Gorham Public Questions & Answers
Park Parcel Public Meeting
Former Gorham Manufacturing Site
Providence, Rhode Island
August 23, 2007

Comment No. 1: A community member noted that drums had been found in the pond (1987) and that police divers had gotten rashes during their investigation. These drums were located immediately off the western peninsula within Mashapaug Pond. They suggested that Textron had not looked in this location as part of the previous Cove investigation.

Response: *During the August 23, 2007 public meeting Textron agreed to review the 1987 reports regarding this event. The following summarizes the attached memorandum regarding the drums (Attachment A). The November 23, 1987 memo from RI Department of Environmental Management (RIDEM) noted on November 17, 1987 they met with the Providence Police Department regarding a diving investigation in Mashapaug Pond. During a search of the pond bottom the divers discovered several drums and cylinders and a white gooey material. These drums were located along the western peninsula within Mashapaug Pond and were in a very degraded condition. Other drums were found on the hillside leading from the former Gorham parking lot (Parcel C) down to the waters edge. These drums were all empty except for one drum containing an "oily, waxy waste"; a sample was collected from this drum, but was non-detect for metals and PCBs. No other analyses were conducted by RIDEM (November 20, 1987). The police were concerned because one of the divers got a rash on his face. RIDEM stated that any concerns with the contact of these chemicals in the water would be "minimal". The police divers also investigated Mashapaug Cove, but no drums were identified.*

In response to previous input from a community member that the Cove had been location of historic dumping, Textron conducted a magnetometer survey and other surveys within the Cove in 2006 to determine if any drums may be present. None were found. Textron also conducted the removal of all metal debris, including drum carcasses from the Park Parcel in 2006. This removal action of the drum carcasses and other debris was photo-documented and a list of removed materials was provided in the September 2006 Slag Removal Action Report. Textron will work with RIDEM to determine what actions are necessary to locate and remove any potential drums immediately along the western peninsula of the Park Parcel as noted by the community. This action will be incorporated into the Supplemental Site Investigation Work Plan

for the Park Parcel Groundwater and Sediment. The need for any further investigation or action along the western peninsula can be done independently of the proposed soil cap on the Park Parcel.

Comment No. 2, Part 1: Mr. Robert Dorr noted that two former USTs at Building N were removed in 1995 by contractors for the City of Providence, but soil sampling was not conducted following the UST removal. He also said he believed that it was possible that solvents may have been stored in these two USTs during the operation of the Gorham facility. Mr. Dorr asked if documentation was to show that these former USTs served as solvent tanks would additional investigation be conducted at this location.

Comment No. 2, Part 2: Mr. Robert Dorr questioned the disposition of soils at locations on the Park Parcel that previously were identified as having high concentrations of contaminants.

Response (Part 1): *Textron has done extensive research on the former Building N UST issue. All of the evidence that we have reviewed indicates that these USTs contained water for fire suppression purposes and were closed in 1995. Information obtained from the Brown University archives dating back to the 1930's indicate that the two USTs were used solely for water suppression and not for solvents. Utility drawings document the water withdrawal lines from Mashapaug Cove up to Building N and the distribution of this water for fire suppression throughout the Site. On March 27, 1995, ABB-ES submitted to RIDEM a letter report concerning the investigation of the two underground tanks located to the north of Building N. This letter report is provided herein as Attachment B. The report indicated the following:*

- *The soils excavated from the sides of the USTs had no detectable VOCs using a PID screening.*
- *The two USTs were situated above the water table (water table is located approximately 30 feet below the ground surface in this area).*
- *The eastern tank was filled with water. A water sample tested by PID (headspace screening) did not exhibit detectable VOCs. No sheen was observed on the water. A water sample collected from this tank and submitted to the laboratory for analysis had no detectable VOCs. The western tank interior could not be accessed.*
- *No vent or fill pipes were observed in the vicinity of the tanks or Building N. Building N did not accommodate a furnace or boiler. This was further evidence the USTs were not used for petroleum storage.*

Since the tanks contained water and did not contain petroleum products or hazardous materials there were no further steps needed and they were not regulated by DEM-DWM-UST05-93

Section 5.03 regulations. Therefore, removal of the tanks was not required and was not proposed at that time.

Nonetheless, the Supplemental Site Investigation Work Plan for the Park Parcel will include a magnetometer survey around the former Building N location and collection of a groundwater sample(s) immediately downgradient of the location of these tanks (between the USTs and the Cove). The sample(s) will be analyzed for volatile organic compounds to determine if there is any evidence of a release to groundwater from the area of the tanks.

Response (Part 2): *The following locations and soil samples have been discussed previously and the information is presented here to once again document the disposition of soils of interest. Please refer to Figure 2 for sample locations.*

- *Soil sample SS-SI0008 – A small area of soil exceeding the UCL for copper was identified during June 2006 supplemental site investigation (see Figure 1). Soil sample SS-SI0008 was found to contain 14,100 mg/kg copper exceeding the UCL of 10,000 mg/kg. In accordance with the Court Consent Order, dated March 29, 2006, the soil with the UCL exceedance was removed for off-site disposal in August 2006 during the slag removal activities.*
- *SD-006 – a copper UCL exceedance (greater than 10,000 mg/kg) was identified in soil sample SD-006 in 1994 (see Figure 1). Subsequent soil samples were collected on September 13, 2001 (SD-006-002N, S, E, W around the original location as well as SD-006-002-01 and SD-006-002-02 at two depths at the original sampling location) to delineate the location of the copper concentrations above the UCL. None of the 2001 soil samples contained copper concentrations above the UCL. However, the soil at location SD-006 was removed and disposed off-site as part of the slag removal activities conducted in this area in August 2006. The copper concentrations in these samples were as follows:*
    - *SD-006 – 15,800 mg/kg*
    - *SD-006-002-01 – 4,890 mg/kg*
    - *SD-006-002-02 -1,190 mg/kg*
    - *SD-006-002N – 2,420 mg/kg*
    - *SD-006-002E -72.8 mg/kg*
    - *SD-006-002S – 16.2 mg/kg*
    - *SD-006-002W – 2,030 mg/kg*

- *SS-1 – TPH at a concentration above the TPH UCL (30,000 mg/kg) was identified at soil sample location SS-1 in 1989 (see Figure 1). That location was resampled on September 13, 2001 (two depths SS-001-002-01 and SS-001-002-02) and on the same date, four additional soil samples were collected around the original location (SS-001-002W, -N, -E, and –S) (see Figure 1). Even though extensive soil sampling was conducted, the TPH UCL exceedance could not be reproduced or confirmed; therefore soil removal is not required in this area. The area of SS-1 will be included in the area capped by the proposed soil cover. The analytical data for the follow-up samples are as follows:*
    - *SS-1 – 73,800 mg/kg*
    - *SS-001-002-01 – 563 mg/kg*
    - *SS-001-002-02 – 537 mg/kg*
    - *SS-001-002N – 629 mg/kg*
    - *SS-001-002E -500 mg/kg*
    - *SS-001-002S – 258 mg/kg*
    - *SS-001-002W -1,430 mg/kg*

Textron has requested additional information from Mr. Robert Dorr associated with the collection and analysis of soil samples associated with analytical data that were appended to a letter from Mr. Dorr to Mr. Joseph Martella dated September 5, 2007. Once supporting information is reviewed, Textron will evaluate these results accordingly as they relate to Park Parcel investigation activities.

Comment No. 3: An individual identified the historical presence of abandoned tanks on the land surface located in the southwest corner of the Gorham Site near Adelaide Avenue and requested that additional investigation and soil sampling be conducted in this area of the Site.

Response: *Textron appreciates the historical knowledge of long-time residents of the neighborhood. Textron has reviewed all available environmental reports prepared for the Site and did not identify the presence of such tanks in any of the documents. As an additional measure Textron inspected this area of the Park Parcel and the adjacent area on Parcel C, but did not observe any evidence of an abandoned tank. If tanks are identified on the Park Parcel in the future, Textron will coordinate the removal of these items for proper off site disposal.*

The soil samples already collected on the southwestern corner of the Park Parcel do not indicate contamination that requires additional delineation so no additional soil sampling is planned for this area of the Park Parcel.

Comment No. 4: Bob McMahon, Director of Parks Department, and Senator Juan Pichardo commented on the number and cluster of soil samples collected on the western peninsula of the Park Parcel and if they are clean enough to support the construction of the proposed park?

Response: *Sampling performed to date indicates that this area in question can be used as a park without any need for a soil cap. Over the years Textron has taken a large number of soil samples in the Park Parcel and at different depths. Surface soil sample SS-103 (see Figure 1) was collected in May 1998 and analyzed for metals, semi-volatiles and total petroleum hydrocarbons (TPH); only petroleum aromatic hydrocarbons (PAHs) were found to exceed RIDEM standards. The reported PAHs prompted further sampling in the area immediately around SS-103 in December 1998, resulting in a cluster of samples on the peninsula (soil samples SS-211 through SS-216, Figure 1). All of these samples were analyzed for PAHs. No PAHs were detected in the samples SS-211 through SS-216. Subsequently, the location of the 1998 SS-103 sample was re-sampled and analyzed for PAHs. No PAHs were detected in that sample. Based on the results of all of those samples, it appears the source of the original PAH detections was likely the result of combustion such as a campfire site on the peninsula. Combustion products from the burning of logs create PAHs.*

Comment No. 5: Senator Juan Pichardo and other community members asked about the current need and nature of fencing around the Park Parcel as people do currently walk through the Park Parcel area.

Response: *Per the terms of the 2006 Consent Order, the City of Providence was required to construct and maintain a barrier fence to prevent access to the Park Parcel until such time when the Park Parcel was remediated to a level sufficient to safely permit recreational use. The school is currently surrounded by a fence to restrict access to the Park Parcel. In addition a second fence runs the length of the Park Parcel. As evidenced by the homeless persons within the Park Parcel, breaches to the fence have been created, repaired by the City and re-opened. Signs posted along the fence in both English and Spanish state that no unauthorized persons should enter the Park Parcel until remediation is complete. Once the remediation of the Park Parcel soils and sediment has been completed to recreational standards the fence can be removed by the City.*

Comment No. 6: A community member asked whether a park would be constructed on the capped site?

Response: *It is Textron's understanding that the City of Providence plans to construct a park on the Park Parcel. Textron's current capping plans include grading for the cap to accommodate future park developments by the City of Providence.*

Textron values the Providence community where it is headquartered and its employees work and live. Because of Textron's commitment to the community and future beneficial use of the Park Parcel, Textron is going beyond their agreement with the City of Providence (1994) to remediate to a level of industrial use by remediating the Park Parcel to support recreational land use.

