1). The source of the arsenic contamination at Apalachicola Northern Railroad was found during a Contamination Assessment in the early '90s and site remediation of the railroad site has been underway since. The Mill View neighborhood's attorneys recently revealed another possible (undisclosed) source to DEP they found during the “discovery” phase of an Apalachicola Northern Railroad cleanup-related lawsuit. DEP then undertook an investigation to resolve the question of the source of arsenic contamination. DEP's investigation resulted in the Draft Mill View Preliminary Contamination Report and Florida DOH's initial Health Consultation.

In June 2001, Florida DEP collected 32 soil samples on a predetermined grid from Mill View Subdivision West (Figure 3). The grid included 19 locations within the “sock-shaped” canal/wetlands area and 13 locations outside this area. Florida DEP found ash, “lime grits” and slag, indicating that this area had been filled with paper mill waste. Florida DEP also tested these soil samples for five metals: arsenic, cadmium, lead, mercury, and nickel. The Gulf County Health Department requested Florida Department of Health (DOH) review the test results. In an October 31, 2001 health consultation, Florida DOH recommended Florida DEP collect additional soil/groundwater samples and analyze for all chemicals associated with paper mill waste (ATSDR 2001a).



## Demographics

In 1990 approximately 224 persons lived within 1 mile of the center of the Mill View Subdivision West. About 29% were 19 years of age or younger. Approximately 69% were white, 31% were black, and less than 1% were American Indian or Hispanic. The average per capita income was \$10,267 and 18% (41 persons) were below the poverty level (Bureau of the Census 1990).

## Methodology

In late 2001 and early to mid-2002 Florida DEP collected soil, groundwater, and surface water samples in Mill View Subdivision West and analyzed for contaminants associated with paper mill waste (Figures 5, 6, and 7, Florida DEP 2002). Florida DEP also tested soil in Mill View Subdivision East (Figure 8). Because they did not find elevated levels of hazardous chemicals in the soil in the Mill View Subdivision East, Florida DEP did not test surface water or groundwater.

In this Health Consultation, Florida DOH evaluates the following analytical data:

### Soil Samples

April 2002 – Florida DEP collected 10 soil samples from Mill View Subdivision West and 8 soil samples from Mill View Subdivision East. They analyzed these soil samples for volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, and metals. They also analyzed 6 soil samples (3 from each subdivision) for dioxins and furans (Florida DEP 2002).

June 2002 – Florida DEP collected 18 more soil samples from Mill View Subdivision West. They also collected one surface scrape sample from both Mill View West and East Subdivisions. They analyzed all of the samples for semi-volatile organic compounds (including polynuclear aromatic hydrocarbons) and polychlorinated biphenyls (Florida DEP 2002).

### Surface Water and Groundwater Samples

August 2001 – Florida DEP sampled groundwater from six irrigation wells and 11 groundwater-monitoring wells in Mill View Subdivision West. They also sampled the canal north of the Subdivision West. Florida DEP analyzed the water samples for arsenic, cadmium, nickel, lead and volatile organic compounds (Florida DEP 2002).

October 2002 – Florida DEP collected groundwater samples from the 11 monitoring wells and the canal and analyzed for chemicals associated with pulpwood manufacturing: calcium, iron, magnesium, manganese, potassium, sodium, chloride, sulfate, sulfide, semi-volatile organic compounds (including polynuclear aromatic hydrocarbons) and alkalinity (Florida DEP 2002).

## Discussion

### Physical Hazards

Florida DOH found fill subsidence in both the eastern and western Mill View subdivision fill areas could indirectly affect the health and quality of life of community members. Subsidence has caused structural damage to homes and affects water, sewer, and gas lines. Cracking outside walls and roofs could also allow inside access to water, insects, birds, and rodents, all of which can be disease vectors.

### Environmental Contamination

By comparing soil, groundwater, and surface water test results to health-based screening values, Florida DOH identified arsenic, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) as contaminants of concern. It should be noted, however, that identification of a contaminant of concern does not necessarily indicate a public health threat; rather, such identification focuses investigative attention on those contaminants of highest concern.

### Air

Mill View is in an industrial area of Port St. Joe. Thus in the past, residents could have been exposed to chemicals in the air from the St. Joe Paper Mill to the west, from the Arizona Chemical Company to the north, and from the Apalachicola Northern Railroad yard to the south. Because of the absence of any air quality measurements, Florida DOH is unable to estimate a dose and evaluate possible health effects from inhalation exposures.

### Soil

Soil in the Mill View Subdivisions is a mixture of paper mill waste, fill, and native soil. Thus Florida DOH assessed the potential public health threat from exposure to all soil samples regardless of depth. Mill View residents could have accidentally eaten small amounts of contaminated soil from their hands or from homegrown vegetables. Residents could also have breathed contaminated dust from this soil.

To estimate potential daily exposure rates for adults and children, Florida DOH assumed exposure to the maximum soil concentration of each chemical (Table 1). Exposure rate (also called a daily dose) is given in milligrams of chemical per kilogram of body weight per day (mg/kg/day). A milligram is  $\frac{1}{1000}$  of a gram (a raisin or a paperclip each weigh about 1 gram). A kilogram is about 2 pounds. To calculate a dose, Florida DOH used standard body weights, ingestion rates, inhalation rates, and exposure times (ATSDR 1992, EPA 1997). Florida DOH assumed that adults might ingest 100 milligrams of soil per day (about the weight of postage stamp) and children might ingest 200 milligrams of soil per day. Florida DOH assumed daily exposure for 30 years for adults, and daily exposure for 4 years for children.

**Table 1. Soil Concentrations for Contaminants of Concern**

<i>Contaminants of Concern</i>	<i>Screening Value*(mg/kg)</i>	<i>Highest Soil Concentration (mg/kg)</i>	<i>Location of Highest Concentration</i>	<i>Number Soil Samples Above Screening Value</i>
<i>Arsenic</i>	0.5	7.4	MV46	12/40
<i>PAHs</i>	0.1	3.5	MV36A	7/20
<i>---</i>	0.4	6.9	MV6	2/20

\*ATSDR 1x 10<sup>-6</sup> excess cancer risk evaluation guide (ATSDR 2001)

mg/kg = milligrams per kilogram

PAHs = polycyclic aromatic hydrocarbons

PCBs = polychlorinated biphenyls

Arsenic in Soil - Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest concentration of arsenic would not likely cause non-cancer illness. Likewise, Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest measured concentration of arsenic would not likely result in an apparent increased cancer risk (ATSDR 2000a).

Polycyclic Aromatic Hydrocarbons (PAHs) in Soil – Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest concentration of PAHs would not likely cause non-cancer illness. Likewise, Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest measured concentration of PAHs would not likely result in an apparent increased cancer risk (ATSDR 1995).

PAHs are not easily or extensively absorbed into the body. Coal tar shampoos and ointments have long been used for the treatment of various skin disorders. Studies have generally been unable to find evidence of increased tumors from exposure to PAHs in coal tar shampoos and ointments (Susten 2000). Generally, adverse respiratory effects and skin cancers are only associated with daily inhalation or direct contact with high workplace levels of PAHs. Of the individual chemicals that make up the PAH group, only 15 are associated with cancer in animals or humans (ATSDR 1995). For an integrated concentration of chemicals Florida DOH multiplied the measured individual PAH concentrations by their toxicity relative to benzo[a]pyrene.

Polychlorinated Biphenyl (PCBs) in Soil – PCBs are measured as concentrations of various mixtures of individual PCBs. A PCB mixture known as “Arochlor-1260” was found in the eastern fill area. Florida DOH compared the doses for adults and children—calculated for the highest levels of Arochlor-1260 found in the fill—to doses of Arochlor-1260 known to cause illness. Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest measured concentration of Arochlor-1260 would not likely cause non-cancer illness (ATSDR 2000b).

Florida DOH found that accidentally ingesting contaminated soil or inhaling contaminated dust with the highest concentration of Arochlor-1260 would not likely result in an apparent increased cancer risk. The dose Florida DOH calculated for daily, long-term exposure to the highest measured level of Arochlor-1260 is about 11,000 times less than the lowest Cancer Effect Level (a daily dose) found in long-term rat studies (ATSDR 2000b).

To minimize exposure to soil contaminants, ATSDR often has recommended residents not garden in soils having PCBs greater than 10 parts per million (ppm—the same as milligrams per kilogram). In soils having between 1 and 10 ppm PCBs, ATSDR has recommended that residents use good gardening practices (see below), ((John Wheeler, ATSDR Environmental Health Scientist, personal communication, 2002, for an example see Appendix A).

In the Mill View western fill area *DEP did not find any surface soil with PCBs measuring more than 10 ppm*. The two samples with PCBs between 1 and 10 ppm were measured in fill samples deeper than 2 feet below the land surface. For soils with less than 1 ppm PCBs, ATSDR recommends *no special* gardening practices but notes that good gardening practices are still recommended.

#### **Good Gardening Practices:**

- ✓ Add clean compost or soil to your garden.
- ✓ Be sure phosphate and pH levels do not fall below recommended values. Your county extension office can help evaluate your soil.
- ✓ Avoid dust. You can do this by using mulches and not gardening in dry soil on windy days.
- ✓ Don't eat and drink while in the garden.
- ✓ Limit intake of homegrown root crops, especially carrots. Root crops, in addition to dirt adhering to them, could take up PCBs under certain conditions. Crops that form above the ground are much less likely to contain PCBs. A layer of cells in the roots stop PCBs from being transported into the rest of the plant. Residents can avoid any chemicals in the fill by growing root vegetables in raised beds containing only clean topsoil (not paper mill waste fill).
- ✓ Wash leafy vegetables that grow close to the ground (such as lettuce) because contaminated soil can adhere to the large surface areas of such plants. Adding a little vinegar to the wash water will help remove dirt and contamination.

When coming in the house from working in the garden:

- ✓ Remove shoes before entering the house.
- ✓ Wash your hands.
- ✓ Wash dirty clothing.

Since Florida DOH cannot rule out PCBs in surface soil at levels that should be avoided in gardening exposures, we recommend residents follow these practices as prudent public health policy. Use of good gardening practices will reduce the chances of coming into contact with contaminated soil while still allowing individuals the enjoyment and convenience of homegrown fruits and vegetables.

### **Surface Water and Groundwater**

No one in the Mill View Subdivision West or East is using either surface water or groundwater as drinking water. These subdivisions are supplied with municipal water from city wells.

Florida DEP found relatively little groundwater contamination. The surface water and many groundwater samples, however, contained iron, a naturally occurring metal. Iron can give water a strong taste and a rusty color. One irrigation well contained lead above the drinking water standard. The lead in water from this well, however, could be from leaded solder in plumbing rather than in groundwater. Lead in water from this irrigation well is unlikely to accumulate to levels in plants that would cause illness if the plants were eaten.

