Health Consultation

Review of Health and Safety Plan

SOUTH PINE CREEK ROAD

FAIRFIELD, FAIRFIELD COUNTY, CONNECTICUT

MAY 4, 1998

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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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HEALTH CONSULTATION

Review of Health and Safety Plan

SOUTH PINE CREEK ROAD

FAIRFIELD, FAIRFIELD COUNTY, CONNECTICUT

Prepared by:

Connecticut Department of Public Health
Under Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

The conclusions and recommendations in this health consultation are based on the data and information made available to the Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry. The Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry will incorporate additional information if and when received. The incorporation of additional data could change the conclusions and recommendations listed in this document.

Background and Statement of Issues

The Connecticut Department of Environmental Protection (CT DEP) requested on March 11, 1998, that [1] the CT Department of Public Health (CT DPH) review the health and safety plan for the South Pine Creek Road Site in Fairfield, CT. The CT DEP provided environmental sampling data from this coal gassification waste site. The purpose of this health consultation is to determine whether the health and safety plan adequately protects the public health during remediation activities.

The remediation efforts began on March 31, 1998. The initial procedures of this remediation include the building of a berm to reduce the likelihood of surface water migrating off-site. This procedure will take approximately one week. The next remedial activity involves excavation of the waste. Since the site is saturated with water, the waste will be de-watered. The waste will be de-watered by placing a pump in the waste, removal and treating waste water, then excavation of de-watered waste. The waste will be placed into lined tractor-trailer trucks. When the trucks are fully loaded, the wheels which were in the waste during loading will be power washed off with water. At the end of each day, clean fill will be placed over the excavation area. The operation will run from 8 am to 5 pm Monday through Friday. The remediation is scheduled for completion one month after commencement.

The South Pine Creek Road Site is a State of Connecticut Superfund Priority List site. This 0.28 acre site currently contains waste material from coal gassification plants. A perimeter 6 foot high chain-linked fence encompasses the site. There is a padlock securing the fence entrance. The estimated volume of waste dumped at the site ranges from 360 to 700 cubic yards. The dumping occurred approximately 30 to 60 years ago, and the materials present include coal tar, metals, and various compounds with a strong odor. This site was also known as the Sweeney Property and the Fairfield Disposal site.

Coal Gassification Process

Combustible gases are evolved from various grades of coal by a process known as coal gassification. This process involved the heating of coal at temperatures above 600° F without oxygen. The main constituents that result from the heating include: methane, propane, carbon monoxide(CO), hydrogen (H_2), hydrogen sulfide (H_2S), cyanide (CN), oils and tars. Some of the by-products of this process include: hydrogen sulfide, cyanide, ammonia, and water. During the gassification process these constituents were removed by filtering the gases through a mixture of iron oxide and wood chips. These materials were part of the waste stream dumped at this site.

Site Visit

A site visit was conducted on Monday, March 16 from 9 am - 10:30 am. During the site visit, sulfur and creosote-like odors were noticed within 20 feet of the site. This site is within 10 feet of two homes on either side. Both homes are currently occupied. The site currently contains numerous remediation-related equipment (including storage drums, wash drums, decontamination equipment, and excavation equipment). The center of the site contained blackened soils and little vegetation was noticed. A wet land area is immediately adjacent to this site. A condominium complex is located about 60 feet to the west across South Pine Creek Road. A hiking trail winds its way behind the site. Concern was raised about site-related contamination drifting to that recreational area during remediation. Funds are available for temporary relocation of the adjacent residents. Currently, no resident has initiated the relocation option.

Available Data and Information

The CT DEP provided analytical results from soil and waste material sampling [2]. Twenty-two sample were collected from the remediation area. The results were divided into the following categories: peat/silt, sand, tar, and wood chips. Table 1 lists the maximum concentrations of semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), and metals. Table 2 lists the maximum concentration of volatile organic compounds (VOCs) contaminant concentration in the four categories sampled.

