

Health Consultation

AREA OF CONCERN

MARINERS MARSH PARK

STATEN ISLAND, RICHMOND COUNTY, NEW YORK

SEPTEMBER 30, 2006

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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Prepared By:

New York State Department of Health
Center for Environmental Health
Under a Cooperative Agreement with
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BACKGROUND AND STATEMENT OF ISSUES

Introduction

The United States Environmental Protection Agency (US EPA) requested the Agency for Toxic Substances and Disease Registry (ATSDR) to provide a health consultation on soil samples collected at the Mariners Marsh Brownfield site, Staten Island, Richmond County, New York. The US EPA collected the samples to determine whether federal emergency response was needed in one heavily contaminated portion of the Mariners Marsh Park brownfield site. The New York State Department of Health (NYS DOH) reviewed the soil data from this portion of the site to evaluate the public health implications of the contamination. Our review of the data was relayed to the US EPA project manager in a letter dated July 28, 2006. This health consultation formalizes the information conveyed in that letter. NYS DOH conducted this health consultation under a cooperative agreement with ATSDR.

An ATSDR public health consultation provides advice on specific public health issues that occur as a result of actual or potential human exposure to a hazardous material. People can be exposed to environmental contamination by eating contaminated food, soil, or water (ingestion); breathing contaminated air (inhalation); and directly touching contaminated materials (dermal contact). Public health consultations rely primarily on environmental data, health data, and community concerns to evaluate exposures at a specific site. A public health consultation makes recommendations based on these data and concludes with an outline of site specific public health actions.

Site Description and History

The Mariners Marsh Park is part of a federal brownfield program sponsored by the US EPA. The site is 107 acres on the north shore of Staten Island, Richmond County, New York. Early in the 20th century a steel manufacturer, a shipbuilding business, and a rail line occupied the site. The site was used to process steel for the shipbuilding industry from the 1930s-1940s. Part of the process required receiving coal and cracking it to generate heat for the facility to melt steel. It appears slag generated from these activities was poured onto the ground in an area about 300 by 300-feet. This is the area of concern addressed in this health consultation. Abandoned cars are in this area, and the entire 107-acre site was abandoned for many years subjecting it to neglect and illegal dumping.

In 1997, New York City acquired the land for use as a park and nature area. The New York City Parks Department manages the site.

The New York City Parks Department hired the Metcalf and Eddy consulting firm to conduct a Phase I Environmental Site Assessment (ESA) of the entire 107-acre site. The US EPA reviewed the ESA and indicated that significant surface soil contamination and coal tar were found east of Downey Pond in the 300 by 300-foot area (see Figure 1). According to the US EPA's review, the ESA did not indicate significant contamination warranting federal emergency response in any other portion of the site including a garden

maintained by the Boy Scouts and ball fields on the site's north end. New York City has a brownfield agreement and a clean-up grant (June 2006) that will address the area outside of the 300 by 300-foot area of concern discussed in this health consultation.

Figure 1.
Mariners Marsh Park
Staten Island, Richmond County



duplicates, so they were averaged prior to data analysis of the remaining samples; leaving twelve unique, non-slag samples collected from the area of concern.

We compared the soil sampling results for the twelve soil samples to background screening levels and health comparison values using exposure scenarios consistent with passive (defined above) and active recreation. Active recreational uses include such things as playgrounds, picnic areas, gardens, etc. Background screening levels and health comparison values are from the *New York State Brownfield Program Development of Soil Cleanup Objectives Technical Support Document: Public Review Draft* (June 2006) and not yet finalized.

Two sets of numbers were used for background screening levels: the ¹Screening Values for Soil Cleanup Objectives (SCO) Priority List Analytes and ²New York Rural Soil Background Concentrations (RSBCs). Screening Values were determined for a priority list of analytes. Screening values for each analyte corresponds to the 98th percentile of the levels found in 146 samples collected during the Rural Survey throughout New York State. Rural Soil

Background Concentrations were determined using more sampling events than the Screening Values, including results of sampling events in two Buffalo neighborhoods. RSBCs were established for twenty-two analytes on the Priority List of Analytes and RSBCs are used for background screening levels instead of Screening Values for those analytes.