Comment No. 7: Community members would like high school representatives (parents, students, administration) to attend meetings regarding the Park Parcel. A suggestion to expand the meeting mailing list to include all of the Reservoir Triangle area was noted as well.

Response: *Textron has engaged the administration of the Adelaide Avenue High School and will work with the administration regarding the most appropriate method for informing the stakeholders of the high school about site activities. Regarding the suggestion to expand the meeting and mailing list to include all of the Reservoir Triangle, a member of the community offered to provide mailing lists for the Reservoir Triangle area and offered to go with Textron representatives and show areas that did not receive previous notices about the project. Textron welcomes this and we'll contact the individual to coordinate such activities for future notices and meetings.*

Comment No. 8: A community member noted concern about the presence of some concentrations above the residential direct exposure criteria (RDEC) outside the proposed cap area.

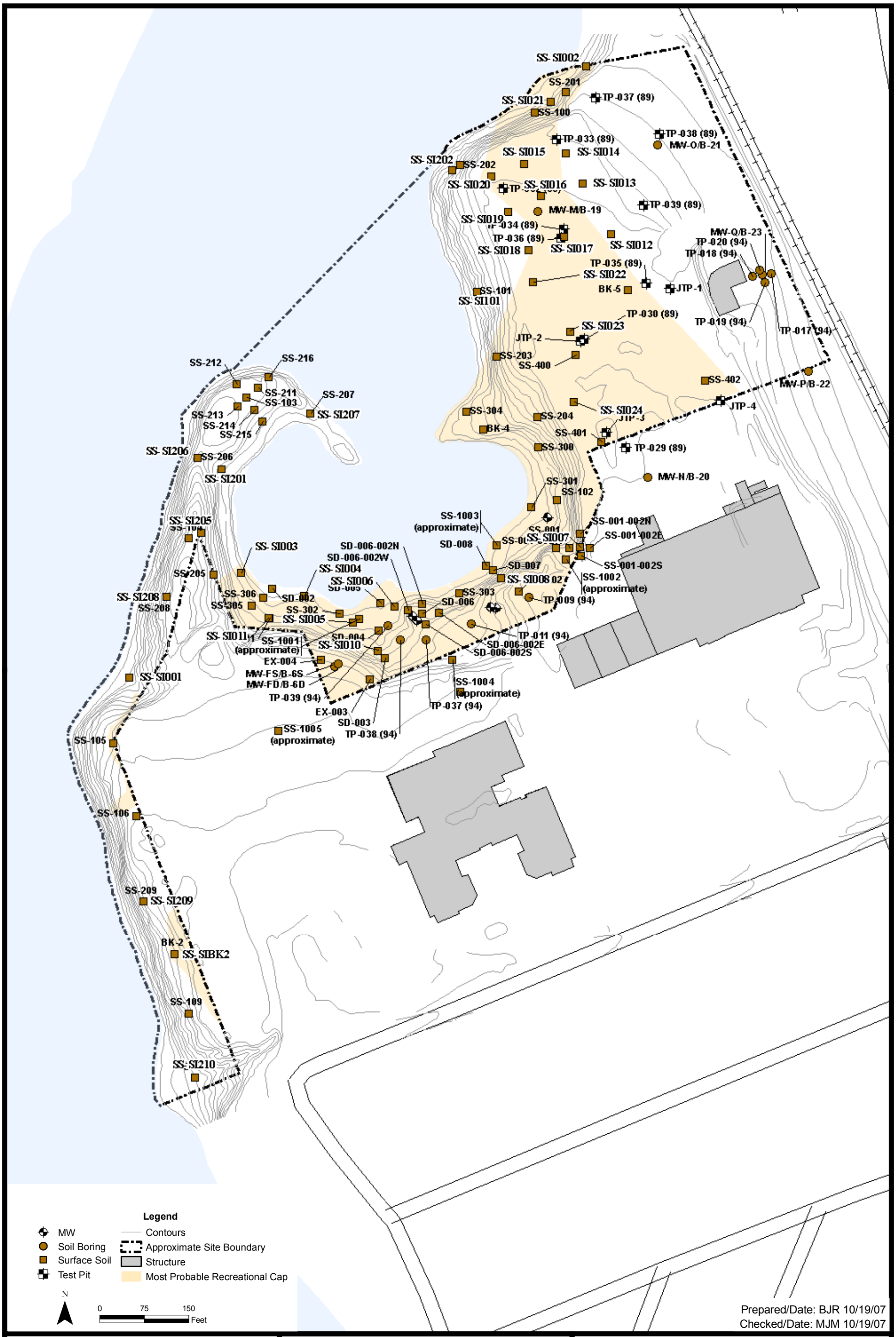
Response: *The RIDEM Remediation Regulations contain clear criteria for determining if soil conditions are in compliance with the risk-based direct exposure criteria. Compliance with the criteria means that the site is safe for the land use and activities associated with the criteria.*

A review of all of the soil data with RIDEM residential direct exposure criteria resulted in the proposed capping plan to achieve compliance and be protective of residential and recreational land use activities for the entire Park Parcel. These compliance criteria were also used to demonstrate that after capping, the uncapped Park Parcel soil would be in compliance with the residential criteria and would be safe for recreational use. A more detailed response regarding the safety of the uncapped areas is presented in the response to Comment Nos. 2, Part 2, and 4 and within Attachment C of this response to comments.

As indicated in the response to Comment No. 2, Part 2 above, Textron has requested additional documentation for soil data provided by Mr. Dorr in his September 5, 2007 letter. Textron will evaluate and address these data when the additional documentation is available.

Comment No. 9: Senator Juan Pichardo asked to receive a copy of the Textron presentation.

Response: *A copy of the presentation was sent to Senator Pichardo on August 27, 2007 and is posted on the RIDEM Gorham project website.*



Former Gorham Manufacturing Site
333 Adelaide Avenue Site
Providence, Rhode Island

MACTEC

Soil Investigation Locations

Project 3650-05-0041

Figure 1

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\SI_Report_11x17P.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Figure 1 - Soil Investigation Locations.pdf 10/19/2007 3:21 PM bjroden

ATTACHMENT A

Mashapaug Pond Investigation

November 23, 1987 Memo

RI Department of Environmental Management

Reference #3

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

INTER-OFFICE MEMO

TO: Thomas D. Getz, Chief
DEPT: Division of Air and Hazardous Materials
Environmental Management

DATE: 23 November 1987

FROM: Felix Harvey, Sr. Engineer FH
DEPT: Division of Air and Hazardous Materials
Environmental Management

SUBJECT: Investigation of Moshapaug Pond

On Tuesday, 17 November 1987, John Leo and I met with representatives of the Providence Police Department (Contact: Sargeant William Gilblin, Juvenile Division) who had been involved with a diving investigation in Moshapaug Pond. Divers were searching the pond bottom when they discovered several drums and cylinders. They also noted a white gooey material. The areas of concern are located in the proximity of the Gorham Manufacturing Company.

The divers recollected that all the drums were in a very degraded condition. The Police Department was concerned because one of the divers experienced a rash on his face. They concluded that it was from toxic waste. They needed to continue search in the pond and wanted our opinion on any dangers to the divers posed by chemicals. We explained to them that in a situation like this with such large quantities of water, any material in the drums would be quite dilute. It was our judgement that any contact with chemicals in the water would be minimal.

We decided to go to the location and determine whether there were any intact barrels which might contain hazardous waste.

We arrived just before 1:00 PM at the Moshapaug Pond boat ramp. Three members of DEM's investigative unit arrived soon after, followed by the Providence Police and then the Providence Fire Department with their outboard motor boat. John Leo rode with the Fire Department and divers in the boat to the area of concern.

I drove around to the other side of the pond with the Police and other DEM staff members. We approached from the Elmwood Avenue side, through a break in the fence over the tracks and circled around the fenced site of Gorham Manufacturing Company. (See Figures 1 & 2)

There had been quite a bit of dumping in and around Moshapaug Pond. There was a lot of debris including quite a few drums in the pond and on the shore. Most of the drums appeared to be open head or empty. There was one crushed drum labelled potassium cyanide that did not contain any material. I found one severely deteriorated drum which did contain an oily, waxy waste from which I obtained a sample. There was a large parking lot (approximately 300' by 300') located behind the Gorham buildings which seemed to be built on top of fill material. The fill material, as it appeared at the pond side edges of the parking lot, was comprised of solid waste and other debris. There was at least one drainage ditch which seemed to drain from underneath the parking lot and

the sediments in the ditch had a black sludgy appearance. I obtained a sample from this ditch.

The divers searched the bottom of the pond to relocate the drums and cylinders which were found in the previous search. They located several drums which were not intact due to deterioration (Area A, Figure 2). Several water and sediment samples were taken in this area. The divers also searched the cove (Area B, Figure 2). They found one cylinder which was an old fire extinguisher. Again, no intact drums were found.

