

Petitioned Health Consultation

**PUBLIC HEALTH IMPLICATIONS OF DIRECT EXPOSURE
TO BYRAM RIVER SEDIMENT**

GREENWICH, FAIRFIELD COUNTY, CONNECTICUT

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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

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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PETITIONED HEALTH CONSULTATION

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TO BYRAM RIVER SEDIMENT**

GREENWICH, FAIRFIELD COUNTY, CONNECTICUT

Prepared by:

**Connecticut Department of Public Health
Under a 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 review additional information when received. The review of additional data could change the conclusions and recommendations listed in this document.

BACKGROUND AND STATEMENT OF ISSUE

The Connecticut Department of Public Health (CT DPH) was asked by the Agency Toxic Substances and Disease Registry (ATSDR) to assess the public health implications of direct exposure to sediment from the Byram River, in Greenwich Connecticut. This request was made in response to a petition submitted to ATSDR by a Greenwich resident on March 6th, 2002.

The Byram River is a small (13 mile long) coastal river located in the western half of Greenwich Connecticut. The river flows from an elevation of 750 feet, at its headwaters, to sea level at Port Chester Harbor. As is true for all coastal New England Rivers, the river passes through small settlements that were once centers of commercial activity. Typically, these were areas where the river could be used to generate power. Today, the river provides this residential community with opportunities for fishing and boating, and it holds significant aesthetic and ecological value as well. A map of the lower portion of the Byram River is included as Attachment A.

For the purposes of this Health Consultation, areas of the River have been divided into sectors. These sectors are (from south to north):

- Sector A Harbor area to railroad bridge
- Sector B From the railroad bridge to Putnam Avenue bridges
- Sector C From the Putnam Avenue bridges to Upland Street
- Sector D From Upland Street to the Old Felt Mill dam

These Sectors are demarcated on the accompanying map (Attachment A).

Community Concerns

The Petitioner is concerned that people living along the river are being exposed to chemical contaminants through direct contact with sediments. According to the Petitioner, seasonal flooding washes some sediment into the basements of nearby homes (primarily in Sector C), and residents are being directly exposed to contaminants as they sweep their basement floors and shovel the river sediment into pails.

Site visit

On August 12th, 2002, staff from CTDPH, ATSDR, and the local health department visited the Byram River accompanied by the Petitioner and some interested local residents. After a presentation of some background material, the Petitioner led the group on a tour of the River.

The river frontage in the harbor area (Sector A) is occupied by light industry and commercial establishments. Public access is limited in the harbor area, though residents report that people do fish in the vicinity of the railroad tracks (Mill Street Bridge). Public Access is also limited at the stone bridges over US Route 1 (Border of Sectors B & C). The streambed is stony and the River is about 15 yards wide at this point. According to the CTDEP classification, the River habitat changes from estuarine to riverine at this approximate location. Farther upriver, the frontage is occupied primarily by residences (Sector C). These residences have public water and sewer services. Generally, the houses in this area have half-basements below grade. Presumably, this is because they are built on a flood plain. At the time of the visit (August) the River was several yards wide at the point adjacent to Den Lane (lower third of Sector C). The area adjacent the riverbank is tree-lined. A slight path is evident along the east bank of the river. This path cuts through several adjacent backyards. Gardens were noted in one or two locations.

Within the flood plain, of Sector C, the river widens to a shallow pond. One local resident (who accompanied the Petitioner) reported that the pond was used for recreational boating. The access point (mid Sector C, at Lucy Street) was posted with a CT DPH's general state-wide "warning to people who fish" placard. Storm drainage from the road enters the pond at this point. Above this point, the banks of the river are protected from erosion by riprap installed after the 1955 flood (Sector D). Public access to the river appears limited in this Sector. Farther upstream is the site of a restored mill and old stone dam (upriver boundary of Sector D). The building now is used for office space, but wool felt was once manufactured at this location. One local resident (the Petitioner) reported that the felt company was a source of river pollution. Farther upriver, beyond Sector D, there is a public access point at Parkway Lake. The lake is used for recreational boating. The access point is not well maintained, and there was a lot of household trash strewn about. In addition to this, an abandoned oil storage tank (about 250 gallons capacity) was found floating on the surface of the river. The tank appeared to have residual fuel in it. Its location was reported to the Oil and Chemical Spills unit of the CTDEP.