Three monitoring wells contained sodium at levels greater than the drinking water standard. Sodium hydroxide was used in the chemical wood-pulping process at the mill and could be responsible for the basic (high) pH levels found in some wells. Florida DEP found very low levels of dioxins and furans in one groundwater sample. The laboratory blank, however, also contained dioxins and furans, indicating laboratory contamination. Regardless of the source of dioxins and furans, residents in the Mill View Subdivision West or East are not using either surface water or groundwater as drinking water.

### **Children's Health Considerations**

ATSDR and Florida DOH recognize that in communities faced with the contamination of their environment, the unique vulnerabilities of infants and children demand special attention. Children are at a greater risk than are adults for certain kinds of exposure to hazardous substances emitted from waste sites. Because they play outdoors and because they often carry food into contaminated areas, children are more likely to be exposed to contaminants in the environment. Most children are shorter than adults. This means they breathe dust, soil, and heavy vapors closer to the ground. They are also smaller in stature than adults, resulting in higher doses of chemical exposure per body weight. And if toxic exposures occur during critical growth stages, the developing body systems of children can sustain permanent damage. Probably most important, however, is that children depend on adults for risk identification and risk management, housing, and access to medical care. Thus adults should be aware of public health risks in their community so they can guide their children accordingly.

In recognition of these concerns, ATSDR has developed screening values for the chemicals calculated specifically for children's exposures. The concentrations of chemicals measured in the soil in the Mill View Subdivision are unlikely to cause illness in children (ATSDR 2000c).

## Conclusions

Florida DOH is unable to evaluate the possible health effects for workers and community members from airborne and/or work exposures from Port St. Joe industrial facilities (St. Joe Paper Mill, Arizona Chemical Company, Apalachicola Northern Railroad and possibly others) because we are unaware of any worker exposure or air quality data. Indirect exposures to family members may also have occurred if workers brought chemicals home on their clothes.

Florida DOH found subsidence in both the eastern and western Mill View subdivision fill areas could indirectly affect the health and quality of life of community members. Subsidence has caused structural damage to homes and affects water, sewer, and gas lines. Cracking outside walls and roofs could also allow inside access to water, insects, birds, and rodents, all of which can be disease vectors. Although subsidence is occurring in both areas, elevated chemicals were only measured in the western fill material. To avoid confusion, our conclusions (other than subsidence) for the western and eastern fill areas are listed separately in the following paragraphs.

### Western Fill Area

The western fill area along Battle Street in the Mill View subdivision is categorized as an “Indeterminate Public Health Hazard” because DOH cannot rule out PCBs in surface soil at levels that should be avoided in gardening exposures. No surface soil samples showed PCBs at levels of concern for health, but two soil samples from below 2 feet deep had PCBs at levels for which ATSDR generally recommends good gardening practices. Adding clean topsoil would help form a barrier against the fill and would reduce potential fill-chemical exposures in dust, soil, or garden vegetables—as would good gardening practices.

While shallow groundwater in the western fill area contains lead and sodium above Florida drinking water standards, no one in the western part of the Mill View Subdivision is using surface water or groundwater as a source of drinking water. No risk of illness is expected from exposure to this groundwater if it is used to water grass or edible plants. The entire Mill View subdivision is supplied with municipal water from city wells for drinking and other uses.

### Eastern Fill Area

The Bay Street fill area is categorized as a “No Public Health Hazard” because fill analytical results did not show chemicals at levels of health concern. Because elevated chemicals levels were not measured in the soil, no shallow groundwater was analyzed in the eastern fill area.

## Recommendations

Florida DOH recommends residents in subsiding houses use flexible connections for gas, water and sewer service. Residents are encouraged to have the appropriate authorities ensure gas, water, and sewage infrastructure meet all safety standards. Florida DOH recommends residents

ensure that repairs are made to cracked roofs and walls to prevent water damage and limit access to insects, birds and rodents.

Specific recommendations for the western fill area include:

- 1) Florida DOH recommends residents use the Good Gardening practices outlined in the previous **Discussion** section.
- 2) Florida DOH recommends residents not use shallow ground water for drinking because the sodium levels are above the Florida drinking water standards.

### **Public Health Action Plan**

- 1 Florida DOH will evaluate the additional information on chemicals in soil and groundwater collected by the EPA and its contractor in late 2002 and early 2003.
2. DOH will continue to assist the Gulf County Health Department and the Millville/Mill View community by reviewing new environmental data.



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Florida Department of Environmental Protection. 2002a. Development of soil target cleanup levels for chapter 62-777, F.A.C. Tallahassee, Florida.

Susten A. 2000. June 28 e-mail regarding toxicity of PAHs.

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**Table 2. Completed Exposure Pathways**

PATHWAY NAME	EXPOSURE PATHWAY ELEMENTS					TIME
	SOURCE	ENVIRONMENTAL MEDIA	POINT OF EXPOSURE	ROUTE OF EXPOSURE	EXPOSED POPULATION	
Surface soil (0-12 inches deep)	Buried paper mill waste: ash, "lime grits", and slag.	Soil	Residential soils in Mill View subdivision	Ingestion	Some residents of the Mill View subdivision.	1950s to present
Dust inhalation	Contaminated surface soil	Dust	Air in Mill View subdivision	Inhalation	Some residents of the Mill View subdivision	1950s to present
Irrigation water/home grown vegetables	Buried paper mill waste: ash, "lime grits," and slag.	Groundwater/ home-grown vegetables	Irrigation wells/ home-grown vegetables in Mill View subdivision	Ingestion	Some residents of the Mill View subdivision	1950s to present

**Table 3. Calculated Dose for Residential Exposure to Soil**

Contaminant of Concern	Maximum Soil Concentration (mg/kg)	Oral MRL Guideline (mg/kg/day)	Estimated Soil Ingestion Dose (mg/kg/day)		Inhalation MRL Guideline TWA (mg/ m <sup>3</sup> )	Estimated Dust Inhalation Dose (mg/m <sup>3</sup> )	
			Child	Adult		Child	Adult
Arsenic	7.4	0.0003 (chronic)	0.0001	0.00001	0.01	0.0000004	0.0000004
Polycyclic Hydrocarbons (PAHs)	3.5	None	0.00005	0.000005	0.2	0.0000002	0.0000002
Polychlorinated Biphenyl (PCBs) (Arochlor-1260)	6.9	0.000003 (intermediate) 0.00002 (chronic) (Arochlor-1254)	0.0009	0.000009 0.0007 (with vegetables)	0.001	0.0000004	0.0000004

Scenario Time frame: Future  
 Land Use Conditions: Residential  
 Exposure Medium- Soil and Dust  
 Exposure Point- Ingestion of Soil or Inhalation of Dust  
 Receptor Population- Residents

These doses were calculated using Risk Assistant Software (Hampshire Research Institute) and standard values for groundwater consumption, shower inhalation exposure and dermal exposure parameters (EPA 1991).

MRL - Minimum Risk Level for non-cancer illnesses  
 mg/kg/day = milligrams per kilogram per day

mg/kg = milligrams per kilogram  
 TWA = time weighted average

mg/m<sup>3</sup> = milligrams per cubic meter

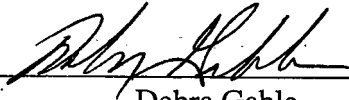
The above doses were calculated using the following values:  
 Acute = exposure is 1- 14 days  
 Intermediate = exposure is 15-364 days  
 Chronic = exposure is 365 and longer  
 ingested were contaminated at the highest level of contamination.

Adult body weight- 70 kg  
 Adult soil consumption- 100mg  
 Soil exposure is 365 events per year, 3 hours per event, 40% of the homegrown vegetable  
 Inhalation breathing rate is 0.5 cubic meters per hour.  
 Child body weight- 15 kg  
 Child water consumption- 200 kg

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## CERTIFICATION

The Florida Department of Health, Bureau of Environmental Epidemiology prepared this Public Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began.



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SPS, SSAB, DHAC  
ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.



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Roberta Erlwein  
Section Chief,  
SPS, SSAB, DHAC,  
ATSDR

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**Appendix A**

**ATSDR's Gardening in Anniston Brochure**

# ATSDR

AGENCY FOR TOXIC SUBSTANCES  
AND DISEASE REGISTRY

**For more information,  
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**ATSDR's Internet address is <http://www.atsdr.cdc.gov>**

1-0673.p65

## Gardening in Anniston



**Safe Gardening and Preparation Tips**

**for**

**Fruits and Vegetables**

**Grown in Your Garden**

**ATSDR**

## Growing and Enjoying Garden Vegetables

Eating fruits and vegetables is important for a healthy diet, and many people enjoy growing and eating their own fresh produce. As you may know, lead and polychlorinated biphenyl (PCB) contamination has been found in the soil in some areas of Anniston. Activities such as gardening might increase your potential exposure to these contaminants because PCBs and lead can be present in the soil and in dust on the outside of plants.

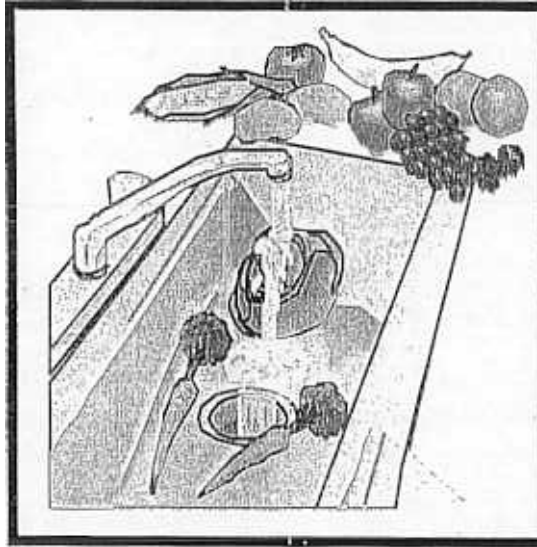
But this doesn't mean you have to give up those homegrown tomatoes and other good foods. By taking a few simple precautions, you can reduce your chances of being exposed to contaminated soil.

### Preparing Your Garden

- Adding material such as compost or topsoil from outside sources such as commercial gardening centers will enrich your soil and help reduce the amount of contaminants that can be taken up by plants.

### Working in the Garden

- Do not eat or drink while working in your garden because contaminated soil and dust might get on your food and you could accidentally swallow it.
- Avoid working in the garden on windy days, when dust can be stirred up and get in your nose or mouth.
- Be sure to wash your hands and work clothes to remove dust and dirt after gardening, and take off your shoes at the door to avoid tracking soil into your home.