The health comparison values for active and passive recreational exposure scenarios were determined by calculating excess cancer risk and hazard indices for each analyte. Active and passive recreational exposure health comparison values correspond respectively to the Restricted Residential and Commercial ³Human Health-based SCOs.

The analytes shown in the following table were selected for review because their levels, in many of the twelve samples, exceed background screening levels; Screening Values (denoted by ¹) or RSBCs. The mean, maximum, and minimum concentrations of each analyte in the twelve soil samples, as well as background screening values and health comparison values, are shown in the following table.

Mariners Marsh		Mean	Maximum	Minimum	Background	Health Comparison Value	Health Comparison Value
Selected Analytes in 0-3" Soil Samples	Analyte type	12 soil samples (excluding S-05, S-10 and averaging duplicate pair)			Screening Values ¹ & RSBCs ²	Active recreational ³	Passive recreational ³
23-Feb-06		mg/kg [*]	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Arsenic	Metal	30.2	58.3	19.5	16	1	5.9
Chromium ^{**}	Metal	28.6	39.1	17.8	30	180	1500
Copper	Metal	131	271	77	61 ¹	270	270
Lead	Metal	361	630	164	101 ¹	400	1000
Mercury	Metal	1.6	2.8	0.4	0.3	5.8	47
Selenium	Metal	11.0	21.4	6.9	4	180	1500
Aldrin	Pesticide	0.3	0.5	0.1	0.005	0.097	0.68
Dieldrin	Pesticide	0.8	1.0	0.5	0.005	0.2	1.4
Benzo(a)anthracene	PAH ^{***}	56.1	250	6.1	1	0.39	5.6
Benzo(b)fluoranthene	PAH	57.6	130	11.0	1	0.39	5.6
Benzo(k)fluoranthene	PAH	60.9	190	11.0	0.8	3.9	56
Benzo(a)pyrene	PAH	41.2	160	5.1	1	0.039	0.56
Chrysene	PAH	76.5	260	13.0	1	3.9	56
Indeno (1,2,3-cd)pyrene	PAH	38.3	110	8.2	0.5	0.39	5.6
Fluorene	PAH	1566	14000	1	0.13 ¹	1100	6200
[*] Milligrams per kilogram (mg/kg). ^{**} Chromium is assumed to be Chromium (III). ^{***} Polycyclic Aromatic Hydrocarbon (PAH). The listed PAHs are all carcinogenic, except fluorene. ¹ Draft Screening Values for SCO Priority List Analytes. Levels that are Screening Values (not RSBC) are indicated. ² Draft Rural Soil Background Concentrations (RSBCs). ³ Draft Final Human Health-based Soil Cleanup Objectives: Restricted Residential (Active), Commercial (Passive).							

For those chemicals that exceed the background screening level, we then compared the levels to the health comparison values for passive and active recreation. The chemicals of concern that should drive cleanup of the soil are those above all three values: background and both recreational scenarios. Arsenic exceeds its RSBC and health comparison values for active and passive recreational exposures in all twelve samples. The mean and maximum levels of six of the seven carcinogenic polycyclic aromatic hydrocarbons (PAHs) exceed their background screening values and the health comparison values for both passive and active recreational exposure scenarios (dibenz[a,h]anthracene was not found in any soil samples).