Besides the abandoned oil tank, no obvious point sources of chemical pollution were apparent. Other (non-point) sources could be contained in storm runoff from streets and highways. Because the felt mill was a potential point source, its operations are discussed in this Health Consultation.

DISCUSSION

Potential Exposure Zone

Because the goal of this Health Consultation is to address concerns relating to direct exposure to river sediment, flood zones along the Byram River were designated as a potential exposure zone. Through consulting flood maps and flood records for the Byram River, CTDPH has determined that the potential exposure zone is bordered on three sides by the Route 1 bridges, the western boundary of the Byram River, and Upland Street (Sector C). The eastern boundary of this

designated zone is undefined because the width of the zone depends on the magnitude of the water flowing down the Byram River. In the last major flood (1955), the flood waters were contained within 400-600 feet of the western bank of the River (US Army Corps of Engineers, 1964). However, for the purposes of this Health Consultation the width of the designated zone is much less because CTDPH is interested in assessing the public health implications of repeated exposure, and it is clear that the flood of 1955 was a rare event. Recent property surveys of the Town of Greenwich indicate that, within the designated zone, there are about 28 dwellings on property adjacent to the eastern bank of the River. Some or all of these dwellings may be at risk of seasonal flooding.

Potential Point Sources of Chemical Pollution & Contamination Data

Past industrial activity upriver from Sector A:

CT DPH is not aware of any sediment contamination data upriver from the railroad bridge in Sector A. This is not unexpected because the upriver areas are primarily residential neighborhoods. However, because there is evidence of past industrial activity, CT DPH investigated where, when, and what industrial activity may have impacted the river.

Manufacturing activity occurred in two areas upriver from the designated area of potential exposure: One area is at the Pemberwick Mill, and the other is near the intersection of Pemberwick Avenue and Comly Avenue (Sector D). Wool felt or building products were made at the Pemberwick Mill, while metal finishing and instrument manufacturing occurred at the Comly Avenue area. The Mill discharged waste material from hides and dyes. A 1932 report states: "It [the Byram River] is a relatively clean stream. One felt manufacturing plant [The Pemberwick Mill] has been the source of complaint due to its wastes, but a treatment plant now approaching completion will neutralize the acid wastes and remove the fiber formerly reaching the stream" (Tri-State Treaty Commission, 1932). Other reports indicate that the primary sewage treatment system was installed at the Pemberwick Mill around 1941 (Greenwich Library, 1994). Later, a municipal sewage system was built and the Pemberwick Mill was connected to it. The acid used at the felt mill was sulfuric acid, while the dyes were probably of a type which does not persist in the environment. For one year, asbestos-containing paper products (e.g., roofing material, hot plates, etc.) were manufactured at the Pemberwick Mill site under the name of the Ruberoid Company. It is not known if any wastes from this operation were put in the river. The nature and extent of contamination produced by the two businesses in the Comly Road area is not known. Suspected and actual point sources of past chemical pollution for the designated area of potential exposure are listed in Table 1.

Table 1: Past suspected and actual point sources of chemical pollution in, or upriver from, the designated area of potential exposure.¹ [From a list submitted by the Petitioner, and an oral history of the American Felt Company (Greenwich Library, 1994.)]

Address	Distance upriver ² (miles)	Company	Years in Production	Product Made	Chemical Discharged (actual or potential)
238 Pemberwick Rd (Pemberwick Mill)	0.5	American Felt	1899-1967	Wool felt	Sulfuric acid dyes for wool
“ ”	“ ”	Ruberoid Company	1967	“	Asbestos
“ ”	“ ”	GAF	1967-late 1970's	“	Sulfuric acid dyes for wool
Pemberwick Rd& Comly Rd	0	Portchester Bolt and Nut Co.	1844-1924	Metal hardware	?
“ ”	0	Aerotec	1940-? ³	Aircraft instruments	?

¹ The Homelite Co was located at the downriver edge of the designated area of potential exposure from 1940 to the late 1970's.