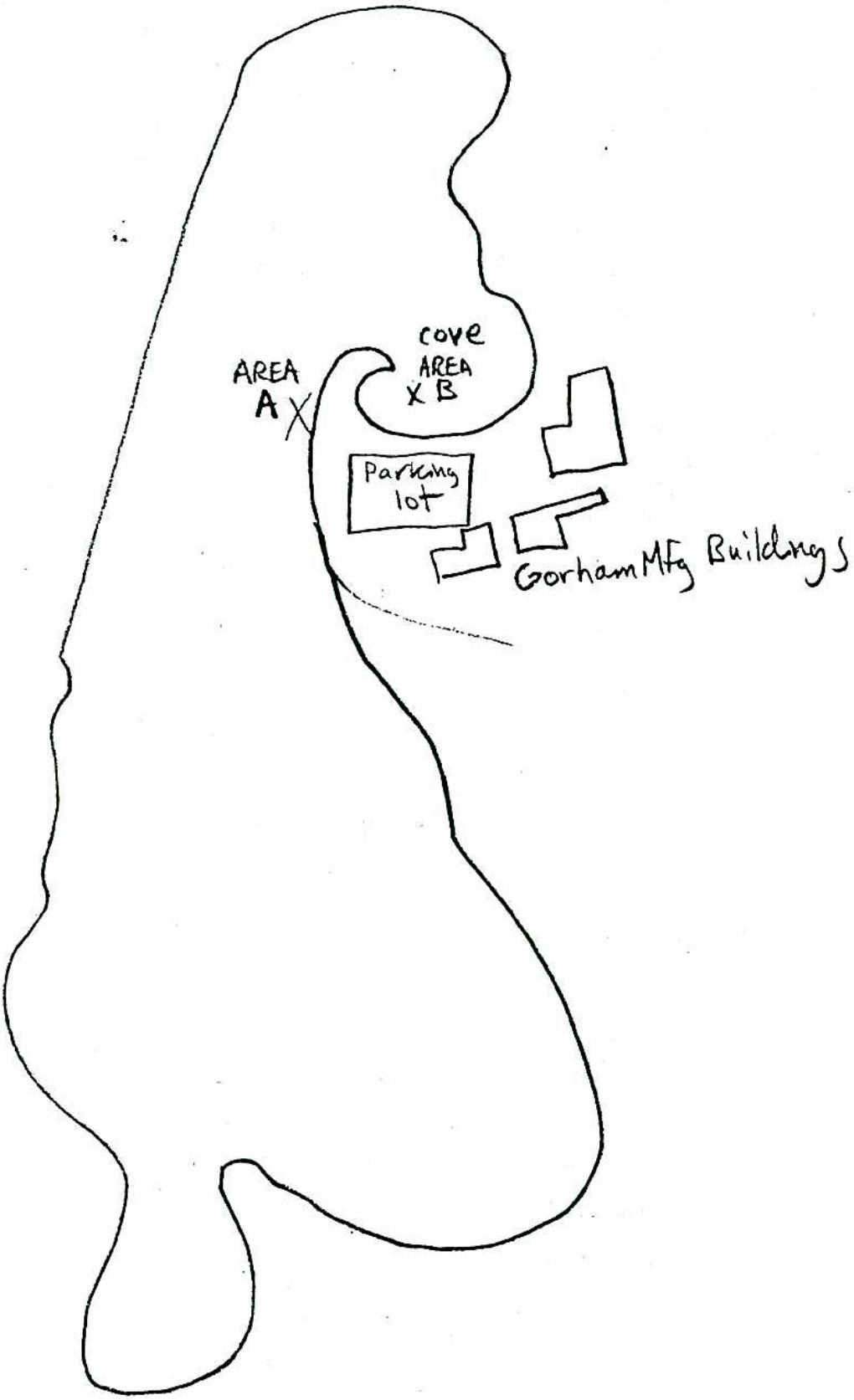
John and I entered the grounds to the Gorham Complex and took a quick tour around. There were two drums partially filled with liquid in the parking lot area, nearer to the buildings. There were several large electrical transformers outside one of the buildings, but enclosed within a locked fence. They appeared to be active. One transformer had a small leak, though John thought that the particular transformer did not contain PCBs (Not a PCB type). There were two transformers which did appear to be PCB type, and they seemed to be in good condition.

We left about 3:45 PM. I believe that there may be a hazardous waste situation at the Gorham site. I would recommend that the site be placed on CERCLIS. I researched the deed to the property. The Gorham Corporation sold the property (Plat 51, Lot 170) to Textron, Inc. in 1967. Textron, Inc. sold to Adelaide Development Corporation on 5 August 1986.

FH/kz
getz-fh/k7


Conlan Jr
Mem Park
HANOVER
ST
WALDO
STREET
UNION
ST 75
Bucklin
Park
POTTERS
HUNTINGTON
AVE
CONRAIL
St Joseph
Hospital
PUBLIC
Home for
The Aged
Locust Grove
Cem
Lexington Ave
Sch
Elmwood
St Elizabeth
Home
Gorham Mfg
Parking lot
Area of Concern
Boat Landing
N
Spectacle Pond
Mussel Pond
PAINE
AVE
INTERCHANGE

Figure 1



MOSHAPAUG POND FIG. 2

R.I. Analytical Laboratories, Inc.

SPECIALIZING IN ENVIRONMENTAL ANALYSIS

231 ELM STREET
WARWICK, R. I. 02888

PHONE: (401) 467-2452

CERTIFICATE OF ANALYSIS

REPORT TO: R.I. Dept. of Environmental Management
Air & Hazardous Material/204 Cannon Bldg.
75 Davis Street, Providence, RI 02903
Attn: Mr. John P. Leo

DATE RECEIVED 11/20/87
DATE REPORTED 12/09/87
PURCHASE ORDER NO. 94758
R.I.A.L. INV. NO. G5410

SAMPLE DESCRIPTION One (1) Sediment, one (1) water, one (1) waxy material & one (1) soil sample labelled Mashappaug Pond, Prov.

Subject samples have been analyzed by our laboratory with the attached results:

Methodology: Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, U.S. EPA, SW-846, September 1986, Third edition.

Guidelines Establishing Testing Procedures For The Analysis of Pollutants, 40CFR, Part 136, July 1986.

If you have any questions regarding this work or if we may be of further assistance, please contact us.

APPROVED BY Robert J. Huffman

Certificate of Analysis

RI Dept. of Environmental Management
Date Collected: 11/18/87
Date Recieved: 11/20/87
Invoice #: G5410

Pond sediment | Pond water | waxy substance | soil sample Drainage ditch

PARAMETER	SAMPLE #1	SAMPLE #2	SAMPLE #3	SAMPLE #4
Oil & Grease	----	----	----	75,000 ppm
Characteristic of E.P. Toxicity:				
Arsenic	<0.01 mg/l	----	<0.01 mg/l	<0.01 mg/l
Barium	<0.50 "	----	<0.50 "	<0.50 "
Cadmium	<0.005 "	----	<0.005 "	<0.005 "
Chromium	<0.05 "	----	<0.05 "	<0.05 "
Lead	<0.05 "	----	<0.05 "	<0.05 "
Mercury	<0.0005"	----	<0.0005"	<0.0005"
Selenium	<0.01 "	----	<0.01 "	<0.01 "
Silver	<0.01 "	----	<0.01 "	<0.01 "
Polychlorinated Biphenyls:	ND	----	ND	ND
PCB's Detection Limit: 1 ppm				
Volatile Organic Compounds:				
trans-1,2-dichloroethylene	ND	11 ppb	----	ND
1,1,1-trichloroethane	ND	3 "	----	ND
trichloroethylene	ND	19 "	----	ND
tetrachloroethylene	ND	1 "	----	ND
Detection Limit:	1 ppb	1 ppb	----	1 ppm

Note: A list of volatile organic compounds tested for is attached.

RI ANALYTICAL LABORATORIES, INC.

VOLATILE ORGANIC PRIORITY POLLUTANTS COMPOUNDS

benzene
bromoform
bromomethane
carbon tetrachloride
chlorobenzene
chloromethane
dibromochloromethane
chloroethane
2-chloroethylvinyl ether
chloroform
bromodichloromethane
dichlorobenzenes
1,1-dichloroethylene
1,1-dichloroethane
1,2-dichloroethane
1,2-dichloropropane
1,3-dichloropropene (cis & trans)
dichlorodiflouromethane
ethylbenzene
methylene chloride
1,1,2,2-tetrachloroethane
tetrachloroethylene
toluene
trans-1,2-dichloroethylene
1,1,1-trichloroethane
1,1,2-trichloroethane
trichloroethylene
trichlorofluoromethane
vinyl chloride
xylenes

RI ANALYTICAL LABORATORIES, INC.

ATTACHMENT B

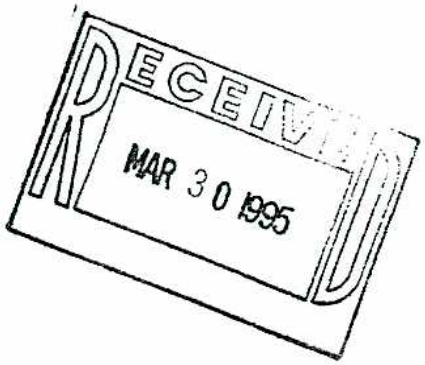
Building N UST Submittal to RIDEM

March 27, 1995

LS 28109

March 27, 1995

PN: 09111.09



Mr. Dan Russell
Rhode Island Department of Environmental Management
Division of Waste Management - UST Section
291 Promenade Street
Providence, Rhode Island 02908-5767

Subject: Underground Storage Tanks
333 Adelaide Avenue, Providence

Dear Mr. Russell:

This letter presents the findings of ABB Environmental Services, Inc.'s (ABB-ES) investigation of the two underground storage tanks (USTs) located behind Building N on the 333 Adelaide Avenue property in Providence, Rhode Island. As you are aware, the tanks were scheduled to be excavated on February 27, 1995 under a closure permit granted by Rhode Island Department of Environmental Management (RIDEM) UST Section. However, prior to commencing tank removal activities, ABB-ES undertook exploratory excavation to determine tank size, orientation and contents.

Results of Tank Investigation

On February 24, 1995, ABB-ES personnel and its subcontractor, Franklin Environmental Services, Inc. (Franklin) were on site to excavate soil surrounding the tanks to expose the tops of the tanks and manways. Results of this investigation showed that there are two USTs located behind (north of) Building N (see attached figure). The tanks are located side by side, with the long axis of the two tanks oriented north/south. An unknown length of the tanks appears to extend beneath the building. Each tank is approximately 30 feet long and 8 feet in diameter with an estimated capacity of approximately 15,000 gallons.

During excavation activities, the excavated soils were field screened with a portable photoionization detector (PID) for volatile organic compounds. PID readings were non-detectable.

No access ports were observed on the excavated portions of the tanks. However, a manway providing access to the eastern tank (Tank 1) was observed inside Building N. This manway had a pump and piping, and one of the pipes leads to an aboveground steel storage tank. An access port to Tank 2 was not found, either within the building or along the excavated top of the tank.

The manway on the eastern tank was opened and the tank appeared to be entirely full of water. No sheen was observed on the water surface. PID readings taken in the manway were non-detectable. A sample of the water collected for headspace analysis was also non-detectable. A sample of the water was collected for analysis of VOCs by EPA Method 8240 at a Rhode Island certified laboratory. No VOC's were detected in this aqueous sample. Laboratory analytical reports are attached.

A site-wide Remedial Investigation is currently being undertaken, and a groundwater table map has been developed for the property. The USTs are located above the water table indicating that the tanks are not submerged in groundwater, and that the material housed in the tanks was not the result of groundwater infiltration. Recently, the basement of Building N has flooded due to pipe breaks, and a leaking roof and floor boards. This water may have entered the tanks through gaps in piping or the manway. If oil had been originally contained in the tanks, the water in the basement would have forced oil out of the tank. However, no oil or staining was observed on the basement floor, the manway or the piping.