## Preparing Fruits and Vegetables

- Clean your hands, cutting boards, and kitchen tools with hot, soapy water and rinse well before and after handling produce.
- Run cool or slightly warm tap water over all produce several times to clean it. This is a good idea whether it is homegrown or comes from a market. Do not wash it with soap because some produce absorbs soap ingredients.
- Before cooking, soak greens in cool water overnight and then rinse thoroughly until the water runs clear. This is especially important for produce that grows low to the ground, such as collard greens, spinach, and lettuce.
- Scrub firm fruits and root-grown vegetables with a clean brush to remove dust and dirt before peeling or eating. These include carrots, turnips, potatoes, rutabagas, radishes, onions, and apples, just to mention a few.
- Wash berry fruits (strawberries, blackberries, etc.) and remove the "caps" (the tops of the berries where the stem and leaves attach).
- Remove outer leaves of leafy crops and thoroughly wash the remaining produce in water containing vinegar (1 percent).

### Buy Some, Grow Some!

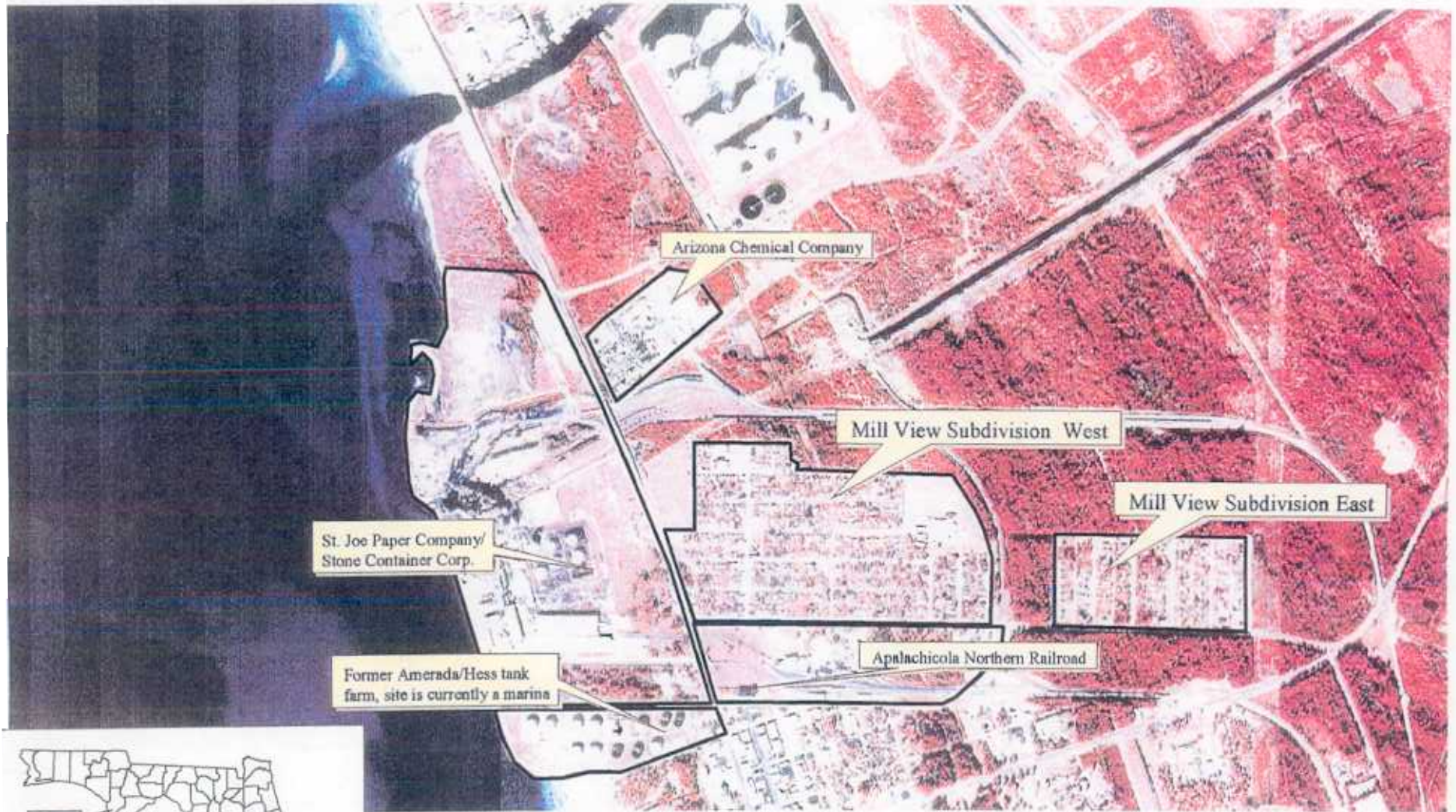
- Eat some fruits and vegetables from your garden and some from the farmers' market or grocery store. Eating a mix of homegrown and commercial products can help reduce your potential for exposure.



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**Appendix B**  
**Figures and Photographs**

Figure 1, Mill View Subdivision and Surrounding Industrial Sites



Florida Department of Health  
Bureau of Environmental Epidemiology

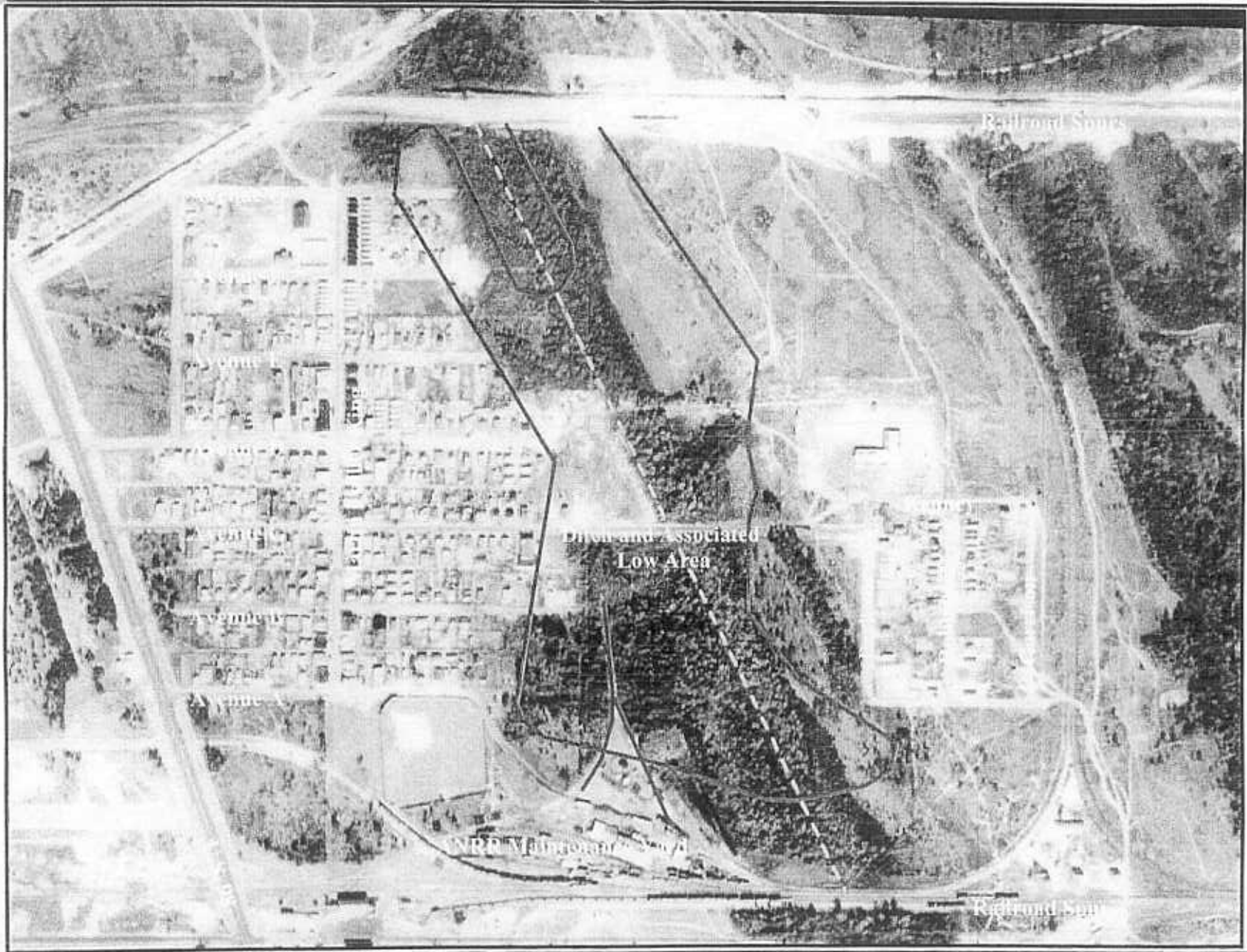


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This product is for reference purposes only and is not to be construed as a legal document. Any reliance on the information contained herein is at the user's own risk. The Florida Department of Health and its agents assume no responsibility for any use of the information contained herein or any loss resulting therefrom.







**Figure 2: Mill View 1953 Site View  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**

- Former railroad spur location
- Approximate extent of fill sock
- Current and previous ditch location