² Distance from the upriver edge of the designated area of potential exposure.

³ Aerotech seems to have been located in the area at least until 1964 (Army Corps of Engineers, 1964).

Contamination Data:

The harbor sediments downriver from the railroad bridge were sampled and are known to be contaminated (New York DEC, 2000). This study found that harbor sediments are contaminated with up to 5 parts per million (ppm) polychlorinated biphenyls (PCBs), and up to 4.2 ppm mercury. The source of the harbor contamination is not apparent. CTDPH is not aware of any other sediment contamination studies from the Byram River watershed.

Exposure Pathways

An exposure pathway is defined by the environmental media through which contamination is spread (soil, water, air), and the route which contaminants enter the body. Contact with the body can occur through the skin, the lungs, or the mouth. Examples of direct contact are touching soils, sediments or surface water, eating soils that may be adhered to fingers or food items, drinking contaminated private well water, breathing dust from soil or building debris, or breathing air contaminated by volatile chemicals. In this instance, the exposure pathway involves river sediment transported by flood waters and exposure via dermal contact and incidental ingestion. Activities that could lead to exposure include shoveling out sediment from basements after a flood, or gardening on alluvial soils. Individuals who may be exposed to sediment include nearby residents and people using the river for recreation.

CTDPH's analysis of exposure pathways strongly suggests that the sediment in the potential exposure zone originates in the river, not the harbor. Furthermore, direct contact with river sediment, whether through cleaning up after a flood, gardening or other recreational activity, is infrequent. Exposure pathways in relevant Sectors are discussed below:

Sector A

CTDPH does not believe that a pathway exists for direct exposure to harbor sediment. Direct contact with sediments, through wading or swimming, does not appear to be occurring in the harbor area (Sector A) because public access to the shore is limited, and the area is not aesthetically suited to recreational activity. Furthermore, floodwaters do not appear to be depositing harbor sediment on land where direct contact could occur because the influence of tides does not extend into the zone of potential exposure (Sector C).

Sector B

The Byram River is tidal up to the stone bridges at Route 1. These bridges mark the approximate confluence of the inland and marine classifications (CT DEP). Between this point and to the railroad bridges, the river is channelized and is designated as a floodway (FEMA, 1999). This area is designated Sector B (Attachment A). In the 1955 flood, only the structures on the river bank of Sector B were affected, and the level of the river dropped significantly downriver from the railroad bridge (Army Corps of Engineers, 1964). Additionally, most of the homes adjacent to the floodway are above the 100 year flood line (FEMA, 1999). Direct exposure to river sediment from flooding is therefore not a concern down river from the Route 1 Bridges. Furthermore, CTDPH does not believe that storm tides facilitate direct exposure in this Sector because the frequency of their occurrence is low and the sediment loads are much less than that from a freshwater flood.

Sector C

Though there is the potential for direct exposure to river sediments in the flood zones of this Sector, there is no evidence of contamination in the up-river Sectors. The exposure Pathways are discussed in the above section titled "Potential Exposure Zone".

Sector D

Flood maps in Sector D show that the river is mostly channeled along the banks from Upland Street to the felt mill. In the 1955 flood the area near the present-day streets of Muriel Place and Riverview Court was flooded. However, recent flood maps (FEMA, 1999) indicate that homes in this area are now above seasonal flood levels. Therefore, direct exposure to river sediment is unlikely to occur often in Sector D.

Chemicals of concern

The paucity of data on Byram River sediments is a reflection of the fact that this watershed, above the harbor, is in a suburban environment where the potential for point-source chemical contamination is low. Nevertheless, CTDPH has examined the potential impact of past industrial

practice in the watershed, and concluded that it is unlikely that exposure to toxic chemicals from past industrial practice, via direct contact with sediments, is occurring in the potential exposure area. Therefore, no contaminants of concern are identified by this Health Consultation.