Table 1
Maximum SVOC, PAHs, and Metal Concentrations Sampled During December of 1995, at the South Pine Creek Road Coal Gassification Waste Site.

	Maximum Concentration (ppb)			
Chemical	Peat/Silt	Sand	Tar	Wood Chips
Acenaphthene	nd	nd	350	280
Acenaphthylene	nd	nd	1,300	3,300
Anthracene	nd	nd	3,200	2,880
Antimony	22.4	12.2	19.5	15.40
Arsenic	0.22	nd	7.65	0.59
Benzo(a)anthracene	nd	nd	2,200	1,940
Benzo(a)pyrene	nd	nd	1,800	1,300
Benzo(b)fluoranthene	nd	nd	2,000	630
Benzo(ghi)perylene	nd	nd	600	350
Benzo(k)fluoranthene	nd	nd	400	615
Beryllium	0.48	nd	0.31	0.26
Cadmium	0.66	0.36	1.3	2
Chromium	14.8	nd	26.2	13.9
Chrysene	nd	nd	2,000	2,300
Copper	15.9	6.4	84.7	78.5
Cyanide	13.4	1.12	890	479
Di(2-ethylhexyl)phthalate	nd	nd	nd	7.2
Dibenzo(a,h)anthracene	nd	nd	14	104
Fluoranthene	nd	nd	4,200	3,040
Fluorene	nd	nd	3,300	2,790
Indeno(1,2,3,-c,d)pyrene	nd	nd	550	398
Lead	32.7	6.6	84	114
Mercury	nd	nd	4.7	nd
Naphthalene	nd	nd	30,000	11,000
Nickel	7.5	nd	17.9	11.5
Phenanthrene	nd	nd	9,500	8,450
Pyrene	nd	nd	5,500	6,850
Selenium	0.23	nd	10.9	3.35
Silver	1.8	1.3	1.4	0.97
Thallium	20.9	12.7	21.7	35.9
Zinc	24.8	nd	32.1	24.1

nd = none detected
ppm = parts per million

Table 2
Maximum VOC Concentrations Sampled During December of 1995, at the South Pine Creek Road Coal Gassification Waste Site.

	Maximum Concentration (ppb)			
Chemical	Peat/Silt	Sand	Tar	Wood Chips
1,1,1-Trichloroethane	nd	nd	nd	16
Benzene	nd	nd	9,100	96
Ethylbenzene	248	nd	12,000	2,008
Methylene chloride	42	nd	330	240
Toluene	17	4	58,000	670
Xylenes	7	nd	nd	102

nd = none detected
ppb = parts per billion

Discussion

One of the main objectives of the CT DPH review of the health and safety plan was to determine the extent to which public health would be protected during all phases of the remediation efforts. The contamination levels in the soil, tar, and wood chips represent a health concern for direct contact. A direct contact exposure scenario is unlikely, as the locked chain-linked fence adequately prevents site access. Odors were noticed during the site visit. No site activities were occurring that time. On the basis of observations reported by residents and the CT DEP, this site appears to off-gas odorous compounds on an irregular basis.

The health and safety plan presented real-time air monitoring plans to be implemented during remediation efforts, as well as three sampling rounds. In each of the three sampling rounds, three locations will be selected which will always include at least one up-wind and one down-wind site. The air sampling plan included a dust action level of 1 mg/M^3, and a VOC action level of 5 ppm. In addition, sampling would be conducted on a 8-hour basis.

The CT DPH has developed site-specific health-based action levels for use at this site. These action levels are to be used as triggers to indicate conditions under which site activities must be altered, as well as the implementation of a contingency plan of action. These levels include action levels for dust and VOC emissions. The CT DPH assumed that the most toxic constituents of the VOCs was benzene. Using the maximum concentration detected in the waste, a VOC action level of 1 ppm was derived. However, concern was raised that VOC background levels may be in the range of 2-3 ppm. Therefore, a modified VOC action level was developed at twice the background level. If the background level was less that 2 ppm, then a level of 4 ppm would be used.