Public Health Implications – adult and child health issues

We evaluated the potential health risks of exposure to benzo(a)pyrene (B(a)P) in the twelve soil samples for a passive recreation scenario. Benzo(a)pyrene levels ranged from 5.1 mg/kg to 160 mg/kg in the soil samples. The mean (41 mg/kg) and maximum (160 mg/kg) levels of B(a)P in the surface soil are 73 and 286 times greater than the health comparison value (0.56 mg/kg) for passive recreation. The estimated lifetime excess cancer risk for exposure to B(a)P in this surface soil at the highest level detected exceeds one in ten thousand, which typically triggers measures to reduce exposures. NYS DOH classifies this exposure as a

moderate risk of long-term cancer health effects (see Appendix A). Maximum levels of five other carcinogenic PAHs are also above health comparison values for passive recreation and would increase this estimated cancer risk. Cleanup triggered by PAH levels in the surface soil would likely be protective of arsenic, as well as the other contaminants that exceed background. This could be verified by post-cleanup sampling. If the land use should change to active recreation, which has a lower health comparison value, the estimated cancer risk would increase due to the increased level of exposure expected under this exposure scenario.

The PAH levels, as well as other contaminant levels, in the two slag samples are high. For example, benzo(a)pyrene was detected at 37,000 and 2,100 mg/kg in the two samples. The background screening level and health comparison value (for passive recreational exposure) for benzo(a)pyrene are 1.0 mg/kg and 0.56 mg/kg, respectively. The estimated cancer risk for exposure to the slag would be much higher than for the soil samples discussed above. The health comparison values for the commercial (passive recreational) scenario consider the potential health risks to children.

Conclusions

Currently the 300 by 300 feet area of concern is classified as a *public health hazard* (see Appendix B) since the estimated lifetime excess cancer risk for exposure to B(a)P in the surface soil exceeds one in ten thousand. The risk of long-term adverse cancer health effects from exposure to site-related contaminants in the surface soil is moderate (see Appendix A). The risk of long-term exposure to slag samples would be even higher.

The contaminant levels indicate that measures should be taken to reduce exposures in the entire contaminated area for almost all uses envisioned at the park. The site, including the contaminated area, is open and accessible to the public year round for many uses, including walking, biking, trailside picnics and other activities with potential for limited soil contact.

For this Health Consultation we reviewed soil data provided by the US EPA on a 300 by 300-foot area of contamination. We have not reviewed any data for other areas of the park, including areas where recreational activities may be more intense, or in the area used by Boy Scouts. Likewise, we saw no data for water bodies or the pond near the area of coal tar contamination. Elevated contaminant levels in any portion of the site, including soils, water and/or sediment, could be a public health concern if children and families will use the area for a wide variety of recreational activities. Given the historic site usage, environmental contamination issues on the entire site are possible.

Finally, there may be physical and potential environmental hazards at the park, including, abandoned equipment or cars that may contain gasoline, antifreeze and other potential environmental health hazards.

Recommendations

- 1) All contaminated coal-like slag material should be removed and properly disposed.
- 2) The area of surface soil contamination should be delineated and we recommend removing or preventing contact with the contaminated soil. We suggest restricting access to the contaminated area during further investigation and cleanup to prevent the public's potential contact with contaminated surface soils.
- 3) Elevated contaminant levels in any portion of the site, including soils, water and/or sediment, could be a public health concern if children and families will use the area for a wide variety of recreational activities. Given the historic site usage, environmental contamination issues on the entire site are possible.
- 4) There may be physical and potential environmental hazards at the park, including, abandoned equipment or cars that may contain gasoline, antifreeze and other potential environmental health hazards.

References:

¹ New York State Department of Environmental Conservation and New York State Department of Health. June 2006. *New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document: Public Review Draft (Revised)*. Table 9.1-1. Screening Values for Soil Cleanup Objective Priority List Analytes. Pgs. 316-318. Available at <http://www.dec.state.ny.us/website/der/superfund/techsuppdoc.pdf>

² New York State Department of Environmental Conservation and New York State Department of Health. June 2006. *New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document: Public Review Draft (Revised)*. Table 9.1-9. Rural Soil Background Concentrations (RSBCs). Pg. 327. Available at <http://www.dec.state.ny.us/website/der/superfund/techsuppdoc.pdf>