0 500 Feet





**Figure 3: Mill View #2 Soil Sample Locations**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

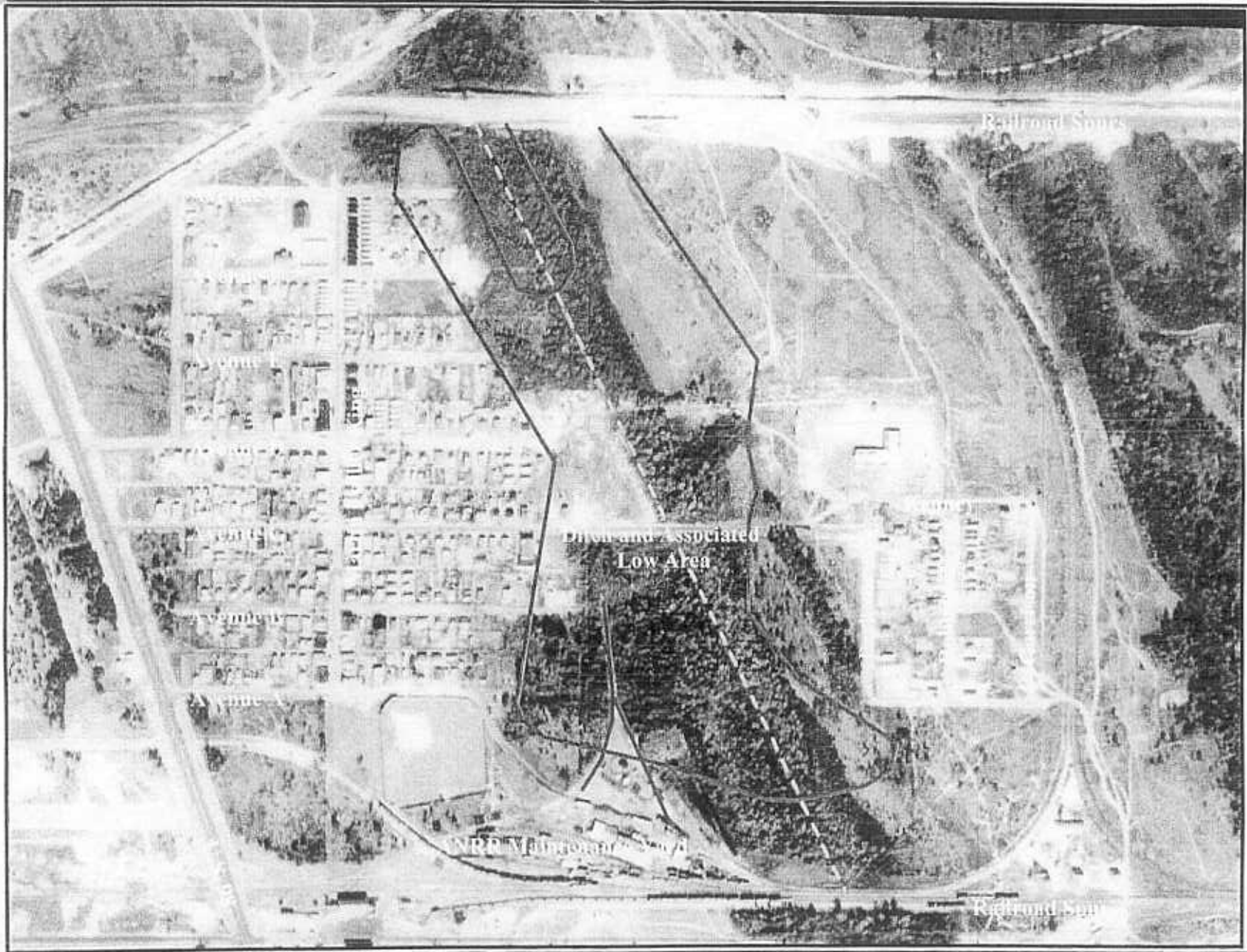
- SIS Soil Sample Location
- - - Former railroad spur location
- Approximate extent of fill sock
- Current and previous ditch location

0 500 Feet

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**Figure 2: Mill View 1953 Site View  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**

- Former railroad spur location
- Approximate extent of fill sock
- Current and previous ditch location

0 500 Feet





**Figure 3: Mill View #2 Soil Sample Locations**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

- SIS Soil Sample Location
- Former railroad spur location
- - - Approximate extent of fill sock
- - - Current and previous ditch location

0 500 Feet

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Photograph 7: Ash/Slag in SIS Core Sample  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida



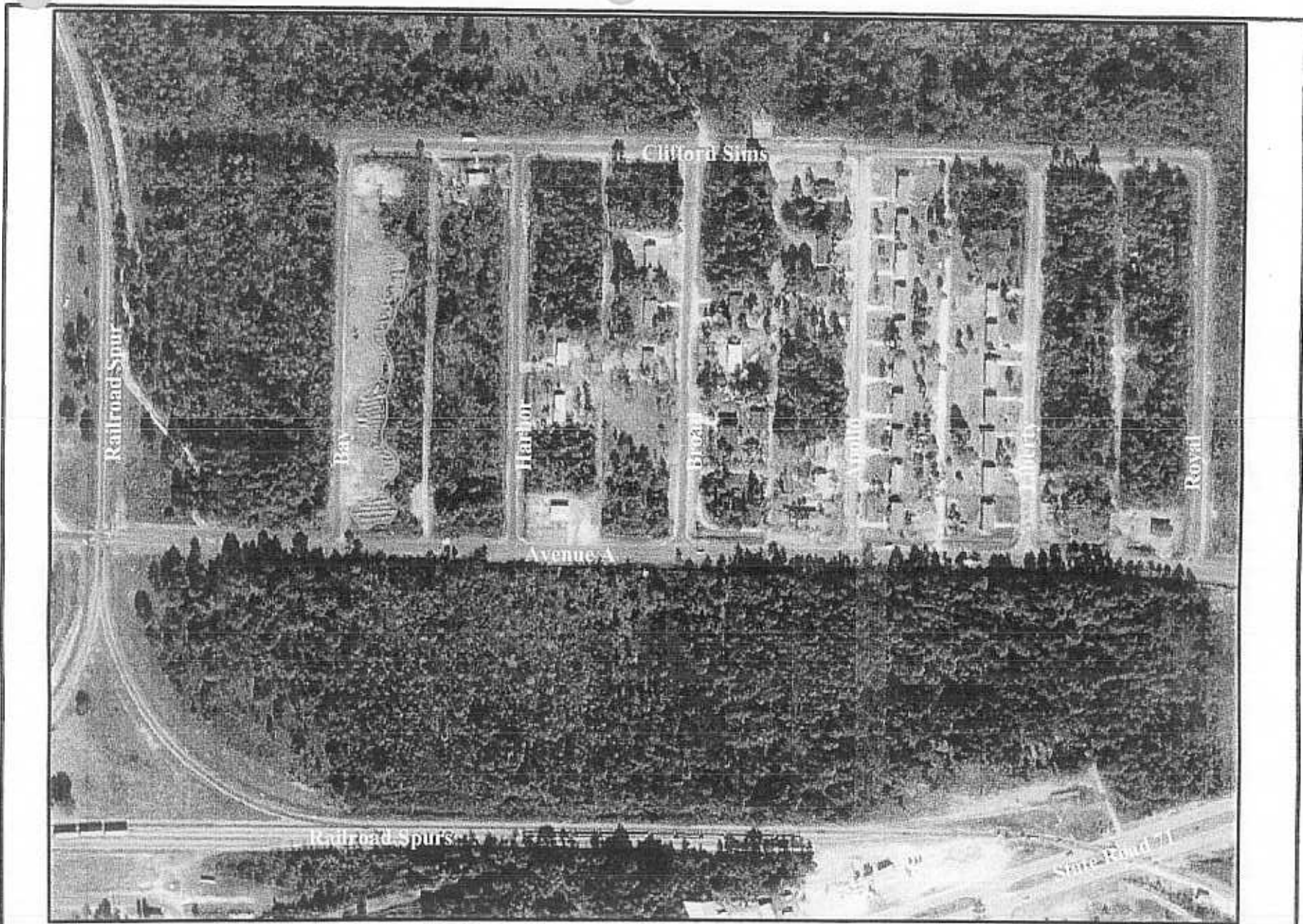




Photograph 7: Ash/Slag in SIS Core Sample  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida







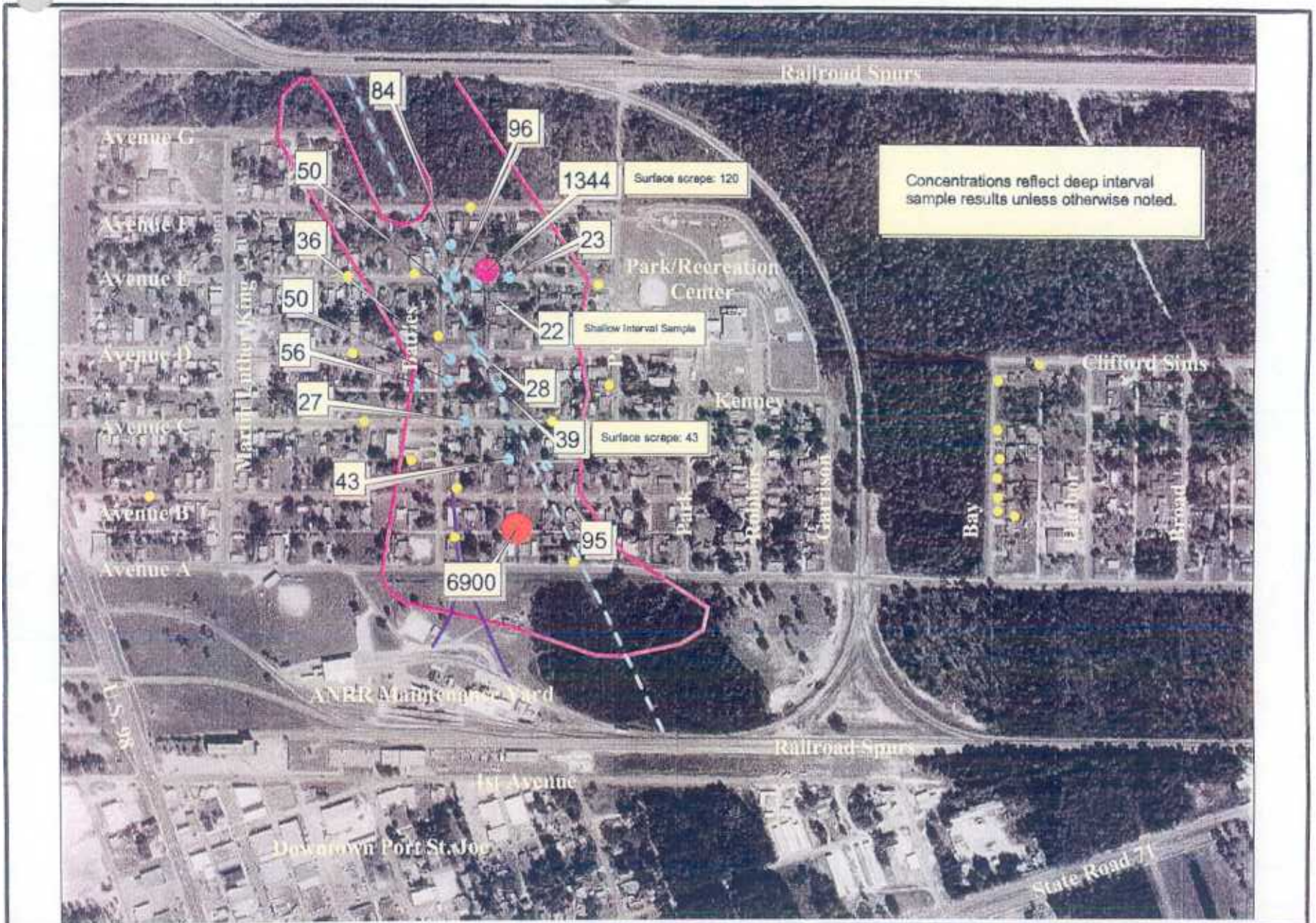
**Figure 4: Mill View #3 1983 Site View**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