Public Health Implications of direct exposure to Byram River sediment

CTDPH has evaluated the potential for chemical contamination in, and the potential for direct exposure to, Byram River sediment. We believe that the potential for significant chemical contamination is low, and that direct exposure to sediment occurs infrequently. Where evidence of past industrial use of the area suggests that there is the potential for chemical contamination by some specific contaminants, their persistence in the environment is low, or (in the instance of potential asbestos release) the exposure pathway which leads to incidental ingestion or dermal contact is not associated with toxicity. Though the harbor sediment is contaminated with PCBs and mercury, exposure through direct contact with harbor sediment is unlikely in the potential exposure zone, and infrequent in the harbor area. In summary, we expect the nature and extent of chemical contamination in the potential exposure zone to be typical of many suburban environments. Subsequently, public health is not likely to be adversely affected by past or ongoing direct exposure to Byram River sediment.

CONCLUSIONS

CTDPH and ATSDR have evaluated the potential for chemical contamination in, and the potential for direct exposure to, Byram River sediment. We believe that the potential for significant chemical contamination is low, and that direct exposure to sediment occurs infrequently. Moreover, the nature and extent of chemical contamination in the potential exposure zone of the river is expected to be typical of many suburban environments. Subsequently, public health is not likely to be adversely affected by past or ongoing direct exposure to Byram River sediment. ATSDR has a categorization scheme whereby the level of public health hazard at a site is assigned to one of five conclusion categories (Attachment B). CTDPH and ATSDR have concluded that the Byram River sediment poses a no apparent public health hazard to nearby residents (Class D).

RECOMMENDATIONS

None at this time.

REFERENCES

FEMA, 1999. *Flood insurance rate map of Greenwich CT, Panel # 090008 021 C*. Federal Emergency Management Agency, Washington DC.

Greenwich Libray, 1994. *American Felt Company, Oral history interviews*. Greenwich CT.

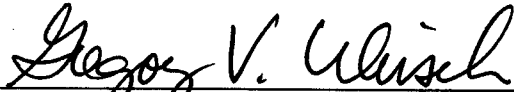
New York DEC, 2000. *Byram River Sediment Survey*. New York State Department of Environmental Conservation, Division of Water, Bureau of Watershed Assessment and Research, Sediment Assessment and Management Section.

Tri-State Treaty Commision, 1932. *Final Report of the Research and Engineering Committee*, January 7th, 1932.

US Army Corps of Engineers, 1964. *Flood Plain Information, Byram River, Greenwich CT*. US Army Engineer Division, New England Corps of Engineers, Waltham MA.

CERTIFICATION

The Health Consultation for the Byram River, Greenwich Connecticut, 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 (DHAC), ATSDR, has reviewed this Health Consultation and concurs with its findings.