Similarly, the dust action level was developed based on the constituents present in the waste. This action level is 0.15 mg/M^3. The CT DPH concluded that these levels would be protective of public health.

The CT DPH also developed action levels for hydrogen sulfide, sulfur dioxide, and odors. These will be implemented using a multi-tiered action level exceedance determination matrix. This matrix is presented in the recommendation section.

The health and safety plan described a contingency plan which was mostly nonspecific. In order, to ensure adequate protection of public health, the contingency plan needed additional specifications. The contingency plan, when coordinated with the matrix, would provide the needed specifications and remain protective of public health.

The health and safety plan indicated that odor masking agents may be employed when odors are unacceptable. The use of odor masking agents is not acceptable at this site, as these agents may be toxic by themselves, and more importantly, do not actually reduce the odor but hide it.

Children's Health

Sensitive individuals, including children, have been considered throughout the development of the action levels for this site. This site is completely fenced and locked, thereby preventing access to child and adult trespassers. Moreover, during episodes when strong odors may be emitted from the site, one of the tiered responses includes a suggestion that children and sensitive individuals remain inside.

CONCLUSIONS

The health and safety plan does not adequately protect the public health during remediation. Specifically, the two indicators of potential inhalation risks, dust and VOC action levels are not protective of the public health. Moreover, action levels for other site-related contaminants were lacking. The use of 24-hour based ambient air sampling would underestimate the air concentrations during the 8-hour work day. The contingency plan does not adequately protect public health.

RECOMMENDATIONS

The CT DPH recommends the follow additions and enhancements to the health and safety plan to ensure the protection of public health during all phases of the remediation effort:

-reduce the dust action level from 1 mg/M^3 to 0.15 mg/M^3 measured as TSP (total suspended particulates)
(See exceedance determination matrix);

-reduce the VOC action level from 5 ppm to twice the background (if background is less than 2 ppm then use 4 ppm) (See exceedance determination matrix)

-eliminate any reference to the deployment of masking agents;

-expand air sampling to include the first day when remediation activities excavate waste;

-conduct air sampling on an 8-hour basis or duration of remediation activities;

-modify remediation activities whenever weather conditions could adversely impact exposures to residents;

-eliminate any reference to the use of fans to control dust or odors.

The CT DPH also recommends several enhancements to the site contingency plan. This would include a protocol containing a list of who will be contacted whenever any of the following occur:

- unacceptable odors are detected or noticed,
- any area of the site is under an evacuation order,
- air/odor monitoring detects are higher than any action level,
- an emergency condition is present,
- a fire or explosion occurs on the site,

This list should include among other organizations: the Fairfield Health Department, the Fairfield Fire Department, the CT DEP, and the CT DPH.

The following exceedance determination matrix has also been developed for use in the health and safety plan. An exceedance occurs whenever any of the following occurs:

A. **VOCs**

Tier 1 Determination:

VOCs above background and < 2 x background (or 4 ppm if background < 2 ppm)

Actions:

Alter work practices to reduce emissions.
Sample upwind to determine if background exceeded.
Notify CT DPH, Local health director, and CT DEP at end of the day.

Tier 2 Determination:

VOCs ≥ 2 x background for 5 minutes

Actions:

Immediately notify CT DPH, Local health director, and CT DEP
Alter work practices to stop emissions.

B. **Hydrogen sulfide**

Tier 1 Determination:

H_2S ≥ 100 ppb and < 2,000 ppb for 15 minutes

Actions:

Alter work practices to reduce emission
Sample more frequently (every 5 minutes)
Notify CT DPH, Local health director, and CT DEP
The concentration is in the range where reversible transient effects may occur such as nausea, headache.