— Extent of dumped mill waste  
 shown in 1983 aerial photograph

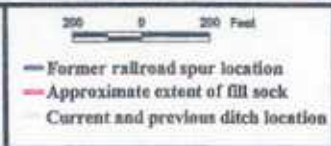
200 0 200 Feet







**Figure 5 : PCBs in Soil Samples  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







**Figure 6: Mill View #2 Monitor Well Locations**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

- SIS surface water sample location
- SIS monitor well location
- Former railroad spur location
- - - Approximate extent of fill sock
- Current and previous ditch location



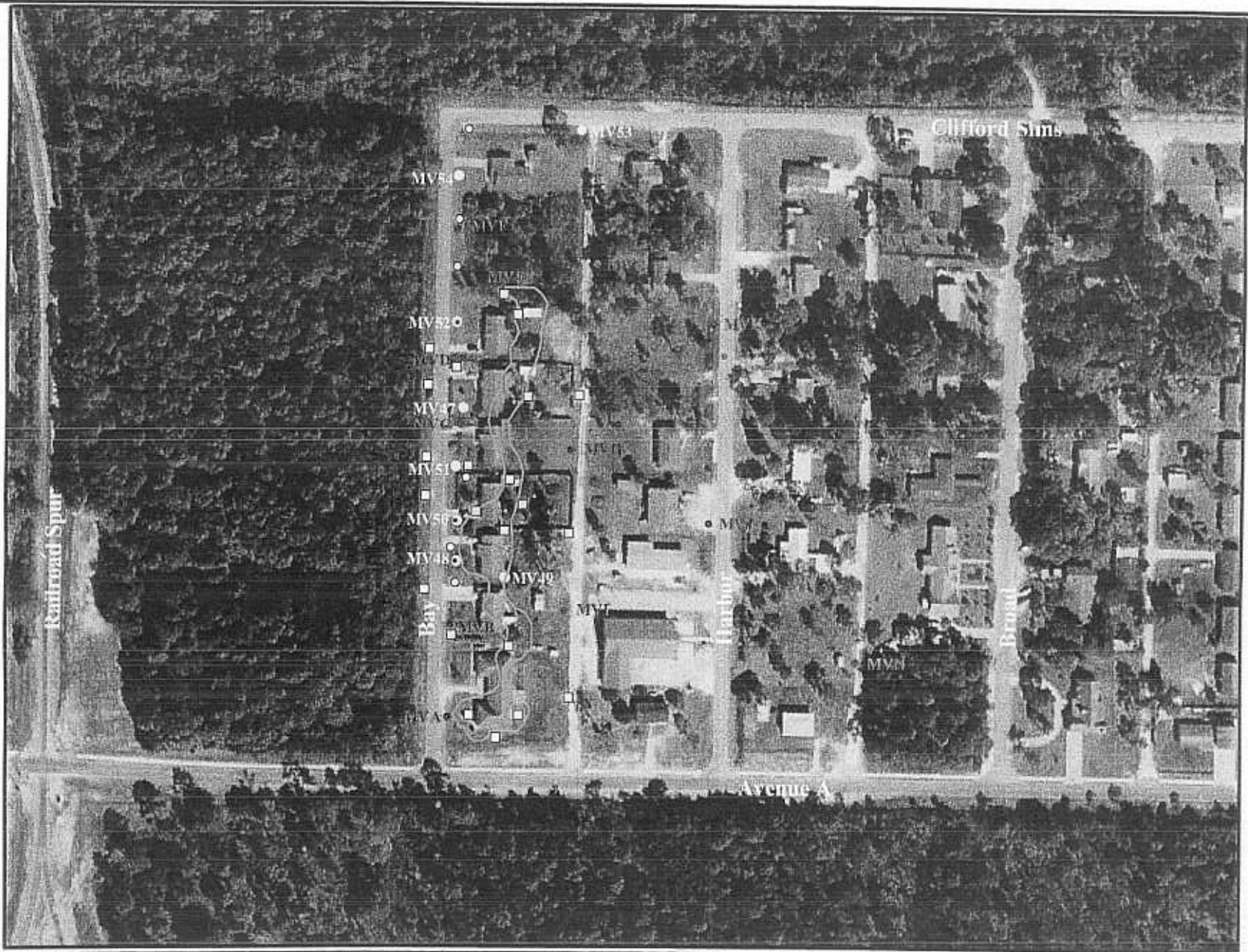


**Figure 7: Mill View #2 Irrigation Well Locations**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

- Irrigation well location
- Former railroad spur location
- - - Approximate extent of fill sock
- Current and previous ditch location







**Figure 8: Mill View #3 Soil Sample Locations**  
**Mill View Subdivision Study Site**  
**Port St. Joe, Gulf County, Florida**

- Wood chips and sand
- Sand fill
- Native soils
- Lime grits
- Conductivity log
- SIS Soil Sample Location (lime grits)
- Extent of dumped mill waste shown in 1983 aerial photograph