³ New York State Department of Environmental Conservation and New York State Department of Health. June 2006. *New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Technical Support Document: Public Review Draft (Revised)*. Table 5.6-1. Final Human Health-based Soil Cleanup Objectives. Restricted Residential, Commercial columns. Pg. 251. Available at <http://www.dec.state.ny.us/website/der/superfund/techsuppdoc.pdf>

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CERTIFICATION

The Health Consultation for the Area of Concern at the Mariners Marsh Park site was prepared by the New York State Department of 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. Editorial review was completed by the cooperative agreement partner.

Technical Project Officer, CAT, CAPEB, DHAC

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

Team Leader, CAT, CAPEB, DHAC, ATSDR

Appendix A

NYS DOH PROCEDURE FOR EVALUATING POTENTIAL HEALTH RISKS FOR CONTAMINANTS OF CONCERN

To evaluate the potential health risks from contaminants of concern associated with the site, the New York State Department of Health assessed the risks for cancer and noncancer health effects.

Increased cancer risks were estimated by using site-specific information on exposure levels for the contaminant of concern and interpreting them using cancer potency estimates derived for that contaminant by the US EPA or, in some cases, by the NYS DOH. The following qualitative ranking of cancer risk estimates, developed by the NYS DOH, was then used to rank the risk from very low to very high. For example, if the qualitative descriptor was "low", then the excess lifetime cancer risk from that exposure is in the range of greater than one per million to less than one per ten thousand. Other qualitative descriptors are listed below:

Excess Lifetime Cancer Risk

<u>Risk Ratio</u>	<u>Qualitative Descriptor</u>
equal to or less than one per million	very low
greater than one per million to less than one per ten thousand	low
one per ten thousand to less than one per thousand	moderate
one per thousand to less than one per ten	high
equal to or greater than one per ten	very high

An estimated increased excess lifetime cancer risk is not a specific estimate of expected cancers. Rather, it is a plausible upper bound estimate of the probability that a person may develop cancer sometime in his or her lifetime following exposure to that contaminant.

There is insufficient knowledge of cancer mechanisms to decide if there exists a level of exposure to a cancer-causing agent below which there is no risk of getting cancer, namely, a threshold level. Therefore, every exposure, no matter how low, to a cancer-causing compound is assumed to be associated with some increased risk. As the dose of a carcinogen decreases, the chance of developing cancer decreases, but each exposure is accompanied by some increased risk.

There is general consensus among the scientific and regulatory communities on what level of estimated excess cancer risk is acceptable. An increased lifetime cancer risk of one in one million or less is generally not considered a significant public health concern.

For noncarcinogenic health risks, the contaminant intake was estimated using exposure assumptions for the site conditions. This dose was then compared to a risk reference dose (estimated daily intake of a chemical that is likely to be without an appreciable risk of health effects) developed by the US EPA, ATSDR and/or NYS DOH. The resulting ratio was then compared to the following qualitative scale of health risk:

Qualitative Descriptions for
Noncarcinogenic Health Risks

<u>Ratio of Estimated Contaminant Intake to Risk Reference Dose</u>	<u>Qualitative Descriptor</u>
equal to or less than the risk reference dose	minimal
greater than one to five times the risk reference dose	low
greater than five to ten times the risk reference dose	moderate
greater than ten times the risk reference dose	high

Noncarcinogenic effects unlike carcinogenic effects are believed to have a threshold, that is, a dose below which adverse effects will not occur. As a result, the current practice is to identify, usually from animal toxicology experiments, a no-observed-effect-level (NOEL). This is the experimental exposure level in animals at which no adverse toxic effect is observed. The NOEL is then divided by an uncertainty factor to yield the risk reference dose. The uncertainty factor is a number which reflects the degree of uncertainty that exists when experimental animal data are extrapolated to the general human population. The magnitude of the uncertainty factor takes into consideration various factors such as sensitive subpopulations (for example, children or the elderly), extrapolation from animals to humans, and the incompleteness of available data. Thus, the risk reference dose is not expected to cause health effects because it is selected to be much lower than dosages that do not cause adverse health effects in laboratory animals.