No vent or fill pipes were identified in the vicinity of the tanks or Building N, offering additional evidence that these tanks were not used for oil storage. Furthermore, Building N did not accommodate a furnace or a boiler.

Upon completion of the tank investigation activities, the excavation around the tanks was backfilled and the site restored to previous conditions. RIDEM was verbally notified of our findings and tank closure activities planned for February 27, 1995 were canceled.

Conclusions

Based on the information obtained, ABB-ES concludes that the tanks were likely used for water storage for firefighting purposes, and not for the storage of fuel oil or hazardous materials. Since the USTs located behind Building N do not contain petroleum products or hazardous materials, they are not regulated under RIDEM regulations (DEM-DWM-UST05-93, Section 5.03). Because they are not used for fuel or hazardous material storage, and because they extend under the building, we do not propose to remove or close the tanks at this time.

Sincerely,

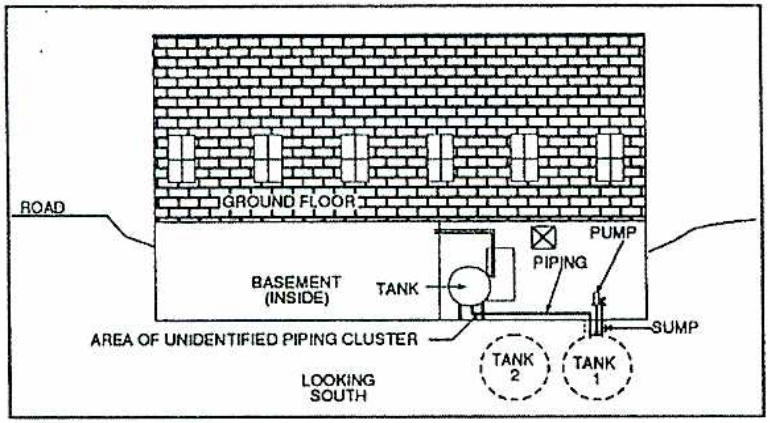
ABB ENVIRONMENTAL SERVICES, INC.

Kathleen Donovan

Kathleen Donovan
Scientist

Ellen G. Cool, Ph.D.
Regional Project Director

cc: R. Brayley, Textron, Inc.
J. Palmieri, City of Providence, Department of Planning
J. Teverow, Esq.
G. Benik, McGovern, Noel, & Benik, Esq.
M. Dennen, RIDEM



APPROXIMATE LOCATION OF USTs

BLDG. H

MW-JS

MW-JD

PUMP

OLD PUMP

TANK 1

TANK 2

TANK

PIPING

BLDG. N

GZA-6

N

0 10 20 40

SCALE FEET

BLDG. K-I

ABB Environmental Services, Inc.

LOCATION OF BUILDING N USTs
GORHAM MANUFACTURING FACILITY
PROVIDENCE, RHODE ISLAND

In Response To The Future

March 9, 1995

Ms. Ellen Cool
ABB Environmental Services
Corporate Place 128 Bldg. 3
107 Audubon Road
Wakefield, MA 01880

Dear Ms. Cool:

Enclosed is the data report of laboratory test results for the analyses of the samples which were received at ESS on February 24, 1995 as part of your Gorham/Textron project number 09111-09.

This letter authorizes the release of your analytical results and should be considered a part of this report. This report should not be copied except in full without the approval of the laboratory.

The Project Invoice for this data report is being forwarded to your Accounts Payable Department. If you have any questions please feel free to call.

Sincerely,

Dave Dickinson
Laboratory Director

Enclosure

CERTIFICATE OF ANALYSIS

In Response To The Future

VOLATILE ORGANICS
Method 8240

Client: ABB Environmental Services

Client Project ID: Gorham/Textron

Client Sample ID: Gorham/Textron 2/24

Date Sampled: 2/24/95

Date Analyzed: 3/8/95

ESS Project ID: 950858

ESS Sample ID: 950858-01

Dilution Factor: 1x

Units: ug/L

Parameter	Result	MRL
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5
1,1-Dichloroethene	ND	5
Acetone	ND	50
Carbon Disulfide	ND	5
Methylene Chloride	ND	5
Methyl tert-Butyl Ether	ND	10
Trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
Cis-1,2-Dichloroethene	ND	5
Methyl Ethyl Ketone	ND	50
Chloroform	ND	5
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Benzene	ND	5
1,2-Dichloroethane	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
Cis-1,3-Dichloropropene	ND	5
Methyl Isobutyl Ketone	ND	50
Toluene	ND	5
Trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	50
Dibromochloromethane	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Xylenes (Total)	ND	10
Styrene	ND	5
Bromoform	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Dichlorobenzene (Total)	ND	10

ND = Not Detected above Method Reporting Limit (MRL)

Approved by: _____ Date: 3/9/95

Environmental Science Services
532 Atwells Avenue, Providence, Rhode Island 02909 (401) 421-0398 Fax. (401) 421-5731

QUALITY CONTROL SECTION

CERTIFICATE OF ANALYSIS

In Response To The Future

VOA AQUEOUS SURROGATE RECOVERY

Client: ABB Environmental Services

Client
Project ID: Gorham/Textron

Date Sample Analyzed: 3/8/95

ESS
Project ID: 950858

SAMPLE ID	1,2 DICHLOROETHANE-D4 (76-114%)*	TOLUENE-D8 (86-110%)*	BFB (86-115%)*
V0308B1	77%	97%	97%
950858-01	77	96	95

* Acceptance criteria

Approved by: _____ Date: 3/9/95

Environmental Science Services
532 Atwells Avenue, Providence, Rhode Island 02909 (401) 421-0398 Fax. (401) 421-5731

QUALITY SYSTEM REGISTRATION

VOLATILE ORGANICS
Method 8240

Client: ABB Environmental Services

Client Project ID: Gorham\Textron

ESS Project ID: 950858

Client Sample ID: Method Blank

ESS Sample ID: V0308B1

Date Sampled: N/A

Dilution Factor: 1x

Date Analyzed: 3/8/95

Units: ug/L

Parameter	Result	MRL
Chloromethane	ND	10
Vinyl Chloride	ND	10
Bromomethane	ND	10
Chloroethane	ND	10
Trichlorofluoromethane	ND	5
1,1-Dichloroethene	ND	5
Acetone	ND	50
Carbon Disulfide	ND	5
Methylene Chloride	ND	5
Methyl tert-Butyl Ether	ND	10
Trans-1,2-Dichloroethene	ND	5
1,1-Dichloroethane	ND	5
Cis-1,2-Dichloroethene	ND	5
Methyl Ethyl Ketone	ND	50
Chloroform	ND	5
1,1,1-Trichloroethane	ND	5
Carbon Tetrachloride	ND	5
Benzene	ND	5
1,2-Dichloroethane	ND	5
Trichloroethene	ND	5
1,2-Dichloropropane	ND	5
Bromodichloromethane	ND	5
Cis-1,3-Dichloropropene	ND	5
Methyl Isobutyl Ketone	ND	50
Toluene	ND	5
Trans-1,3-Dichloropropene	ND	5
1,1,2-Trichloroethane	ND	5
Tetrachloroethene	ND	5
2-Hexanone	ND	50
Dibromochloromethane	ND	5
Chlorobenzene	ND	5
Ethylbenzene	ND	5
Xylenes (Total)	ND	10
Styrene	ND	5
Bromoform	ND	5
1,1,2,2-Tetrachloroethane	ND	5
Dichlorobenzene (Total)	ND	10

N/A = Not Applicable
ND = Not Detected above Method Reporting Limit (MRL)

Approved by: _____ Date: 3/9/95

ATTACHMENT C

Risk Evaluation Park Parcel Soils

ATTACHMENT C
Risk Evaluation Park Parcel Soils

The Park Parcel site investigations have lead to a proposed cap as a remedial action to make the land suitable for recreational use. In order to answer the question about the safe use of the Park Parcel, it is necessary to evaluate the conditions that would exist once the proposed cap is in place as shown in Figure C-1. The cap would be constructed with soil that meets the RIDEM direct exposure criteria for residential land use. Then, the analytical data for the area outside the proposed cap and within the Park Parcel is evaluated to assess the suitability of the Park Parcel for recreational use. In this case, the evaluation for recreational use is conducted by comparing the data to standards for residential land use (there are no standards developed specifically for recreational land use). Obviously, if the property is suitable for residential purposes, it would be suitable for recreational use.

The following demonstration that the soils outside the proposed soil cap at the Park Parcel are safe for use as a park is taken primarily from the Supplemental Site Investigation Report Addendum, dated June 2007. Additional evaluation and explanation of the soil chemical data has been added in response to the questions asked at the August 23, 2007 public meeting.

The following paragraphs, tables, and figure document that the portions of the Park Parcel that are outside the footprint of the proposed "Recreational Use" Cap are in compliance with the RIDEM Residential Direct Exposure Criteria (RDEC). The cap will be constructed with material that meets RDEC, so overall, the soils both inside and outside the footprint of the proposed cap will be in compliance with the health protective RDEC.

Figure C-1 documents the extent of the proposed "Residential" Cap and also shows the soil sampling locations that are outside the footprint of the cap. Those soil sampling locations are representative of potential soil exposures outside the cap footprint. Table C-1 documents the comparison of uncapped soil analytical data to the RDEC and documents that there are no applicable Leachability Criteria for detected analytes. The RDEC was calculated as a Method 2 Risk Assessment activity because the RIDEM Remediation Regulations do not include soil criteria for dioxins. Calculation of the Method 2 RDEC is presented in Appendix F of the July 2006 Supplemental SSIR.

As set forth in Section 8.10 of the RIDEM Remediation Regulations, compliance with soil RDECs is demonstrated as discussed below.

For less than twenty soil samples (this applies to acetone, the pesticides 4,4-dichlorodiphenyldichoroethylene (DDE), 4,4'-dichlorodiphenyltrichloroethane (DDT), delta-BHC, Endosulfan II, Endrin ketone, gamma-chlordane, barium, beryllium, cadmium, chromium, mercury, nickel, silver, zinc, and total petroleum hydrocarbon (TPH)):

- The analytical results for all samples using this approach must be below the appropriate soil objective to demonstrate compliance.

As shown in Table C-1, the maximum detected concentrations and maximum reporting limits for non-detects of 4,4-DDE, 4,4'-DDT, delta-BHC, Endosulfan II, Endrin ketone, gamma-chlordane, barium, beryllium, cadmium, chromium, mercury, nickel, silver, zinc, and TPH in soil samples are below the corresponding RDECs. Therefore, these concentrations from outside the footprint of the "Recreational Use" Cap for these chemical parameters are in compliance with the RDECs.