Tier 2 Determination:

H_2S ≥ 2,000 ppb and < 5,000 ppb for 10 minutes

Actions:

Immediately notify CT DPH, Local health director, and CT DEP
Alter work practices to stop emission
Sample more frequently (every minute).
Sensitive individuals may consider staying indoors (e.g., asthmatics, children) and cease exercise or strenuous activities, alternatively such individuals may consider temporarily leaving the area.
The concentration is in the range where reversible effects in sensitive individuals may occur (increased airway resistance, irritation).

Tier 3 Determination:

H_2S ≥ 5,000 ppb for 10 minutes

Actions:

Immediately notify CT DPH, Local health director, and CT DEP
Stop work practices to stop emission
All individuals consider leaving the area
The concentration is in the range where reversible irritative and biochemical effects are possible in exposed individuals.

C. **Sulfur dioxide**

Tier 1 Determination:

SO_2 is detected at concentrations < 250 ppb for 10 minutes

Actions:

Initiate odor reduction efforts
Alter work practices to reduce emission
Sample more frequently (every 5 minutes)
Notify CT DPH, Local health director, and CT DEP.

Tier 2 Determination:

SO_2 ≥ 250 ppb and < 3,000 ppb for 10 minutes

Actions:

Immediately notify CT DPH, Local health director, and CT DEP
Alter work practices to stop emission
Sample more frequently (every minute).
Sensitive individuals may consider staying indoors (e.g., asthmatics, children) and cease exercise or strenuous activities, alternatively such individuals may consider temporarily leaving the area.

Tier 3 Determination:

SO_2 ≥ 3,000 ppb for 10 minutes

Actions:

Immediately notify CT DPH, Local health director, and CT DEP
Stop work practices to stop emission
All individuals consider leaving the area.

D. **Dust**

Tier 1 Determination:

Dust concentration ≥ 0.15 mg/m3 and < 0.3 mg/m3 for 1 hour

Actions:

Work practices must be altered to reduce dust
Notify CT DPH, Local health director, and CT DEP at end of the day.

Tier 2 Determination:

Dust concentration ≥ 0.3 mg/m3 for 1 hour

Actions:

Work practices must be altered to reduce dust
Immediately notify CT DPH, Local health director, and CT DEP at end of the day.

E. **Odor**

Tier 1 Determination:

Strong odor noticed by the CT DEP, the on-site engineer, local health official, or any resident

Actions:

Alter work practices to reduce odors

Notify CT DPH, Local health director, and CT DEP at end of the day.

Tier 2 Determination:

Objectionable odor noticed by the CT DEP, the on-site engineer, local health official, or any resident

This is a subjective determination made after direct consultation with CT DEP and the on-site engineer.

Actions:

Immediately notify CT DPH, Local health director, and CT DEP

Stop work practices

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REFERENCES

1. Correspondence from: Michael J. Harder (Director, Water Bureau, PERD, CT DEP) to: Brian Toal (CT DPH - EEOH), March 11, 1998.