for Chief, SPS, SSAB,DHAC,ATSDR

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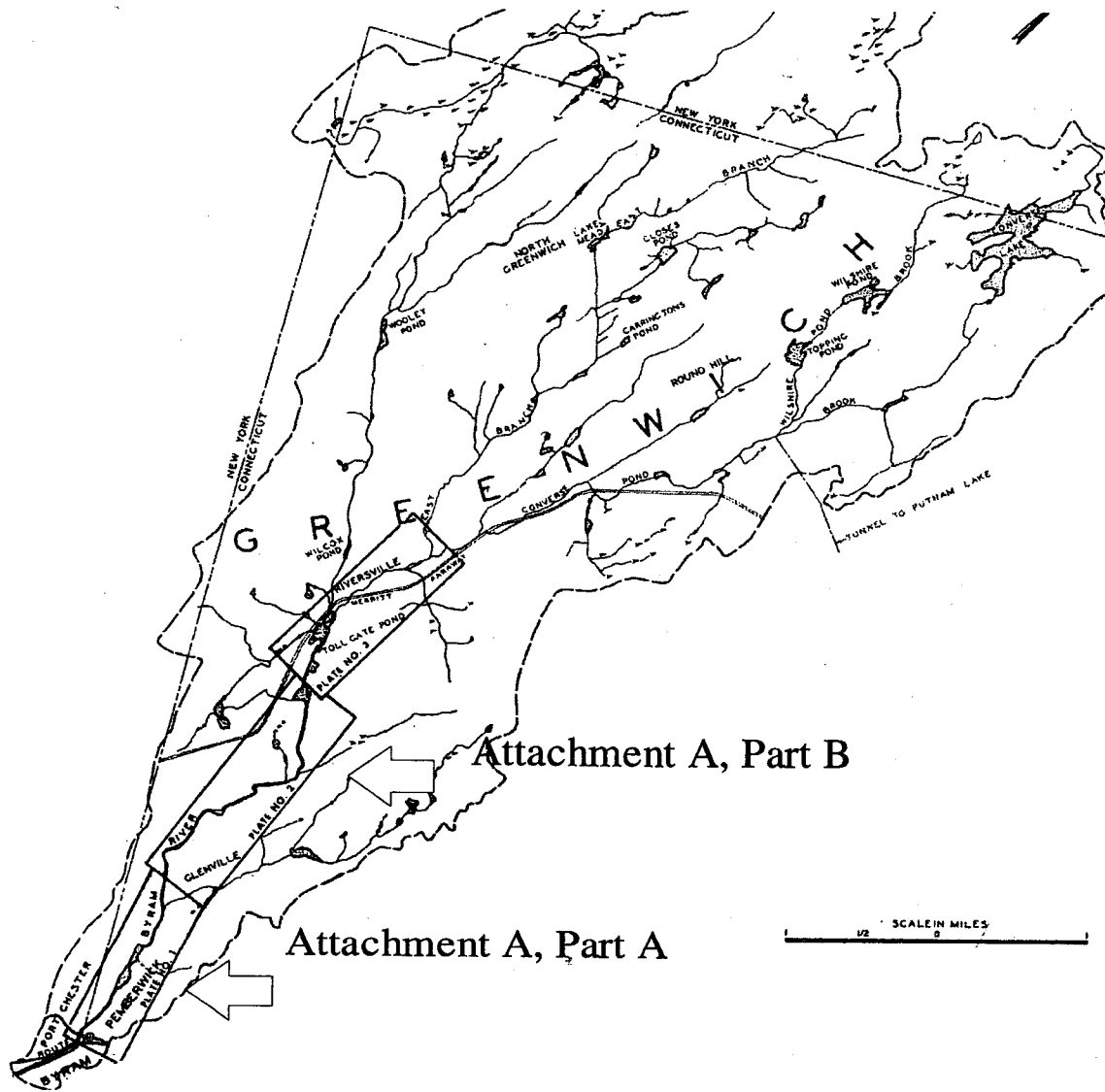
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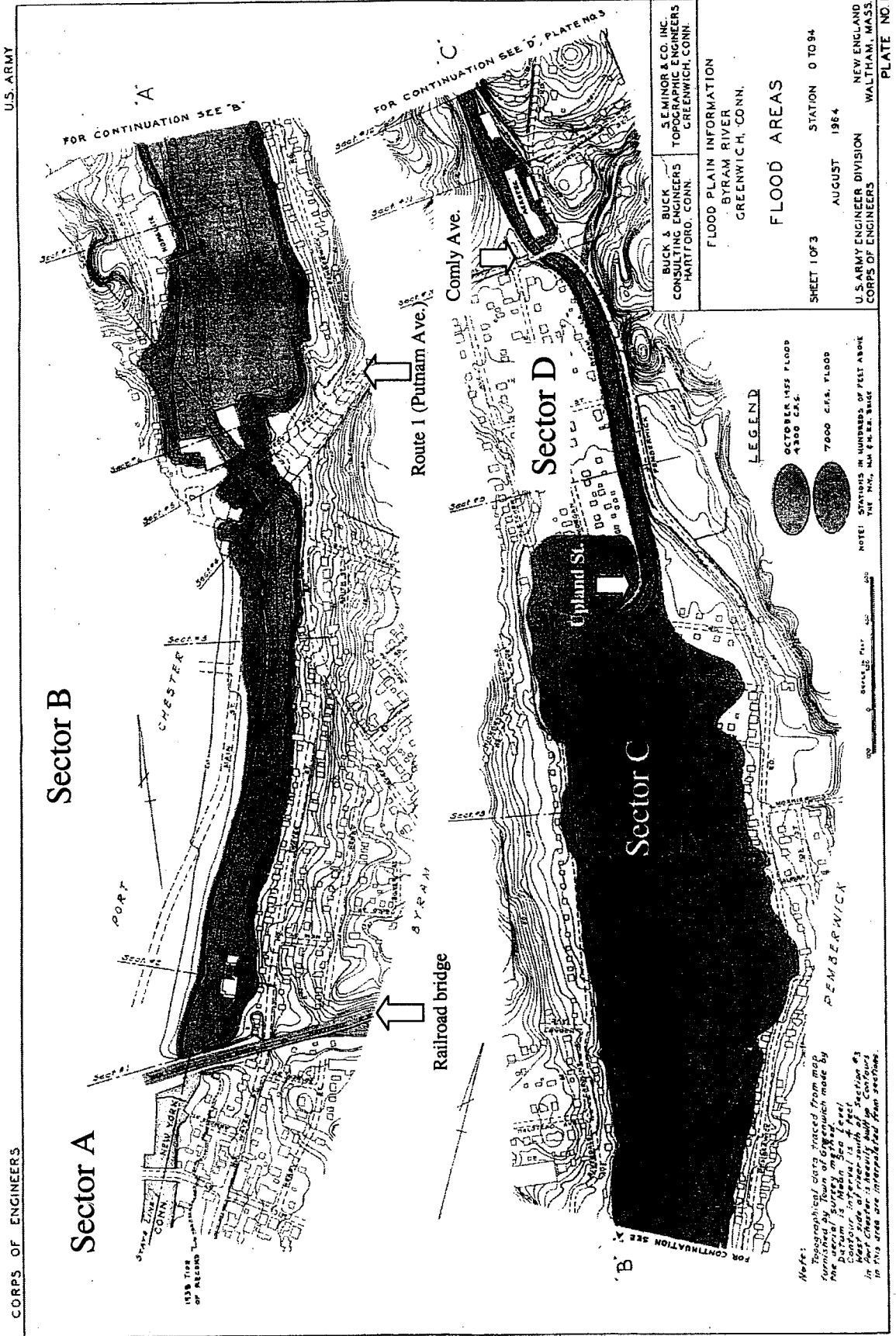
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Attachment A: Map of Greenwich CT showing the Byram River and part of its watershed. Plates 1 & 2 are included in this attachment as Part A & B, respectively. Maps are from an Army Corps of Engineers report on the flood of 1955 (1964).