For twenty or more samples (this applies to the 13 detected polynuclear aromatic hydrocarbon (PAH) compounds, arsenic, copper, lead, and dioxin TEQ):

- A statistical approach may be proposed for determining compliance;
- No single sample result exceeds the soil objective by a factor of 5;
- No more than 10% of the individual sample results exceed the soil objective; and
- No single sample result exceeds any Upper Concentration Limit (UCL) as defined by Rule 8.07.

For chemicals with twenty or more samples, the statistical approach selected for determining compliance is that the arithmetic mean concentration for all samples is representative of potential exposures and if the arithmetic mean is below the RDEC and the data set also meets the specific criteria identified above, the data are in compliance with the RDEC. The arithmetic mean is calculated using all sample results, including one-half the reporting limit for non-detects. As shown in Table C-1, the arithmetic mean concentrations of the 13 detected PAH compounds, arsenic, copper, lead, and dioxin TEQ are all below the corresponding RDECs. Therefore, the compliance criteria for these compounds have been met.

In addition, the maximum detected concentrations and the maximum reporting limits for non-detects of arsenic and lead are below the RDEC. Obviously, for arsenic and lead, no single sample result exceeds the soil objective by a factor of 5; and no more than 10% of the individual sample results exceed the soil objective; and no single sample result exceeds any UCL as defined

by Rule 8.07. Therefore arsenic and lead concentrations in soil are in compliance with the RDECs.

Copper was detected in all samples but below the RDEC. Obviously, for copper, no single sample result exceeds the soil objective by a factor of 5; and no more than 10% of the individual sample results exceed the soil objective; and no single sample result exceeds any UCL as defined by Rule 8.07. Therefore copper concentrations in soil are in compliance with the RDECs.

For the detected PAHs, only three compounds (benzo(a)pyrene, benzo(b)fluoranthene, and chrysene) have at least one detected concentration that is greater than the RDEC. However, none of the detected concentrations are more than 5 times the corresponding RDEC. For all three compounds, there is only one detected concentration above the RDEC among 27 samples. Therefore, less than 10% of the samples had a detected concentration greater than the RDEC. Therefore the RIDEM compliance for these compounds is met.

For dioxin TEQ, the arithmetic mean concentration 2.1 parts per trillion (ppt) (2.1×10^{-6} milligrams per kilogram (mg/kg)) is below the calculated RDEC of 4.3 ppt. The maximum dioxin TEQ concentration is 8.5 ppt (not more than 5 times the RDEC) and only two of twenty samples (10%) have a concentration greater than the RDEC. Therefore, the compliance criteria identified above are met for dioxin TEQ in the portion of the Park Parcel that is outside the "Recreational Use" Cap footprint. Using USEPA computer software, the conservative (health protective) estimate of the average dioxin TEQ concentration was also calculated. The resulting 95% Upper Confidence Limit on the average (3.94 ppt) was also below the RDEC of 4.3 ppt. The documentation of the 95% Upper Confidence limit is shown in Table C-2.

As seen in Table C-1, none of the detected concentrations or reporting limits for any chemical parameters (including the PAH compounds) are above the UCL of 10,000 mg/kg for non-TPH parameters and the TPH concentrations and reporting limits are well below the UCL of 30,000 mg/kg.

In conclusion, the analytical data for soils outside the footprint of the proposed "Recreational Use" Cap have been compiled, summarized, and compared to RDECs and UCLs. Using the criteria contained in Section 8.10 of the Remediation Regulations, the soils in areas outside the proposed "Recreational Use" Cap have arithmetic mean chemical concentrations that are below

the RDECs, no single concentration is greater than 5 times the corresponding RDECs, not more than 10% of the samples have concentrations greater than the RDECs, and no concentrations of chemicals in soil are greater than the soil UCLs. Therefore, the soils outside the proposed "Recreational Use" Cap are in compliance with the RDECs. In the absence of any recreational land use criteria, the RDECs are health protective criteria for recreational land use. The exposure assumptions used to calculate the RDECs would clearly overestimate likely recreational exposures. Therefore, the soils outside the proposed "Recreational Use" Cap represent a health protective condition for recreational land use.

SS-SI014
SS-202
SS-SI013
SS-SI019
SS-SI012
SS-SI018
SS-101
SS-211
SS-216
SS-212
SS-103
SS-213
SS-207
SS-214
SS-215
SS-206
SS-SI201
SS-104
SS-205
SS-306
SD-002
SS-208
SS-SI004
SS-SI001
SS-106
SS-209
SS-109

N
0 75 150
Feet

Legend

- Soil Sample
- Division of Phase I and III and access roads to cap and cove
- Approximate Waste Fill Area
- Wetland Buffer 12" Soil, Limited Clearing of Brush
- 12" Soil Cap with Geofabric
- 24" Soil Cap without Geofabric
- Former Slag Area 12" Soil Cap with Liner
- Approximate Park Parcel Boundary
- Elevation

Prepared/Date: BJR 10/19/07
Checked/Date: MJM 10/19/07

Former Gorham Maufacturing Site
333 Adelaide Avenue
Providence, RI

MACTEC

Soil Samples Outside Proposed Recreational Cap
Park Parcel

Project 3650-05-0041

Figure C-1

Document: P:\TEXTRON\GORHAM\GIS\MapDocuments\ParkParcel\RemediationOptions.mxd PDF: P:\TEXTRON\GORHAM\GIS\Figures\Figure C-1 - Soil Samples Outside Proposed Recreational Cap.pdf 10/19/2007 3:24 PM bjroden

Table C-1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average of Samples	DEC Residential (ppm)	GB Leachabiliity Criteria (ppm)	SD-002 GMSD0020 0101XX 10/13/1994	SD-002 SD-002D 3/12/2001
Volatile Organics (mg/kg)								
Acetone	2 / 5	0.0462 - 0.168	0.209 - 0.313	0.14	7800			
Semivolatile Organics (mg/kg)								
Anthracene	2 / 27	0.0261 - 3.3	0.0572 - 0.0811	0.177	35		3.3 U	0.468 U
Benzo(a)anthracene	10 / 27	0.0261 - 3.3	0.0332 - 0.623	0.218	0.9		3.3 U	0.468 U
Benzo(a)pyrene	11 / 27	0.0261 - 3.3	0.0273 - 0.694	0.226	0.4		3.3 U	0.468 U
Benzo(b)fluoranthene	10 / 27	0.0261 - 3.3	0.0867 - 1.07	0.252	0.9		3.3 U	0.468 U
Benzo(g,h,i)perylene	6 / 27	0.0261 - 3.3	0.0283 - 0.061	0.180	0.8		3.3 U	0.468 U
Benzo(k)fluoranthene	9 / 27	0.0261 - 3.3	0.0638 - 0.192	0.209	0.9		3.3 U	0.468 U
Chrysene	11 / 27	0.0261 - 3.3	0.0284 - 0.749	0.230	0.4		3.3 U	0.468 U
Dibenzo(a,h)anthracene	2 / 27	0.0261 - 3.3	0.0277 - 0.033	0.174	0.4		3.3 U	0.468 U
Fluoranthene	12 / 27	0.0261 - 3.3	0.0626 - 1.74	0.363	20		3.3 U	0.468 U
Fluorene	1 / 27	0.0261 - 3.3	0.0438 - 0.0438	0.174	28		3.3 U	0.468 U
Indeno(1,2,3-cd)pyrene	7 / 27	0.0261 - 3.3	0.0293 - 0.0682	0.181	0.9		3.3 U	0.468 U
Phenanthrene	10 / 27	0.0261 - 3.3	0.0364 - 0.906	0.239	40		3.3 U	0.468 U
Pyrene	12 / 27	0.0261 - 0.611	0.0375 - 6.92	0.475	13		6.92	0.468 U
Pesticide/PCBs (mg/kg)								
4,4'-DDE	3 / 14	0.00507 - 0.0061	0.0104 - 0.0165	0.0051	1.9			
4,4'-DDT	5 / 14	0.00507 - 0.0061	0.0085 - 0.0253	0.0077	1.9			
delta-BHC	1 / 14	0.00507 - 0.00617	0.00804 - 0.00804	0.0032	0.5			
Endosulfan II	1 / 14	0.00507 - 0.00617	0.0135 - 0.0135	0.0036	470			
Endrin ketone	1 / 14	0.00507 - 0.00617	0.0131 - 0.0131	0.0035	23			
gamma-Chlordane	1 / 14	0.00507 - 0.00617	0.00736 - 0.00736	0.0031	1.8			
Inorganics (mg/kg)								
Arsenic	15 / 20	1 - 3.4	1.5 - 5.1	2.59	7		3	2.75
Barium	6 / 7	13.7 - 13.7	12.6 - 54.9	25.05	5500			
Beryllium	8 / 19	0.06 - 1	0.131 - 0.3	0.15	0.4		1 U	
Cadmium	1 / 19	0.6 - 1	1 - 1	0.458	39		1	
Chromium	17 / 19	3 - 4	4 - 75	10.03	390		75	
Copper	20 / 20		3 - 1260	89.9	3100		1260	25
Lead	17 / 20	6 - 7	6.8 - 153	33.45	150		**153**	40.3
Mercury	5 / 19	0.032 - 0.5	0.055 - 0.145	0.0595	23		0.5 U	
Nickel	19 / 19		3 - 23	6.40	1000		23	
Silver	11 / 19	0.6 - 1	0.81 - 58	5.581	200		58	
Zinc	19 / 19		8 - 1020	76.2	6000		1020	
Total Petroleum Hydrocarbons (mg/kg)								
Total Petroleum Hydrocarbons	4 / 6	26 - 27	42 - 142	53.42	500		59	
Dioxins/Furans (mg/kg)								
TEQ - Mammal	20 / 20		0.00000087 - 0.0000085	0.0000021	0.0000043			