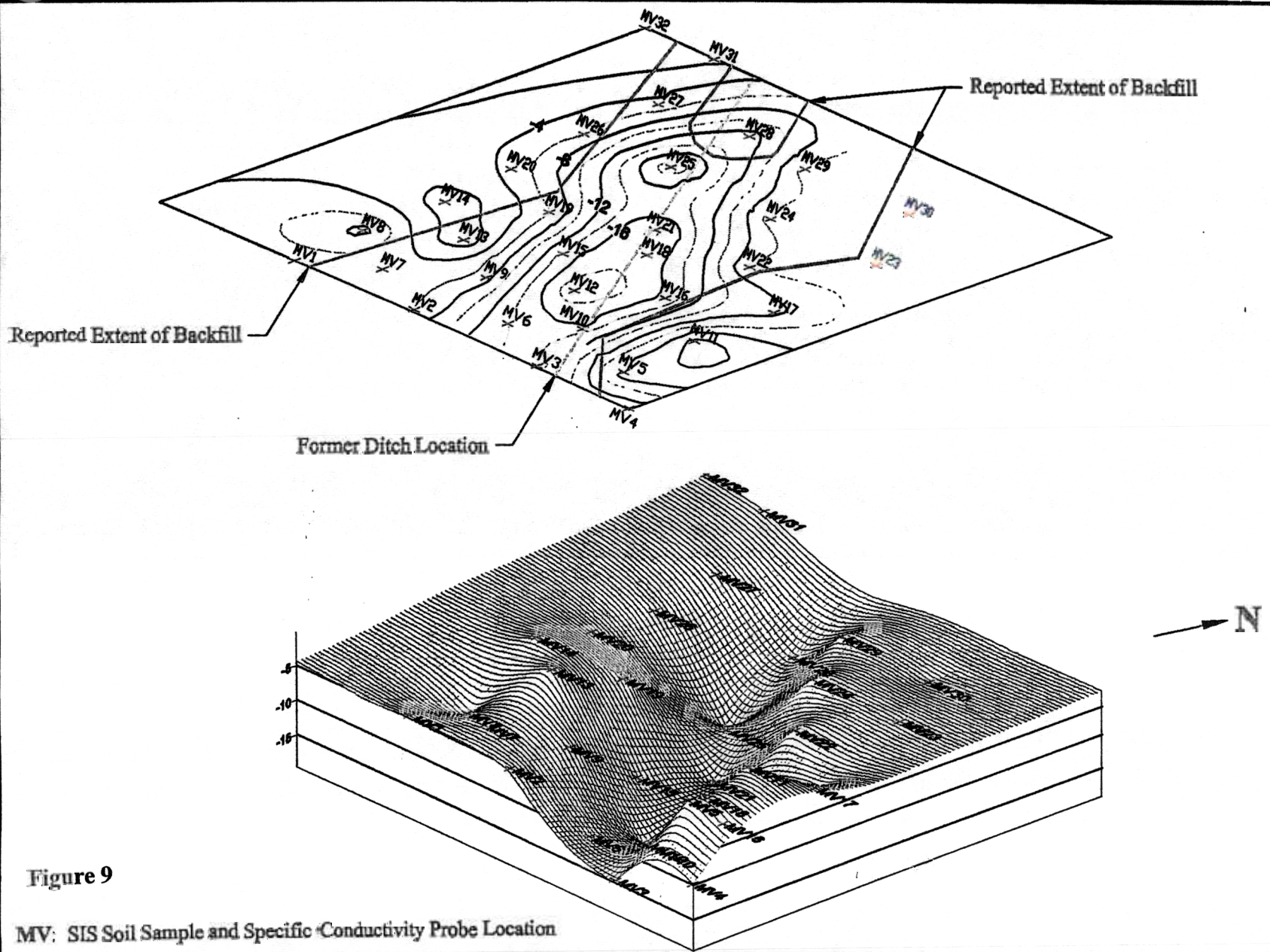


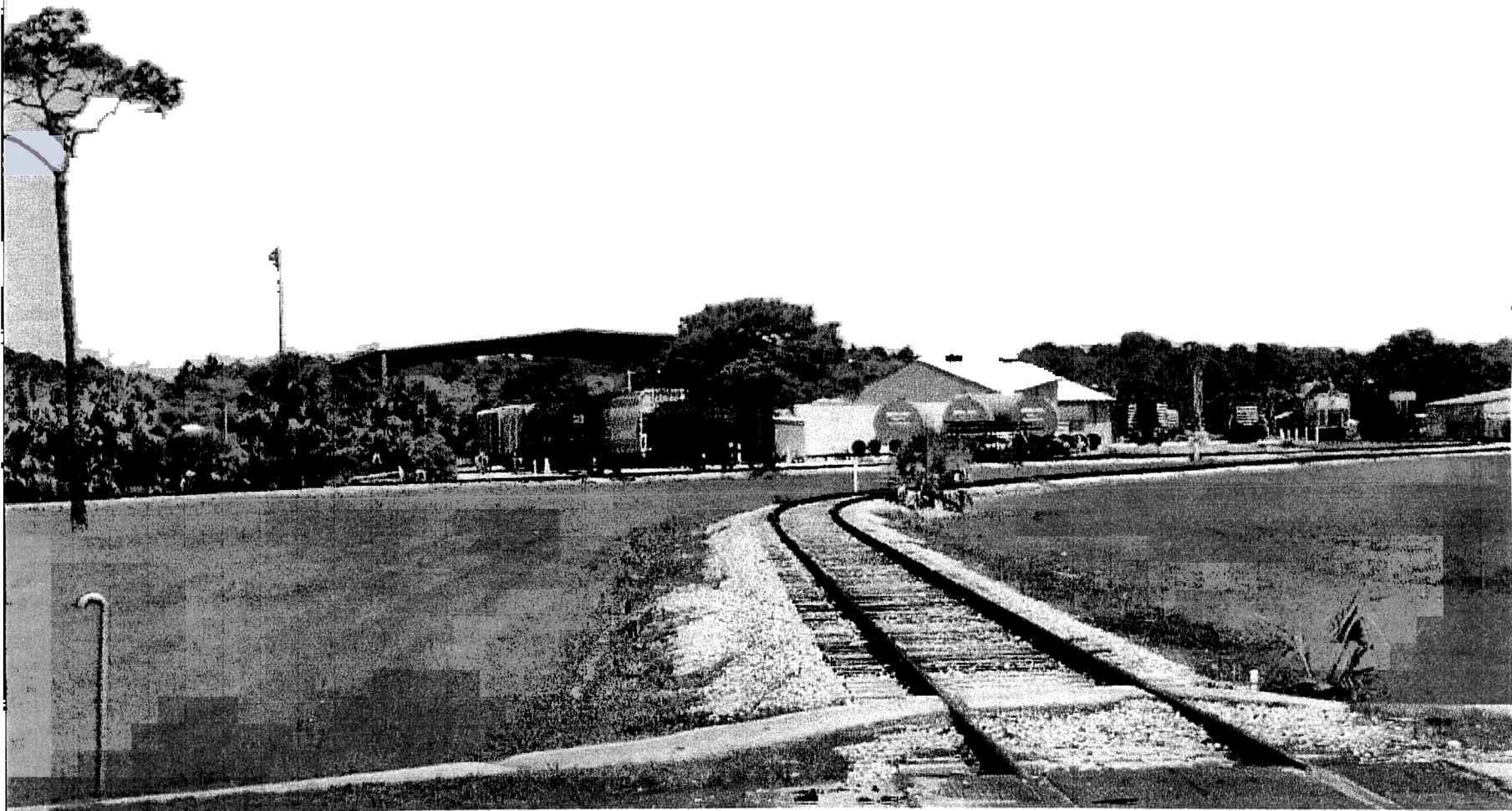
Figure 9

MV: SIS Soil Sample and Specific Conductivity Probe Location

Extent of Backfill in Mill View #2 Based on Direct Push Rate of Penetration  
 Basal Extent Based on 10 Feet/Minute Rate of Penetration Rate  
 Mill View Subdivision, Port St. Joe, Gulf County, Florida







**Photograph 1: ANRR Maintenance Yard  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**





**Photograph 2: Closed St. Joe Paper Mill  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







**Photograph 3: Lime Grits as Road Base  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







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**Photograph 4: Ditch Located North of Avenue F  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







**Photograph 5: Typical Mill View Neighborhood Streets and Alleys  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







**Photograph 6: Decomposing Wood Chips  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







Photograph 7: Ash/Slag in SIS Core Sample  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida







**Photograph 8: Lime Grits in Blue/Green Clayey Matrix**  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida



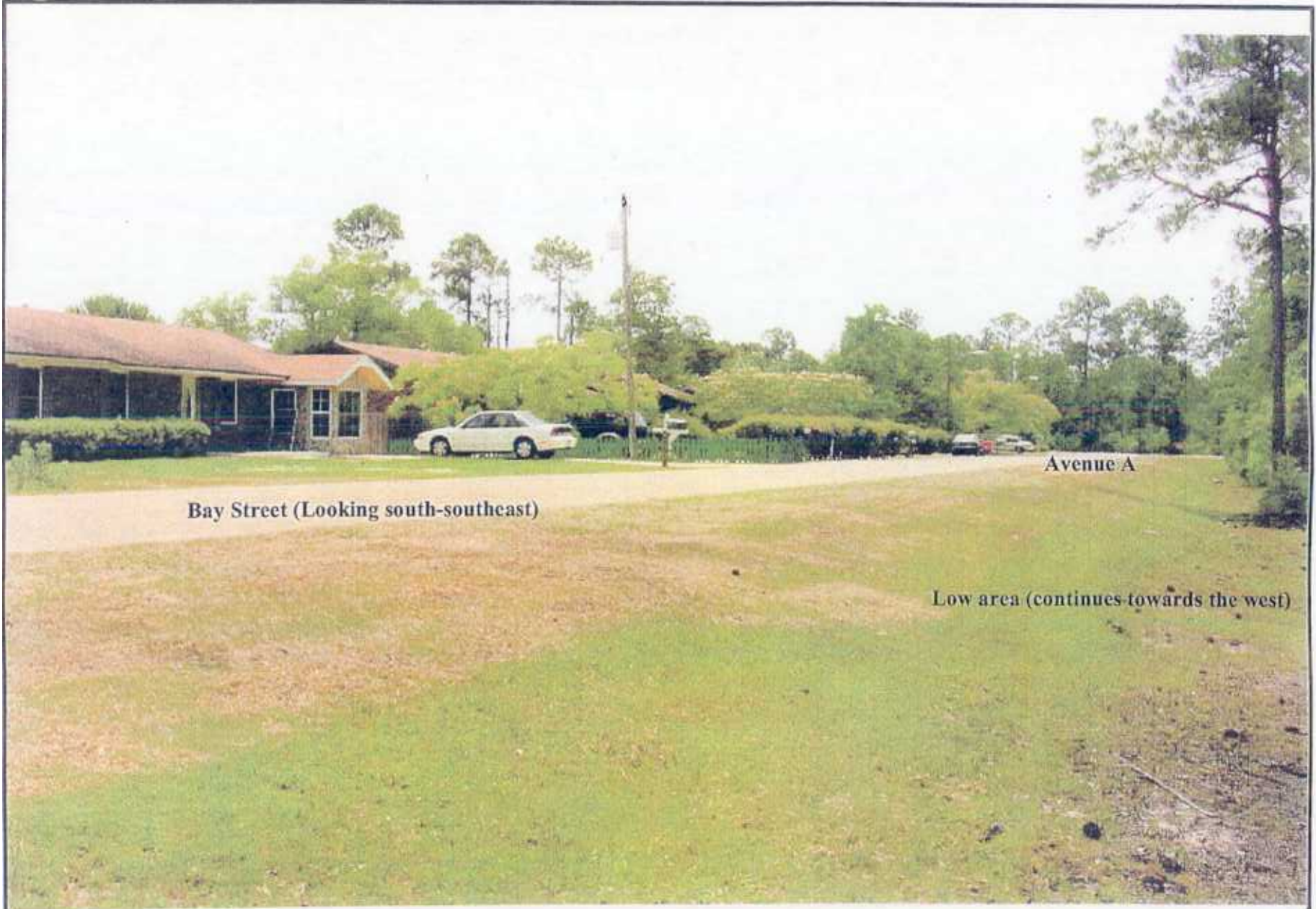




**Photograph 9: Mill View Neighborhood Private Irrigation Wells  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida**







Bay Street (Looking south-southeast)

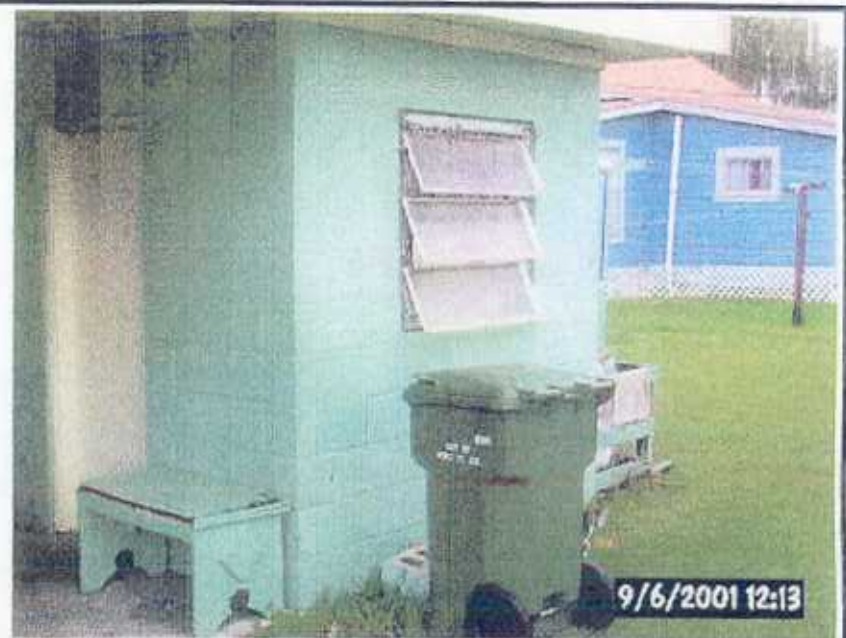
Avenue A

Low area (continues towards the west)

**Photograph 10: Mill View #3 Surface Topography**  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida







**Photograph 11: Mill View Neighborhood Homes With Visible Cracks**  
Mill View Subdivision Study Site  
Port St. Joe, Gulf County, Florida







**Photograph 12: Mill View neighborhood, sidewalk was replaced due to cracking. This is what the fill looks like without vegetation covering it.**

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## Appendix C

### Glossary

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## ATSDR Glossary of Environmental Health Terms

The Agency for Toxic Substances and Disease Registry (ATSDR) is a federal public health agency with headquarters in Atlanta, Georgia, and 10 regional offices in the United States. ATSDR's mission is to serve the public by using the best science, taking responsive public health actions, and providing trusted health information to prevent harmful exposures and diseases related to toxic substances. ATSDR is not a regulatory agency, unlike the U.S. Environmental Protection Agency (EPA), which is the federal agency that develops and enforces environmental laws to protect the environment and human health.

This glossary defines words used by ATSDR in communications with the public. It is not a complete dictionary of environmental health terms. If you have questions or comments, call ATSDR's toll-free telephone number, 1-888-42-ATSDR (1-888-422-8737).

**Absorption** - The process of taking in. For a person or animal, absorption is the process of a substance getting into the body through the eyes, skin, stomach, intestines, or lungs.

**Acute** - Occurring over a short time [compare with **chronic**].

**Acute exposure** - Contact with a substance that occurs once or for only a short time (up to 14 days) [compare with **intermediate duration exposure** and **chronic exposure**].

**Additive effect**- A biologic response to exposure to multiple substances that equals the sum of responses of all the individual substances added together [compare with **antagonistic effect** and **synergistic effect**].

**Adverse health effect** - A change in body function or cell structure that might lead to disease or health problems.

**Aerobic**-. Requiring oxygen [compare with **anaerobic**].

**Ambient**-. Surrounding (for example, *ambient* air).

**Anaerobic**-. Requiring the absence of oxygen [compare with **aerobic**].

**Analyte** - A substance measured in the laboratory. A chemical for which a sample (such as water, air, or blood) is tested in a laboratory. For example, if the analyte is mercury, the laboratory test will determine the amount of mercury in the sample.

**Analytic epidemiologic study** - A study that evaluates the association between exposure to hazardous substances and disease by testing scientific hypotheses.

**Antagonistic effect** - A biologic response to exposure to multiple substances that is less than would be expected if the known effects of the individual substances were added together [compare with **additive effect** and **synergistic effect**].