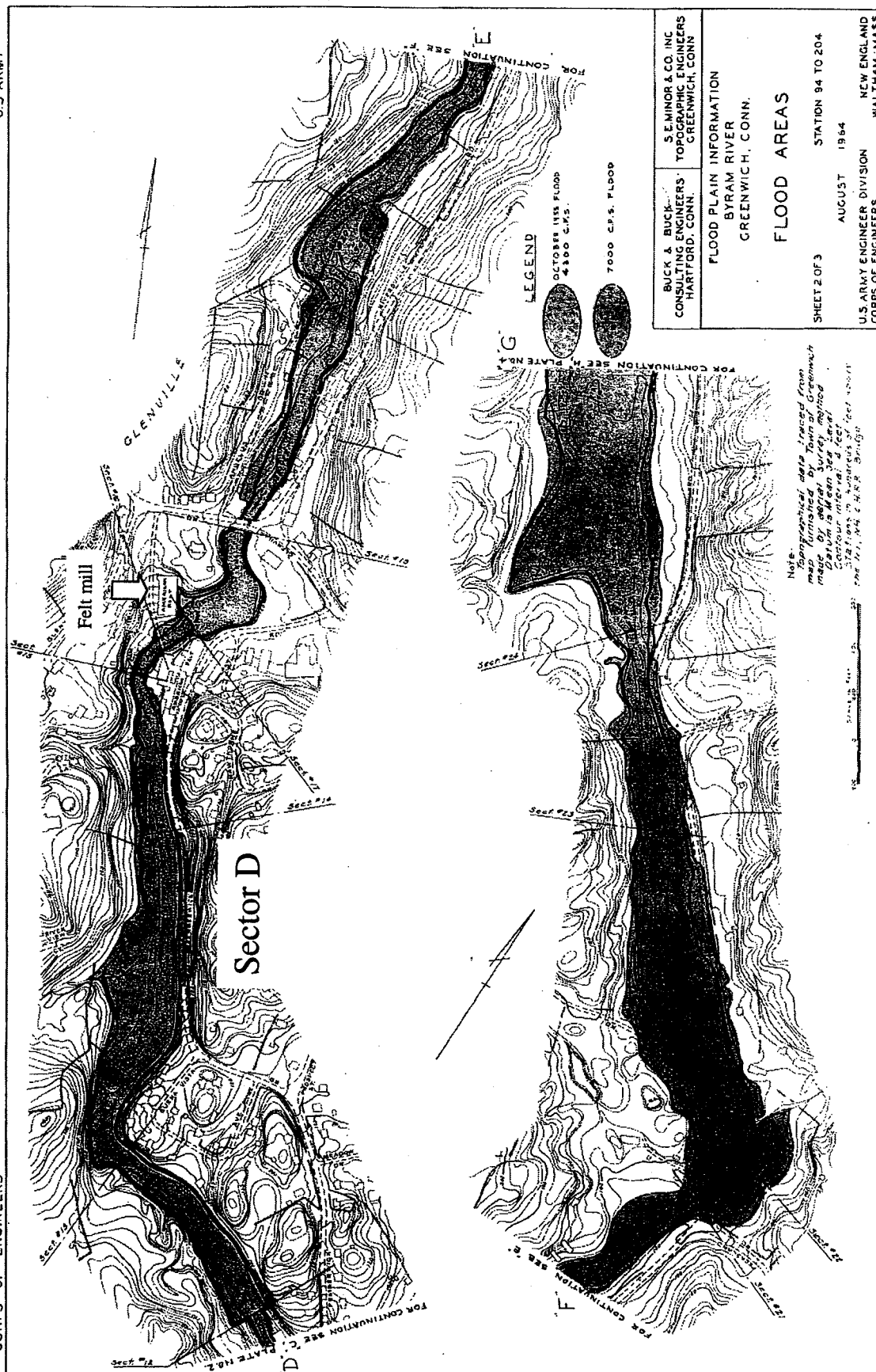
Attachment A, Part A: Downriver area of the Byran River. Because this map is from an Army Corps of Engineers report on the 1955 flood, there are differences in street names and the level of development as compared to today. Sectors are those referred to in the text