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Bolded values indicate a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table C-1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	SS-101 GMSS101X 01LDXX 5/27/1998	SS-101 SI101 SS- 6/8/2006	SS-103 GMSS103X 01LDXX 5/27/1998	SS-103 GMSS103X 01RAXX 4/15/1999	SS-104 GMSS104X 01LDXX 5/27/1998	SS-104 SS10401 2/28/2007	SS-106 GMSS106X 01LDXX 5/27/1998	SS-106 SS10601 2/28/2007	SS-109 GMSS109X 01LDXX 5/27/1998	SS-109 SS10901 2/28/2007
Volatile Organics (mg/kg)										
Acetone	0.168 U				0.209		0.313		0.161 U	
Semivolatile Organics (mg/kg)										
Anthracene		0.028 U		0.388 U	0.359 U		0.344 U		0.34 U	
Benzo(a)anthracene		0.108		0.388 U	0.359 U		0.344 U		0.34 U	
Benzo(a)pyrene		0.137		0.388 U	0.359 U		0.344 U		0.34 U	
Benzo(b)fluoranthene		0.174		0.388 U	0.359 U		0.344 U		0.34 U	
Benzo(g,h,i)perylene		0.0342		0.388 U	0.359 U		0.344 U		0.34 U	
Benzo(k)fluoranthene		0.128		0.388 U	0.359 U		0.344 U		0.34 U	
Chrysene		0.141		0.388 U	0.359 U		0.344 U		0.34 U	
Dibenzo(a,h)anthracene		0.028 U		0.388 U	0.359 U		0.344 U		0.34 U	
Fluoranthene		0.429		0.388 U	0.359 U		0.344 U		0.34 U	
Fluorene		0.028 U		0.388 U	0.359 U		0.344 U		0.34 U	
Indeno(1,2,3-cd)pyrene		0.0392		0.388 U	0.359 U		0.344 U		0.34 U	
Phenanthrene		0.123		0.388 U	0.359 U		0.344 U		0.34 U	
Pyrene		0.267		0.388 U	0.359 U		0.344 U		0.34 U	
Pesticide/PCBs (mg/kg)										
4,4'-DDE		0.0061 U								
4,4'-DDT		0.0061 U								
delta-BHC		0.0061 U								
Endosulfan II		0.0061 U								
Endrin ketone		0.0061 U								
gamma-Chlordane		0.0061 U								
Inorganics (mg/kg)										
Arsenic	4		5		3		3		1 U	
Barium										
Beryllium	0.2 U		0.2 U		0.2 U		0.2 U		0.2 U	
Cadmium	1 U		1 U		1 U		1 U		1 U	
Chromium	7		7		5		6		3 U	
Copper	12		13		6		42		3	
Lead	23		29		9		23		6 U	
Mercury	0.1 U		0.1		0.1 U		0.1		0.1 U	
Nickel	5		4		5		6		3	
Silver	2		1		1 U		14		1 U	
Zinc	11		10		11		17		11	
Total Petroleum Hydrocarbons (mg/kg)										
Total Petroleum Hydrocarbons	42		142		27 U		51		26 U	
Dioxins/Furans (mg/kg)										
TEQ - Mammal		0.0000016				0.0000009		0.0000020		0.0000010

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Bolded values indicate a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table C-1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	SS-202 GMSS202X 01RAXX 12/11/1998	SS-202 SS-SI202 6/7/2006	SS-205 GMSS205X 01RAXX 12/11/1998	SS-205 SS-SI205 6/8/2006	SS-206 GMSS206X 01RAXX 12/11/1998	SS-206 SS-SI206 6/6/2006	SS-207 GMSS207X 01RAXX 12/11/1998	SS-207 SS-SI207 6/6/2006	SS-208 GMSS208X 01RAXX 12/11/1998	SS-208 SS-SI208 6/6/2006
Volatile Organics (mg/kg)										
Acetone										
Semivolatile Organics (mg/kg)										
Anthracene		0.0572		0.0268 U		0.611 U		0.0277 U		0.0268 U
Benzo(a)anthracene		0.203		0.0268 U		0.611 U		0.0277 U		0.0615
Benzo(a)pyrene		0.203		0.0273		0.611 U		0.0277 U		0.0712
Benzo(b)fluoranthene		0.24		0.0268 U		0.611 U		0.0277 U		0.0867
Benzo(g,h,i)perylene		0.0578		0.0268 U		0.611 U		0.0277 U		0.0268 U
Benzo(k)fluoranthene		0.183		0.0268 U		0.611 U		0.0277 U		0.0728
Chrysene		0.229		0.0284		0.611 U		0.0277 U		0.0877
Dibenzo(a,h)anthracene		0.033		0.0268 U		0.611 U		0.0277 U		0.0268 U
Fluoranthene		0.646		0.0626		0.63		0.0277 U		0.196
Fluorene		0.0295 U		0.0268 U		0.611 U		0.0277 U		0.0268 U
Indeno(1,2,3-cd)pyrene		0.0636		0.0268 U		0.611 U		0.0277 U		0.0268 U
Phenanthrene		0.3		0.0268 U		0.611 U		0.0277 U		0.108
Pyrene		0.45		0.0375		0.611 U		0.0277 U		0.133
Pesticide/PCBs (mg/kg)										
4,4'-DDE		0.00578 U		0.00579 U		0.0136		0.00579 U		0.00559 U
4,4'-DDT		0.0085		0.00579 U		0.0253 P		0.00579 U		0.00559 U
delta-BHC		0.00578 U		0.00579 U		0.00617 U		0.00804 P		0.00559 U
Endosulfan II		0.00578 U		0.00579 U		0.00617 U		0.00579 U		0.00559 U
Endrin ketone		0.00578 U		0.00579 U		0.00617 U		0.00579 U		0.00559 U
gamma-Chlordane		0.00578 U		0.00579 U		0.00617 U		0.00579 U		0.00559 U
Inorganics (mg/kg)										
Arsenic	2.9		2.2		2.4		3.1		3.4	
Barium										
Beryllium	0.2		0.2		0.2		0.2		0.2	
Cadmium	1 U		1 U		1 U		1 U		1 U	
Chromium	5		4 U		4		4		4	
Copper	31		15		10		27		3	
Lead	61		22		25		98		7 U	
Mercury	0.07 U		0.07 U		0.07 U		0.07		0.06 U	
Nickel	8		3		3		3		3	
Silver	5		1 U		1		2		1 U	
Zinc	143		10		8		10		9	
Total Petroleum Hydrocarbons (mg/kg)										
Total Petroleum Hydrocarbons										
Dioxins/Furans (mg/kg)										
TEQ - Mammal		0.0000020		0.0000010		**0.0000085**		0.0000009		0.0000012

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Bolded values indicate a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table C-1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	SS-209 GMSS209X 01RAXX 12/11/1998	SS-209 SS-SI209 6/6/2006	SS-211 GMSS211X 01RAXX 12/11/1998	SS-212 GMSS212X 01RAXX 12/11/1998	SS-212 SS21201 2/28/2007	SS-213 GMSS213X 01RAXX 12/11/1998	SS-214 GMSS214X 01RAXX 12/11/1998	SS-215 GMSS215X 01RAXX 12/11/1998	SS-215 SS21501 2/28/2007	SS-216 GMSS216X 01RAXX 12/11/1998	SS-306 SS306XX01 0-1 8/6/2002
Volatile Organics (mg/kg)											
Acetone											
Semivolatile Organics (mg/kg)											
Anthracene		0.0283 U	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Benzo(a)anthracene		0.0736	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Benzo(a)pyrene		0.0923	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Benzo(b)fluoranthene		0.131	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Benzo(g,h,i)perylene		0.0283	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Benzo(k)fluoranthene		0.0861	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Chrysene		0.102	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Dibenzo(a,h)anthracene		0.0283 U	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Fluoranthene		0.289	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Fluorene		0.0283 U	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Indeno(1,2,3-cd)pyrene		0.03	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Phenanthrene		0.077	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Pyrene		0.175	0.375 U	0.37 U		0.375 U	0.379 U	0.379 U		0.383 U	0.337 U
Pesticide/PCBs (mg/kg)											
4,4'-DDE		0.00528 U									
4,4'-DDT		0.00528 U									
delta-BHC		0.00528 U									
Endosulfan II		0.00528 U									
Endrin ketone		0.00528 U									
gamma-Chlordane		0.00528 U									
Inorganics (mg/kg)											
Arsenic	4.1										3.4 U
Barium											13.7 U
Beryllium	0.3										0.131
Cadmium	1 U										0.687 U
Chromium	5										7.84
Copper	24										87.6
Lead	26										35.5
Mercury	0.06 U										0.0606 U
Nickel	4										3.67
Silver	3										4.81
Zinc	16										29.5
Total Petroleum Hydrocarbons (mg/kg)											
Total Petroleum Hydrocarbons											
Dioxins/Furans (mg/kg)											
TEQ - Mammal		0.0000037			0.0000009				0.0000011		

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Bolded values indicate a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table C-1
Comparison of Uncapped Park Parcel Soils Data to Applicable RIDEM Residential Direct Exposure Criteria

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	SS-SI001 SS-SI001 6/6/2006	SS-SI004 SS-SI004 6/5/2006	SS-SI012 SS-SI012 6/8/2006	SS-SI013 SS-SI013 6/8/2006	SS-SI014 SS-SI014 6/8/2006	SS-SI018 SS-SI018 6/8/2006	SS-SI019 SS-SI019 6/8/2006	SSSI-201 SSSI20101 2/28/2007
Volatile Organics (mg/kg)								
Acetone		0.0462 U						
Semivolatile Organics (mg/kg)								
Anthracene	0.581 U	0.0299 U	0.0277 U	0.0811	0.0261 U	0.0272 U	0.0264 U	
Benzo(a)anthracene	0.623	0.109	0.177	0.193	0.0261 U	0.0717	0.0332	
Benzo(a)pyrene	**0.694**	0.132	0.211	0.165	0.0261 U	0.0869	0.0585	
Benzo(b)fluoranthene	**1.07**	0.191	0.244	0.222	0.0261 U	0.125	0.0886	
Benzo(g,h,i)perylene	0.581 U	0.0401	0.061	0.0513	0.0261 U	0.0272 U	0.0264 U	
Benzo(k)fluoranthene	0.581 U	0.139	0.192	0.157	0.0261 U	0.0934	0.0638	
Chrysene	**0.749**	0.132	0.184	0.195	0.0261 U	0.0766	0.0427	
Dibenzo(a,h)anthracene	0.581 U	0.0299 U	0.0277	0.027 U	0.0261 U	0.0272 U	0.0264 U	
Fluoranthene	1.74	0.493 E	0.495	0.504	0.0261 U	0.273	0.116	
Fluorene	0.581 U	0.0299 U	0.0277 U	0.0438	0.0261 U	0.0272 U	0.0264 U	
Indeno(1,2,3-cd)pyrene	0.581 U	0.0418	0.0682	0.0573	0.0261 U	0.0293	0.0264 U	
Phenanthrene	0.906	0.12	0.0621	0.413	0.0261 U	0.0565	0.0364	
Pyrene	1.08	0.207	0.294	0.438	0.0261 U	0.171	0.0828	
Pesticide/PCBs (mg/kg)								
4,4'-DDE	0.0165	0.0104 P	0.00528 U	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
4,4'-DDT	0.0161	0.0237 P	0.00976	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
delta-BHC	0.0061 U	0.00607 U	0.00528 U	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
Endosulfan II	0.0135	0.00607 U	0.00528 U	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
Endrin ketone	0.0061 U	0.0131 P	0.00528 U	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
gamma-Chlordane	0.00736 P	0.00607 U	0.00528 U	0.00514 U	0.00507 U	0.00549 U	0.00554 U	
Inorganics (mg/kg)								
Arsenic		5.1	1.9	1.5 U	1.5	1.5 U	1.5 U	
Barium		12.6	12.7	54.9	36.1	29.4	22.8	
Beryllium		0.19	0.06 U	0.31 U	0.06 U	0.06 U	0.06 U	
Cadmium		0.67 U	0.61 U	0.61 U	0.6 U	0.6 U	0.61 U	
Chromium		6.1	7.4	10.8	9.8	11.8	11.4	
Copper		130	8.4	26.3	22.8	28.1	23.7	
Lead		74.7	15.4	8.5	9.3	6.8	6.1 U	
Mercury		0.145	0.055	0.034 U	0.032 U	0.034 U	0.032 U	
Nickel		4.6	3.3	11.1	9.3	10.4	9.3	
Silver		11.2	0.81	0.61 U	0.6 U	0.6 U	0.61 U	
Zinc		19.9	16.2	29.4	27.3	26.2	23.6	
Total Petroleum Hydrocarbons (mg/kg)								
Total Petroleum Hydrocarbons								
Dioxins/Furans (mg/kg)								
TEQ - Mammal	**0.0000045**	0.0000033	0.0000012	0.0000009	0.0000009	0.0000009	0.0000009	0.0000040

DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
Bolded values indicate a concentration greater than the RI RDEC.
mg/kg - milligrams per kilogram
U - not detected, value is the reporting limit

Table C-2
95 Percent UCLs for Uncapped Park Parcel Soils Data

Former Gorham Manufacturing Site
333 Adelaide Avenue
Providence, Rhode Island

Parameter	Frequency of Detection	Range of Nondetects	Range of Detected Concentrations	Average of Samples	95% UCL (1)	Statistic	DEC Residential (ppm)
Volatile Organics (mg/kg)							
Acetone	2 / 5	0.0462 - 0.168	0.209 - 0.313	0.14	NC		7800
Semivolatile Organics (mg/kg)							
Anthracene	2 / 27	0.0261 - 3.3	0.0572 - 0.0811	0.177	0.0811	95% KM (% Bootstrap) UCL	35
Benzo(a)anthracene	10 / 27	0.0261 - 3.3	0.0332 - 0.623	0.218	0.162	95% KM (t) UCL	0.9
Benzo(a)pyrene	11 / 27	0.0261 - 3.3	0.0273 - 0.694	0.226	0.177	95% KM (t) UCL	0.4
Benzo(b)fluoranthene	10 / 27	0.0261 - 3.3	0.0867 - 1.07	0.252	0.253	95% KM (% Bootstrap) UCL	0.9
Benzo(g,h,i)perylene	6 / 27	0.0261 - 3.3	0.0283 - 0.061	0.180	0.0475	95% KM (% Bootstrap) UCL	0.8
Benzo(k)fluoranthene	9 / 27	0.0261 - 3.3	0.0638 - 0.192	0.209	0.138	95% KM (% Bootstrap) UCL	0.9
Chrysene	11 / 27	0.0261 - 3.3	0.0284 - 0.749	0.230	0.186	95% KM (t) UCL	0.4
Dibenzo(a,h)anthracene	2 / 27	0.0261 - 3.3	0.0277 - 0.033	0.174	0.0292	95% KM (t) UCL	0.4
Fluoranthene	12 / 27	0.0261 - 3.3	0.0626 - 1.74	0.363	0.426	95% KM (t) UCL	20
Fluorene	1 / 27	0.0261 - 3.3	0.0438 - 0.0438	0.174	NC		28
Indeno(1,2,3-cd)pyrene	7 / 27	0.0261 - 3.3	0.0293 - 0.0682	0.181	0.0483	95% KM (% Bootstrap) UCL	0.9
Phenanthrene	10 / 27	0.0261 - 3.3	0.0364 - 0.906	0.239	0.205	95% KM (t) UCL	40
Pyrene	12 / 27	0.0261 - 0.611	0.0375 - 6.92	0.475	1.002	95% KM (BCA) UCL	13
Pesticide/PCBs (mg/kg)							
4,4'-DDE	3 / 14	0.00507 - 0.0061	0.0104 - 0.0165	0.0051	NC		1.9
4,4'-DDT	5 / 14	0.00507 - 0.0061	0.0085 - 0.0253	0.0077	NC		1.9
delta-BHC	1 / 14	0.00507 - 0.00617	0.00804 - 0.00804	0.0032	NC		0.5
Endosulfan II	1 / 14	0.00507 - 0.00617	0.0135 - 0.0135	0.0036	NC		470
Endrin ketone	1 / 14	0.00507 - 0.00617	0.0131 - 0.0131	0.0035	NC		23
gamma-Chlordane	1 / 14	0.00507 - 0.00617	0.00736 - 0.00736	0.0031	NC		1.8
Inorganics (mg/kg)							
Arsenic	15 / 20	1 - 3.4	1.5 - 5.1	2.59	3.255	95% KM (% Bootstrap) UCL	7
Barium	6 / 7	13.7 - 13.7	12.6 - 54.9	25.05	NC		5500
Beryllium	8 / 19	0.06 - 1	0.131 - 0.3	0.15	NC		0.4
Cadmium	1 / 19	0.6 - 1	1 - 1	0.458	NC		39
Chromium	17 / 19	3 - 4	4 - 75	10.03	NC		390
Copper	20 / 20		3 - 1260	89.9	706.3	99% Chebyshev (Mean, Sd) UCL	3100
Lead	17 / 20	6 - 7	6.8 - 153	33.45	50.53	95% KM (BCA) UCL	150
Mercury	5 / 19	0.032 - 0.5	0.055 - 0.145	0.0595	NC		23
Nickel	19 / 19		3 - 23	6.40	NC		1000
Silver	11 / 19	0.6 - 1	0.81 - 58	5.581	NC		200
Zinc	19 / 19		8 - 1020	76.2	NC		6000
Total Petroleum Hydrocarbons (mg/kg)							
Total Petroleum Hydrocarbons	4 / 6	26 - 27	42 - 142	53.42	NC		500
Dioxins/Furans (mg/kg)							
TEQ - Mammal	20 / 20		0.00000087 - 0.0000085	0.0000021	0.0000039	95% Chebyshev (Mean, Sd) UCL	0.0000043

(1) - 95% Upper Confidence Limit (UCL) calculated using ProUCL version 4.0 using nondetects.
DEC - Direct Exposure Criteria
TEQ - calculated using 2005 WHO TEFs.
mg/kg - milligrams per kilogram
NC - Not calculated

General UCL Statistics for Data Sets with Non-Detects

User Selected Options	
From File	P:\TEXTRON\GORHAM\Database\ProUCL-SoilOutsideCap.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Anthracene

General Statistics

Number of Valid Samples	27	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	25
		Percent Non-Detects	92.59%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0572	Minimum Detected	-2.861
Maximum Detected	0.0811	Maximum Detected	-2.512
Mean of Detected	0.0692	Mean of Detected	-2.687
SD of Detected	0.0169	SD of Detected	0.247
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.177	Mean	-2.604
SD	0.31	SD	1.419
95% DL/2 (t) UCL	0.278	95% H-Stat (DL/2) UCL	0.623
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.359	Nonparametric Statistics	

5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0592
5% K-S Critical Value	N/A	SD	0.00661

Data not Gamma Distributed at 5% Sig

MLE method failed to converge properly		Mean in Log Scale	-2.6
		SD in Log Scale	0.722
		Mean in Original Scale	0.1
		SD in Original Scale	0.114
		95% Percentile Bootstrap UCL	0.14
		95% BCA Bootstrap UCL	0.164
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.222	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.135		
nu star	24.44		
A-D Test Statistic	0.494	Nonparametric Statistics	
5% A-D Critical Value	0.738	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.738	Mean	0.114
5% K-S Critical Value	0.271	SD	0.118
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0277
		95% KM (t) UCL	0.162
Assuming Gamma Distribution		95% KM (z) UCL	0.16
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.158
Minimum	0.00782	95% KM (bootstrap t) UCL	0.183
Maximum	0.623	95% KM (BCA) UCL	0.17
Mean	0.171	95% KM (Percentile Bootstrap) UCL	0.166
Median	0.203	95% KM (Chebyshev) UCL	0.235
SD	0.123	97.5% KM (Chebyshev) UCL	0.288
k star	1.309	99% KM (Chebyshev) UCL	0.39
Theta star	0.131		
Nu star	70.66	Potential UCLs to Use	
AppChi2	52.31	95% KM (t) UCL	0.162
95% Gamma Approximate UCL	0.231		
95% Adjusted Gamma UCL	0.235		
Note: DL/2 is not a recommended method.			

Benzo(a)pyrene

General Statistics

Number of Valid Samples	27	Number of Detected Data	11
Number of Unique Samples	11	Number of Non-Detect Data	16
		Percent Non-Detects	59.26%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0273	Minimum Detected	-3.601
Maximum Detected	0.694	Maximum Detected	-0.365
Mean of Detected	0.171	Mean of Detected	-2.113
SD of Detected	0.183	SD of Detected	0.834
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.653	Shapiro Wilk Test Statistic	0.967
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.226	Mean	-1.951
SD	0.311	SD	0.999
95% DL/2 (t) UCL	0.328	95% H-Stat (DL/2) UCL	0.607
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.434
		SD in Log Scale	0.692
		Mean in Original Scale	0.115
		SD in Original Scale	0.125
		95% Percentile Bootstrap UCL	0.158
		95% BCA Bootstrap UCL	0.183
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.221	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.14		
nu star	26.87		
A-D Test Statistic	0.487	**Nonparametric Statistics**	
5% A-D Critical Value	0.742	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.742	Mean	0.126
5% K-S Critical Value	0.259	SD	0.129
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0298
		95% KM (t) UCL	0.177
Assuming Gamma Distribution		95% KM (z) UCL	0.175
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.174
Minimum	0	95% KM (bootstrap t) UCL	0.206
Maximum	0.694	95% KM (BCA) UCL	0.189
Mean	0.171	95% KM (Percentile Bootstrap) UCL	0.179
Median	0.195	95% KM (Chebyshev) UCL	0.256
SD	0.128	97.5% KM (Chebyshev) UCL	0.312
k star	0.604	99% KM (Chebyshev) UCL	0.422
Theta star	0.283		
Nu star	32.62	Potential UCLs to Use	
AppChi2	20.57	95% KM (t) UCL	0.177
95% Gamma Approximate UCL	0.271		
95% Adjusted Gamma UCL	0.279		

Note: DL/2 is not a recommended method.