**Background level** - An average or expected amount of a substance or radioactive material in a specific environment, or typical amounts of substances that occur naturally in an environment.

**Biodegradation** - Decomposition or breakdown of a substance through the action of microorganisms (such as bacteria or fungi) or other natural physical processes (such as sunlight).

**Biologic indicators of exposure study** - A study that uses (a) **biomedical testing** or (b) the measurement of a substance [an **analyte**], its **metabolite**, or another marker of exposure in human body fluids or tissues to confirm human exposure to a hazardous substance [also see **exposure investigation**].

**Biologic monitoring** - Measuring hazardous substances in biologic materials (such as blood, hair, urine, or breath)

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to determine whether exposure has occurred. A blood test for lead is an example of biologic monitoring.

**Biologic uptake** - The transfer of substances from the environment to plants, animals, and humans.

**Biomedical testing** - Testing of persons to find out whether a change in a body function might have occurred because of exposure to a hazardous substance.

**Biota** - Plants and animals in an environment. Some of these plants and animals might be sources of food, clothing, or medicines for people.

**Body burden** - The total amount of a substance in the body. Some substances build up in the body because they are stored in fat or bone or because they leave the body very slowly.

**CAP** - See **Community Assistance Panel**.

**Cancer** - Any one of a group of diseases that occurs when cells in the body become abnormal and grow or multiply out of control.

**Cancer risk** - A theoretical risk of for getting cancer if exposed to a substance every day for 70 years (a lifetime exposure). The true risk might be lower.

**Carcinogen** - A substance that causes cancer.

**Case study** - A medical or epidemiologic evaluation of one person or a small group of people to gather information about specific health conditions and past exposures.

**Case-control study** - A study that compares exposures of people who have a disease or condition (cases) with people who do not have the disease or condition (controls). Exposures that are more common among the cases may be considered as possible risk factors for the disease.

**CAS registry number** - A unique number assigned to a substance or mixture by the American Chemical Society Abstracts Service.

**Central nervous system** - The part of the nervous system that consists of the brain and the spinal cord.

**CERCLA** [see **Comprehensive Environmental Response, Compensation, and Liability Act of 1980**]

**Chronic** - Occurring over a long time (more than 1 year) [compare with **acute**].

**Chronic exposure** - Contact with a substance that occurs over a long time (more than 1 year) [compare with **acute exposure** and **intermediate duration exposure**].

**Cluster investigation** - A review of an unusual number, real or perceived, of health events (for example, reports of cancer) grouped together in time and location. Cluster investigations are designed to confirm case reports; determine whether they represent an unusual disease occurrence; and, if possible, explore possible causes and contributing environmental factors.

**Community Assistance Panel (CAP)** - A group of people, from a community and from health and environmental agencies, who work with ATSDR to resolve issues and problems related to hazardous substances in the community. CAP members work with ATSDR to gather and review community health concerns, provide information on how people might have been or might now be exposed to hazardous substances, and inform ATSDR on ways to involve the community in its activities.

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**Comparison value (CV)** - Calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful (adverse) health effects in exposed people. The CV is used as a screening level during the public health assessment process. Substances found in amounts greater than their CVs might be selected for further evaluation in the public health assessment process.

**Completed exposure pathway** [see exposure pathway].

**Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)** - CERCLA, also known as **Superfund**, is the federal law that concerns the removal or cleanup of hazardous substances in the environment and at hazardous waste sites. ATSDR, which was created by CERCLA, is responsible for assessing health issues and supporting public health activities related to hazardous waste sites or other environmental releases of hazardous substances.

**Concentration** - The amount of a substance present in a certain amount of soil, water, air, food, blood, hair, urine, breath, or any other media.

**Contaminant** - A substance that is either present in an environment where it does not belong or is present at levels that might cause harmful (adverse) health effects.

**Delayed health effect** - A disease or injury that happens as a result of exposures that might have occurred in the past.

**Dermal** - Referring to the skin. For example, dermal absorption means passing through the skin.

**Dermal contact** - Contact with (touching) the skin [see route of exposure].

**Descriptive epidemiology** - The study of the amount and distribution of a disease in a specified population by person, place, and time.

**Detection limit** - The lowest concentration of a chemical that can reliably be distinguished from a zero concentration.

**Disease prevention** - Measures used to prevent a disease or reduce its severity

**Disease registry** - A system of ongoing registration of all cases of a particular disease or health condition in a defined population.

**DOD** - United States Department of Defense.

**DOE** - United States Department of Energy.

**Dose (for chemicals that are not radioactive)** - The amount of a substance to which a person is exposed over some time period. Dose is a measurement of exposure. Dose is often expressed as milligram (amount) per kilogram (a measure of body weight) per day (a measure of time) when people eat or drink contaminated water, food, or soil. In general, the greater the dose, the greater the likelihood of an effect. An "exposure dose" is how much of a substance is encountered in the environment. An "absorbed dose" is the amount of a substance that actually got into the body through the eyes, skin, stomach, intestines, or lungs.

**Dose (for radioactive chemicals)** - The radiation dose is the amount of energy from radiation that is actually absorbed by the body. This is not the same as measurements of the amount of radiation in the environment.

**Dose-response relationship** - The relationship between the amount of exposure [dose] to a substance and the resulting changes in body function or health (response).

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**Environmental media** - Soil; water, air, biota (plants and animals), or any other parts of the environment that can contain contaminants.

**Environmental media and transport mechanism** - Environmental media include water, air, soil, and biota (plants and animals). Transport mechanisms move contaminants from the source to points where human exposure can occur. The **environmental media and transport mechanism** is the second part of an **exposure pathway**.

**EPA** - United States Environmental Protection Agency.

**Epidemiologic surveillance** - The ongoing, systematic collection, analysis, and interpretation of health data. This activity also involves timely dissemination of the data and use for public health programs.

**Epidemiology** - The study of the distribution and determinants of disease or health status in a population; the study of the occurrence and causes of health effects in humans.

**Exposure** - Contact with a substance by swallowing, breathing, or touching the skin or eyes. Exposure may be short-term [**acute exposure**], of intermediate duration, or long-term [**chronic exposure**].

**Exposure assessment** - The process of finding out how people come into contact with a hazardous substance, how often and for how long they are in contact with the substance, and how much of the substance they are in contact with.

**Exposure-dose reconstruction** - A method of estimating the amount of people's past exposure to hazardous substances. Computer and approximation methods are used when past information is limited, not available, or missing.

**Exposure investigation** - The collection and analysis of site-specific information and biologic tests (when appropriate) to determine whether people have been exposed to hazardous substances.

**Exposure pathway** - The route a substance takes from its source (where it began) to its end point (where it ends), and how people can come into contact with (or get exposed to) it. An exposure pathway has five parts: a **source of contamination** (such as an abandoned business); an **environmental media and transport mechanism** (such as movement through groundwater); a **point of exposure** (such as a private well); a **route of exposure** (eating, drinking, breathing, or touching), and a **receptor population** (people potentially or actually exposed). When all five parts are present, the exposure pathway is termed a **completed exposure pathway**.

**Exposure registry** - A system of ongoing follow up of people who have had documented environmental exposures

**Feasibility study** - A study by EPA to determine the best way to clean up environmental contamination. A number of factors are considered, including health risk, costs, and what methods will work well.

**Geographic information system (GIS)** - A mapping system that uses computers to collect, store, manipulate, analyze, and display data. For example, GIS can show the concentration of a contaminant within a community in relation to points of reference such as streets and homes.

**Grand rounds** - Training sessions for physicians and other health care providers about health topics

**Groundwater** - Water beneath the earth's surface in the spaces between soil particles and between rock surfaces [compare with **surface water**].

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**Half-life ( $t_{1/2}$ )** - The time it takes for half the original amount of a substance to disappear. In the environment, the half-life is the time it takes for half the original amount of a substance to disappear when it is changed to another chemical by bacteria, fungi, sunlight, or other chemical processes. In the human body, the half-life is the time it takes for half the original amount of the substance to disappear, either by being changed to another substance or by leaving the body. In the case of radioactive material, the half life is the amount of time necessary for one half the initial number of radioactive atoms to change or transform into another atom (that is normally not radioactive). After two half lives, 25% of the original number of radioactive atoms remain.

**Hazard** - A source of potential harm from past, current, or future exposures.

**Hazardous Substance Release and Health Effects Database (HazDat)** - The scientific and administrative database system developed by ATSDR to manage data collection, retrieval, and analysis of site-specific information on hazardous substances, community health concerns, and public health activities.

**Hazardous waste** - Potentially harmful substances that have been released or discarded into the environment.

**Health consultation** - A review of available information or collection of new data to respond to a specific health question or request for information about a potential environmental hazard. Health consultations are focused on a specific exposure issue. Health consultations are therefore more limited than a public health assessment, which reviews the exposure potential of each pathway and chemical [compare with **public health assessment**].

**Health education** - Programs designed with a community to help it know about health risks and how to reduce these risks.

**Health investigation** - The collection and evaluation of information about the health of community residents. This information is used to describe or count the occurrence of a disease, symptom, or clinical measure and to estimate the possible association between the occurrence and exposure to hazardous substances.

**Health promotion** - The process of enabling people to increase control over, and to improve, their health.

**Health statistics review** - The analysis of existing health information (i.e., from death certificates, birth defects registries, and cancer registries) to determine if there is excess disease in a specific population, geographic area, and time period. A health statistics review is a descriptive epidemiologic study.

**Indeterminate public health hazard** - The category used in ATSDR's public health assessment documents when a professional judgment about the level of health hazard cannot be made because information critical to such a decision is lacking.

**Incidence** - The number of new cases of disease in a defined population over a specific time period [contrast with **prevalence**].

**Ingestion** - The act of swallowing something through eating, drinking, or mouthing objects. A hazardous substance can enter the body this way [see **route of exposure**].

**Inhalation** - The act of breathing. A hazardous substance can enter the body this way [see **route of exposure**].

**Intermediate duration exposure** - Contact with a substance that occurs for more than 14 days and less than a year [compare with **acute exposure** and **chronic exposure**].

**In vitro** - In an artificial environment outside a living organism or body. For example, some toxicity testing is done on cell cultures or slices of tissue grown in the laboratory, rather than on a living animal [compare with **in vivo**].

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**vivo**].

**In vivo** - Within a living organism or body. For example, some toxicity testing is done on whole animals, such as rats or mice [compare with **in vitro**].

**Lowest-observed-adverse-effect level (LOAEL)** - The lowest tested dose of a substance that has been reported to cause harmful (adverse) health effects in people or animals.

**Medical monitoring** - A set of medical tests and physical exams specifically designed to evaluate whether an individual's exposure could negatively affect that person's health.