Attachment A, Part B: Upriver area of the Byram River to the felt mill. Because this map is from an Army Corps of Engineers report on the 1955 flood, there are differences in street names and the level of development as compared to today. Sectors are those referred to in the text.

CORPS OF ENGINEERS

U.S. ARMY



ATTACHMENT B: ATSDR Public Health Hazard Categories

<i>Category</i>	<i>Definition</i>	<i>Criteria</i>
<i>A. Urgent public health hazard</i>	<i>This category is used for sites that pose an urgent public health hazard as the result of short-term exposures to hazardous substances.</i>	<i>evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND estimated exposures are to a substance(s) at concentrations in the environment that, upon short-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR community-specific health outcome data indicate that the site has had an adverse impact on human health that requires rapid intervention AND/OR physical hazards at the site pose an imminent risk of physical injury</i>
<i>B. Public health hazard</i>	<i>This category is used for sites that pose a public health hazard as the result of long-term exposures to hazardous substances.</i>	<i>evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND estimated exposures are to a substance(s) at concentrations in the environment that, upon long-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR community-specific health outcome data indicate that the site has had an adverse impact on human health that requires intervention</i>
<i>C. Indeterminate public health hazard</i>	<i>This category is used for sites with incomplete information.</i>	<i>limited available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects; data or information are not available for all environmental media to which humans may be exposed AND there are insufficient or no community-specific health outcome data to indicate that the site has had an adverse impact on human health</i>
<i>D. No apparent public health hazard</i>	<i>This category is used for 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.</i>	<i>exposures do not exceed an ATSDR chronic MRL or other comparable value AND data are available for all environmental media to which humans are being exposed AND there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health</i>
<i>E. No public health hazard</i>	<i>This category is used for sites that do not pose a public health hazard.</i>	<i>no evidence of current or past human exposure to contaminated media AND future exposures to contaminated media are not likely to occur AND there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health</i>