The measure used to describe the potential for noncancer health effects to occur in an individual is expressed as a ratio of estimated contaminant intake to the risk reference dose. A ratio equal to or less than one is generally not considered a significant public health concern. If exposure to the contaminant exceeds the risk reference dose, there may be concern for potential noncancer health effects because the margin of protection is less than that afforded by the reference dose. As a rule, the greater the ratio of the estimated contaminant intake to the risk reference dose, the greater the level of concern. This level of concern depends upon an evaluation of a number of factors such as the actual potential for exposure, background exposure, and the strength of the toxicologic data.

APPENDIX B

INTERIM PUBLIC HEALTH HAZARD CATEGORIES

APPENDIX B: INTERIM PUBLIC HEALTH HAZARD CATEGORIES

CATEGORY / DEFINITION	DATA SUFFICIENCY	CRITERIA
<p>A. Urgent Public Health Hazard</p> <p>This category is used for sites where short-term exposures (< 1 yr) to hazardous substances or conditions could result in adverse health effects that require rapid intervention.</p>	<p>This determination represents a professional judgement based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* indicates that site-specific conditions or likely exposures have had, are having, or are likely to have in the future, an adverse impact on human health that requires immediate action or intervention. Such site-specific conditions or exposures may include the presence of serious physical or safety hazards.</p>
<p>B. Public Health Hazard</p> <p>This category is used for sites that pose a public health hazard due to the existence of long-term exposures (> 1 yr) to hazardous substance or conditions that could result in adverse health effects.</p>	<p>This determination represents a professional judgement based on critical data which ATSDR has judged sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* suggests that, under site-specific conditions of exposure, long-term exposures to site-specific contaminants (including radio nuclides) have had, are having, or are likely to have in the future, an adverse impact on human health that requires one or more public health interventions. Such site-specific exposures may include the presence of serious physical or safety hazards.</p>
<p>C. Indeterminate Public Health Hazard</p> <p>This category is used for sites in which “critical” data are <i>insufficient</i> with regard to extent of exposure and/or toxicologic properties at estimated exposure levels.</p>	<p>This determination represents a professional judgement that critical data are missing and ATSDR has judged the data are insufficient to support a decision. This does not necessarily imply all data are incomplete; but that some additional data are required to support a decision.</p>	<p>The health assessor must determine, using professional judgement, the “criticality” of such data and the likelihood that the data can be obtained and will be obtained in a timely manner. Where some data are available, even limited data, the health assessor is encouraged to the extent possible to select other hazard categories and to support their decision with clear narrative that explains the limits of the data and the rationale for the decision.</p>
<p>D. No Apparent Public Health Hazard</p> <p>This category is used for sites where human exposure to contaminated media may be occurring, may have occurred in the past, and/or may occur in the future, but the exposure is not expected to cause any adverse health effects.</p>	<p>This determination represents a professional judgement based on critical data which ATSDR considers sufficient to support a decision. This does not necessarily imply that the available data are complete; in some cases additional data may be required to confirm or further support the decision made.</p>	<p>Evaluation of available relevant information* indicates that, under site-specific conditions of exposure, exposures to site-specific contaminants in the past, present, or future are not likely to result in any adverse impact on human health.</p>
<p>E: No Public Health Hazard</p> <p>This category is used for sites that, because of the absence of exposure, do NOT pose a public health hazard.</p>	<p>Sufficient evidence indicates that no human exposures to contaminated media have occurred, none are now occurring, and none are likely to occur in the future</p>	

**Such as environmental and demographic data; health outcome data; exposure data; community health concerns information; toxicologic, medical, and epidemiologic data; monitoring and management plans*