2. Malcolm Pirnie. Final Report: Feasibility Study South Pine Creek Road Site Fairfield, Connecticut. December 1995.

Figure 1

South Pine Creek Road Site Map

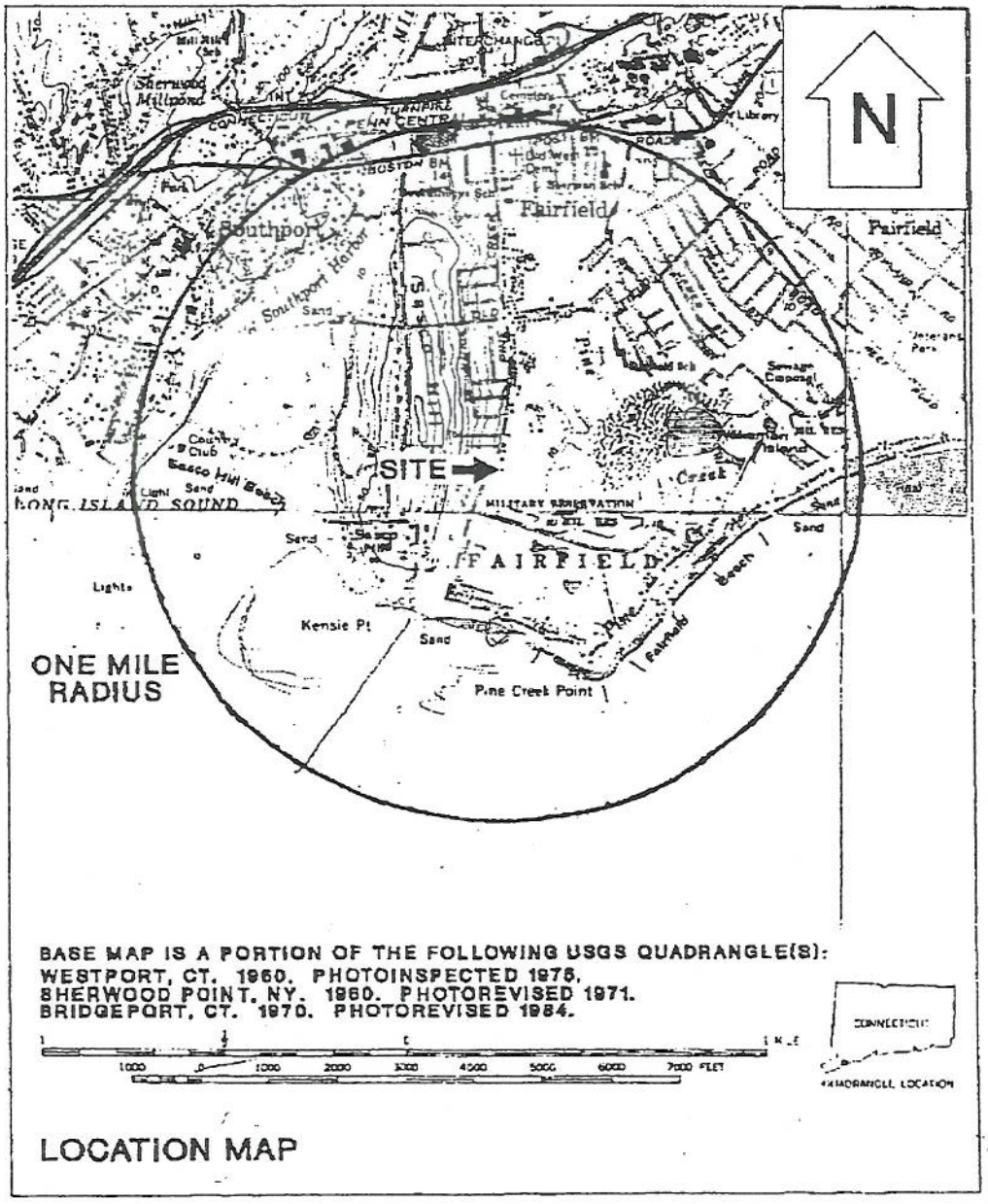
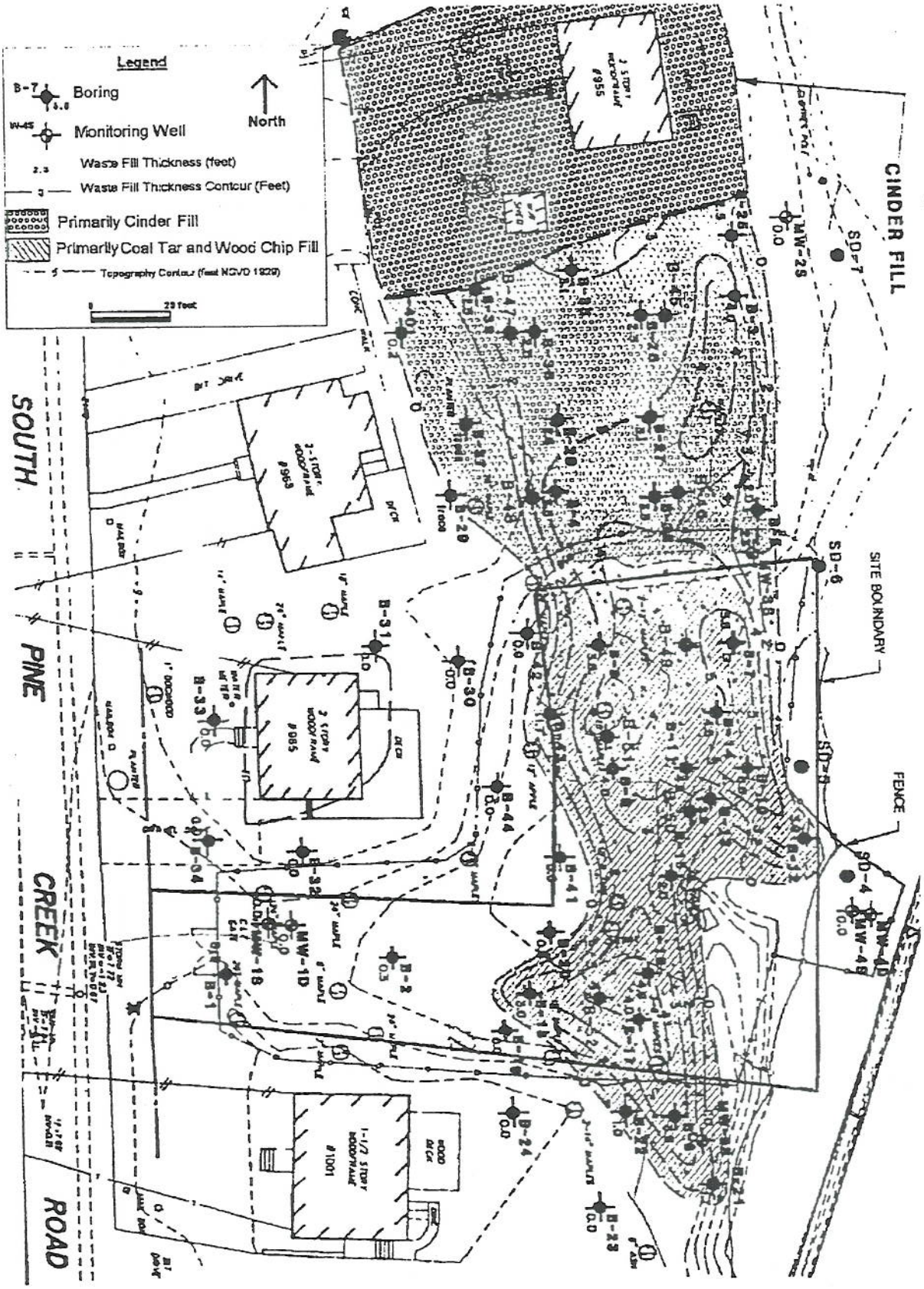


Figure 2


Legend
Boring
Monitoring Well
North
Waste Fill Thickness (feet)
Waste Fill Thickness Contour (Feet)
Primarily Cinder Fill
Primarily Coal Tar and Wood Chip Fill
Topography Contour (feet NGVD 1929)
CINDER FILL
SOUTH PINE CREEK ROAD
SITE BOUNDARY
FENCE
COOK WALK
MW-2S
MW-3S
MW-1D
MW-4D
SD-7
SD-6
SD-5
SD-4
B-20
B-31
B-30
B-33
B-44
B-41
B-32
B-34
B-24
B-23
B-21
#955
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CERTIFICATION

The South Pine Creek Road Coal Gassification Waste Site, Review of Health and Safety Plan Health Consultation was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated.

Technical Project Officer, SPS, SSAB, DHAC

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

Chief, SPS, SSAB, DHAC, ATSDR