**Metabolism** - The conversion or breakdown of a substance from one form to another by a living organism.

**Metabolite** - Any product of **metabolism**.

**mg/kg** - Milligram per kilogram.

**mg/cm<sup>2</sup>** - Milligram per square centimeter (of a surface).

**mg/m<sup>3</sup>** - Milligram per cubic meter; a measure of the concentration of a chemical in a known volume (a cubic meter) of air, soil, or water.

**Migration** - Moving from one location to another.

**Minimal risk level (MRL)** - An ATSDR estimate of daily human exposure to a hazardous substance at or below which that substance is unlikely to pose a measurable risk of harmful (adverse), noncancerous effects. MRLs are calculated for a route of exposure (inhalation or oral) over a specified time period (acute, intermediate, or chronic). MRLs should not be used as predictors of harmful (adverse) health effects [see **reference dose**].

**Morbidity** - State of being ill or diseased. Morbidity is the occurrence of a disease or condition that alters health and quality of life.

**Mortality** - Death. Usually the cause (a specific disease, condition, or injury) is stated.

**Mutagen** - A substance that causes **mutations** (genetic damage).

**Mutation** - A change (damage) to the DNA, genes, or chromosomes of living organisms.

**National Priorities List for Uncontrolled Hazardous Waste Sites (National Priorities List or NPL)** - EPA's list of the most serious uncontrolled or abandoned hazardous waste sites in the United States. The NPL is updated on a regular basis.

**No apparent public health hazard** - A category used in ATSDR's public health assessments for sites where human exposure to contaminated media might be occurring, might have occurred in the past, or might occur in the future, but where the exposure is not expected to cause any harmful health effects.

**No-observed-adverse-effect level (NOAEL)** - The highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals.

**No public health hazard** - A category used in ATSDR's public health assessment documents for sites where people have never and will never come into contact with harmful amounts of site-related substances.

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**NPL** [see **National Priorities List for Uncontrolled Hazardous Waste Sites**]

**Physiologically based pharmacokinetic model (PBPK model)**

A computer model that describes what happens to a chemical in the body. This model describes how the chemical gets into the body, where it goes in the body, how the body changes it, and how it leaves the body.

**Pica** - A craving to eat nonfood items, such as dirt, paint chips, and clay. Some children exhibit pica-related behavior.

**Plume** - A volume of a substance that moves from its source to places farther away from the source. Plumes can be described by the volume of air or water they occupy and the direction they move. For example, a plume can be a column of smoke from a chimney or a substance moving with groundwater.

**Point of exposure** - The place where someone can come into contact with a substance present in the environment [see **exposure pathway**].

**Population** - A group or number of people living within a specified area or sharing similar characteristics (such as occupation or age).

**Potentially responsible party (PRP)** - A company, government, or person legally responsible for cleaning up the pollution at a hazardous waste site under Superfund. There may be more than one PRP for a particular site.

**ppb** - Parts per billion.

**ppm** - Parts per million.

**Prevalence** - The number of existing disease cases in a defined population during a specific time period [contrast with **incidence**].

**Prevalence survey** - The measure of the current level of disease(s) or symptoms and exposures through a questionnaire that collects self-reported information from a defined population.

**Prevention** - Actions that reduce exposure or other risks, keep people from getting sick, or keep disease from getting worse.

**Public comment period** - An opportunity for the public to comment on agency findings or proposed activities contained in draft reports or documents. The public comment period is a limited time period during which comments will be accepted.

**Public availability session** - An informal, drop-by meeting at which community members can meet one-on-one with ATSDR staff members to discuss health and site-related concerns.

**Public health action** - A list of steps to protect public health.

**Public health advisory** - A statement made by ATSDR to EPA or a state regulatory agency that a release of hazardous substances poses an immediate threat to human health. The advisory includes recommended measures to reduce exposure and reduce the threat to human health.

**Public health assessment (PHA)** - An ATSDR document that examines hazardous substances, health outcomes, and community concerns at a hazardous waste site to determine whether people could be harmed from coming into contact with those substances. The PHA also lists actions that need to be taken to protect public health [compare with **health consultation**].

**Public health hazard** - A category used in ATSDR's public health assessments for sites that pose a public health

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hazard because of long-term exposures (greater than 1 year) to sufficiently high levels of hazardous substances or **radionuclides** that could result in harmful health effects.

**Public health hazard categories** - Public health hazard categories are statements about whether people could be harmed by conditions present at the site in the past, present, or future. One or more hazard categories might be appropriate for each site. The five public health hazard categories are **no public health hazard, no apparent public health hazard, indeterminate public health hazard, public health hazard, and urgent public health hazard**.

**Public health statement** - The first chapter of an ATSDR **toxicological profile**. The public health statement is a summary written in words that are easy to understand. The public health statement explains how people might be exposed to a specific substance and describes the known health effects of that substance.

**Public meeting** - A public forum with community members for communication about a site.

**Radioisotope** - An unstable or radioactive isotope (form) of an element that can change into another element by giving off radiation.

**Radionuclide** - Any radioactive isotope (form) of any element.

**RCRA** [See Resource Conservation and Recovery Act (1976, 1984)]

**Receptor population** - People who could come into contact with hazardous substances [see **exposure pathway**].

**Reference dose (RfD)** - An EPA estimate, with uncertainty or safety factors built in, of the daily lifetime dose of a substance that is unlikely to cause harm in humans.

**Registry** - A systematic collection of information on persons exposed to a specific substance or having specific diseases [see **exposure registry** and **disease registry**].

**Remedial Investigation** - The CERCLA process of determining the type and extent of hazardous material contamination at a site.

**Resource Conservation and Recovery Act (1976, 1984) (RCRA)** - This Act regulates management and disposal of hazardous wastes currently generated, treated, stored, disposed of, or distributed.

**RFA** - RCRA Facility Assessment. An assessment required by RCRA to identify potential and actual releases of hazardous chemicals.

**RfD** - See reference dose.

**Risk** - The probability that something will cause injury or harm.

**Risk reduction** - Actions that can decrease the likelihood that individuals, groups, or communities will experience disease or other health conditions.

**Risk communication** - The exchange of information to increase understanding of health risks.

**Route of exposure** - The way people come into contact with a hazardous substance. Three routes of exposure are breathing [**inhalation**], eating or drinking [**ingestion**], or contact with the skin [**dermal contact**].

**Safety factor** [see **uncertainty factor**]

**SARA** [see **Superfund Amendments and Reauthorization Act**]

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**Sample** - A portion or piece of a whole. A selected subset of a population or subset of whatever is being studied. For example, in a study of people the sample is a number of people chosen from a larger population [see **population**]. An environmental sample (for example, a small amount of soil or water) might be collected to measure contamination in the environment at a specific location.

**Sample size** - The number of units chosen from a population or environment.

**Solvent** - A liquid capable of dissolving or dispersing another substance (for example, acetone or mineral spirits).

**Source of contamination** - The place where a hazardous substance comes from, such as a landfill, waste pond, incinerator, storage tank, or drum. A source of contamination is the first part of an **exposure pathway**.

**Special populations** - People who might be more sensitive or susceptible to exposure to hazardous substances because of factors such as age, occupation, sex, or behaviors (for example, cigarette smoking). Children, pregnant women, and older people are often considered special populations.

**Stakeholder** - A person, group, or community who has an interest in activities at a hazardous waste site.

**Statistics** - A branch of mathematics that deals with collecting, reviewing, summarizing, and interpreting data or information. Statistics are used to determine whether differences between study groups are meaningful.

**Substance** - A chemical

**Substance-specific applied research** - A program of research designed to fill important data needs for specific hazardous substances identified in ATSDR's **toxicological profiles**. Filling these data needs would allow more accurate assessment of human risks from specific substances contaminating the environment. This research might include human studies or laboratory experiments to determine health effects resulting from exposure to a given hazardous substance.

**Superfund Amendments and Reauthorization Act (SARA)** - In 1986, SARA amended CERCLA and expanded the health-related responsibilities of ATSDR. CERCLA and SARA direct ATSDR to look into the health effects from substance exposures at hazardous waste sites and to perform activities including health education, health studies, surveillance, health consultations, and toxicological profiles.

**Surface water** - Water on the surface of the earth, such as in lakes, rivers, streams, ponds, and springs [compare with **groundwater**].

**Surveillance** [see **epidemiologic surveillance**]

**Survey** - A systematic collection of information or data. A survey can be conducted to collect information from a group of people or from the environment. Surveys of a group of people can be conducted by telephone, by mail, or in person. Some surveys are done by interviewing a group of people [see **prevalence survey**].

**Synergistic effect** - A biologic response to multiple substances where one substance worsens the effect of another substance. The combined effect of the substances acting together is greater than the sum of the effects of the substances acting by themselves [see **additive effect** and **antagonistic effect**].

**Teratogen** - A substance that causes defects in development between conception and birth. A teratogen is a substance that causes a structural or functional birth defect.

**Toxic agent** - Chemical or physical (for example, radiation, heat, cold, microwaves) agents which, under certain circumstances of exposure, can cause harmful effects to living organisms.

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**Toxicological profile** - An ATSDR document that examines, summarizes, and interprets information about a hazardous substance to determine harmful levels of exposure and associated health effects. A toxicological profile also identifies significant gaps in knowledge on the substance and describes areas where further research is needed.

**Toxicology** - The study of the harmful effects of substances on humans or animals.

**Tumor** - An abnormal mass of tissue that results from excessive cell division that is uncontrolled and progressive. Tumors perform no useful body function. Tumors can be either benign (not cancer) or malignant (cancer).

**Uncertainty factor** - Mathematical adjustments for reasons of safety when knowledge is incomplete. For example, factors used in the calculation of doses that are not harmful (adverse) to people. These factors are applied to the lowest-observed-adverse-effect-level (LOAEL) or the no-observed-adverse-effect-level (NOAEL) to derive a minimal risk level (MRL). Uncertainty factors are used to account for variations in people's sensitivity, for differences between animals and humans, and for differences between a LOAEL and a NOAEL. Scientists use uncertainty factors when they have some, but not all, the information from animal or human studies to decide whether an exposure will cause harm to people [also sometimes called a **safety factor**].

**Urgent public health hazard** - A category used in ATSDR's public health assessments for sites where short-term exposures (less than 1 year) to hazardous substances or conditions could result in harmful health effects that require rapid intervention.

**Volatile organic compounds (VOCs)** - Organic compounds that evaporate readily into the air. VOCs include substances such as benzene, toluene, methylene chloride, and methyl chloroform.

**Other glossaries and dictionaries:**

Environmental Protection Agency <http://www.epa.gov/OCEPAterms/>

National Center for Environmental Health (CDC)

<http://www.cdc.gov/nceh/dls/report/glossary.htm>

National Library of Medicine

<http://www.nlm.nih.gov/medlineplus/dictionaries.html>