Benzo(b)fluoranthene

General Statistics

Number of Valid Samples	27	Number of Detected Data	10
Number of Unique Samples	10	Number of Non-Detect Data	17
		Percent Non-Detects	62.96%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0867	Minimum Detected	-2.445
Maximum Detected	1.07	Maximum Detected	0.0677
Mean of Detected	0.257	Mean of Detected	-1.666
SD of Detected	0.291	SD of Detected	0.719
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.556	Shapiro Wilk Test Statistic	0.847
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.252	Mean	-1.867
SD	0.337	SD	1.066
95% DL/2 (t) UCL	0.363	95% H-Stat (DL/2) UCL	0.627
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.072
		SD in Log Scale	0.63
		Mean in Original Scale	0.163
		SD in Original Scale	0.189
		95% Percentile Bootstrap UCL	0.231
		95% BCA Bootstrap UCL	0.281
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.306	Data appear Lognormal at 5% Significance Level	
Theta Star	0.197		
nu star	26.12		
A-D Test Statistic	1.02	Nonparametric Statistics	
5% A-D Critical Value	0.737	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.737	Mean	0.182
5% K-S Critical Value	0.27	SD	0.187
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0408
		95% KM (t) UCL	0.252
Assuming Gamma Distribution		95% KM (z) UCL	0.25
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.25
Minimum	0.0225	95% KM (bootstrap t) UCL	0.326
Maximum	1.07	95% KM (BCA) UCL	0.274
Mean	0.266	95% KM (Percentile Bootstrap) UCL	0.253
Median	0.244	95% KM (Chebyshev) UCL	0.36
SD	0.201	97.5% KM (Chebyshev) UCL	0.437
k star	1.593	99% KM (Chebyshev) UCL	0.589
Theta star	0.167		

Nu star	86.04	Potential UCLs to Use	
AppChi2	65.66	95% KM (t) UCL	0.252
95% Gamma Approximate UCL	0.349	95% KM (% Bootstrap) UCL	0.253
95% Adjusted Gamma UCL	0.355		

Note: DL/2 is not a recommended method.

Benzo(g,h,i)perylene

General Statistics

Number of Valid Samples	27	Number of Detected Data	6
Number of Unique Samples	6	Number of Non-Detect Data	21
		Percent Non-Detects	77.78%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0283	Minimum Detected	-3.565
Maximum Detected	0.061	Maximum Detected	-2.797
Mean of Detected	0.0455	Mean of Detected	-3.129
SD of Detected	0.0133	SD of Detected	0.307
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.934	Shapiro Wilk Test Statistic	0.932
5% Shapiro Wilk Critical Value	0.788	5% Shapiro Wilk Critical Value	0.788
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	

Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.18	Mean	-2.47
SD	0.308	SD	1.286
95% DL/2 (t) UCL	0.281	95% H-Stat (DL/2) UCL	0.574
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.578
		SD in Log Scale	0.347
		Mean in Original Scale	0.0297
		SD in Original Scale	0.0115
		95% Percentile Bootstrap UCL	0.0336
		95% BCA Bootstrap UCL	0.0342

Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	6.782	Data appear Normal at 5% Significance Level	
Theta Star	0.0067		
nu star	81.39		
A-D Test Statistic	0.291	Nonparametric Statistics	
5% A-D Critical Value	0.698	Kaplan-Meier (KM) Method	

K-S Test Statistic	0.698	Mean	0.0369
5% K-S Critical Value	0.332	SD	0.0121
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00383
		95% KM (t) UCL	0.0434
Assuming Gamma Distribution		95% KM (z) UCL	0.0432
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0429
Minimum	0.0283	95% KM (bootstrap t) UCL	0.044
Maximum	0.0639	95% KM (BCA) UCL	0.0535
Mean	0.0523	95% KM (Percentile Bootstrap) UCL	0.0475
Median	0.058	95% KM (Chebyshev) UCL	0.0536
SD	0.00907	97.5% KM (Chebyshev) UCL	0.0608
k star	26.16	99% KM (Chebyshev) UCL	0.075
Theta star	0.002		
Nu star	1413	Potential UCLs to Use	
AppChi2	1327	95% KM (t) UCL	0.0434
95% Gamma Approximate UCL	0.0557	95% KM (Percentile Bootstrap) UCL	0.0475
95% Adjusted Gamma UCL	0.0559		

Note: DL/2 is not a recommended method.

Benzo(k)fluoranthene

General Statistics

Number of Valid Samples	27	Number of Detected Data	9
Number of Unique Samples	9	Number of Non-Detect Data	18
		Percent Non-Detects	66.67%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0638	Minimum Detected	-2.752
Maximum Detected	0.192	Maximum Detected	-1.65
Mean of Detected	0.124	Mean of Detected	-2.158
SD of Detected	0.0475	SD of Detected	0.404
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.93	Shapiro Wilk Test Statistic	0.933
5% Shapiro Wilk Critical Value	0.829	5% Shapiro Wilk Critical Value	0.829
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.209	Mean	-2.015
SD	0.297	SD	1.007
95% DL/2 (t) UCL	0.307	95% H-Stat (DL/2) UCL	0.549
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.4

		SD in Log Scale	0.378
		Mean in Original Scale	0.0971
		SD in Original Scale	0.0372
		95% Percentile Bootstrap UCL	0.109
		95% BCA Bootstrap UCL	0.111
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	4.947	Data appear Normal at 5% Significance Level	
Theta Star	0.025		
nu star	89.04		
A-D Test Statistic	0.304	Nonparametric Statistics	
5% A-D Critical Value	0.722	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.722	Mean	0.109
5% K-S Critical Value	0.28	SD	0.0467
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0143
		95% KM (t) UCL	0.133
Assuming Gamma Distribution		95% KM (z) UCL	0.132
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.133
Minimum	0.0638	95% KM (bootstrap t) UCL	0.136
Maximum	0.192	95% KM (BCA) UCL	0.137
Mean	0.133	95% KM (Percentile Bootstrap) UCL	0.138
Median	0.152	95% KM (Chebyshev) UCL	0.171
SD	0.0387	97.5% KM (Chebyshev) UCL	0.198
k star	8.83	99% KM (Chebyshev) UCL	0.251
Theta star	0.015		
Nu star	476.8	Potential UCLs to Use	
AppChi2	427.2	95% KM (t) UCL	0.133
95% Gamma Approximate UCL	0.148	95% KM (Percentile Bootstrap) UCL	0.138
95% Adjusted Gamma UCL	0.149		
Note: DL/2 is not a recommended method.			

Chrysene

General Statistics

Number of Valid Samples	27	Number of Detected Data	11
Number of Unique Samples	11	Number of Non-Detect Data	16
		Percent Non-Detects	59.26%
Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0284	Minimum Detected	-3.561
Maximum Detected	0.749	Maximum Detected	-0.289
Mean of Detected	0.179	Mean of Detected	-2.098
SD of Detected	0.199	SD of Detected	0.877
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.651	Shapiro Wilk Test Statistic	0.969
5% Shapiro Wilk Critical Value	0.85	5% Shapiro Wilk Critical Value	0.85
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.23	Mean	-1.945
SD	0.314	SD	1.012
95% DL/2 (t) UCL	0.333	95% H-Stat (DL/2) UCL	0.626
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.451
		SD in Log Scale	0.74
		Mean in Original Scale	0.117
		SD in Original Scale	0.136
		95% Percentile Bootstrap UCL	0.165
		95% BCA Bootstrap UCL	0.195
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.131	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.158		
nu star	24.89		
A-D Test Statistic	0.452	Nonparametric Statistics	
5% A-D Critical Value	0.743	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.743	Mean	0.131
5% K-S Critical Value	0.26	SD	0.14
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0321
		95% KM (t) UCL	0.186
Assuming Gamma Distribution		95% KM (z) UCL	0.184
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.184
Minimum	0	95% KM (bootstrap t) UCL	0.214
Maximum	0.749	95% KM (BCA) UCL	0.195
Mean	0.179	95% KM (Percentile Bootstrap) UCL	0.189
Median	0.204	95% KM (Chebyshev) UCL	0.271
SD	0.139	97.5% KM (Chebyshev) UCL	0.331
k star	0.408	99% KM (Chebyshev) UCL	0.45
Theta star	0.438		
Nu star	22.03	Potential UCLs to Use	
AppChi2	12.36	95% KM (t) UCL	0.186
95% Gamma Approximate UCL	0.318		
95% Adjusted Gamma UCL	0.331		

Note: DL/2 is not a recommended method.

Dibenzo(a,h)anthracene

General Statistics			
Number of Valid Samples	27	Number of Detected Data	2
Number of Unique Samples	2	Number of Non-Detect Data	25
		Percent Non-Detects	92.59%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0277	Minimum Detected	-3.586
Maximum Detected	0.033	Maximum Detected	-3.411
Mean of Detected	0.0304	Mean of Detected	-3.499
SD of Detected	0.00375	SD of Detected	0.124
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	1	Shapiro Wilk Test Statistic	1
5% Shapiro Wilk Critical Value	N/A	5% Shapiro Wilk Critical Value	N/A
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.174	Mean	-2.665
SD	0.311	SD	1.439
95% DL/2 (t) UCL	0.276	95% H-Stat (DL/2) UCL	0.523
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	N/A
		SD in Log Scale	N/A
		Mean in Original Scale	N/A
		SD in Original Scale	N/A
		95% Percentile Bootstrap UCL	N/A
		95% BCA Bootstrap UCL	N/A
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	N/A	Data do not follow a Discernable Distribution (0.05)	
Theta Star	N/A		
nu star	N/A		
A-D Test Statistic	0.359	**Nonparametric Statistics**	
5% A-D Critical Value	N/A	Kaplan-Meier (KM) Method	
K-S Test Statistic	N/A	Mean	0.0281
5% K-S Critical Value	N/A	SD	0.00146
Data not Gamma Distributed at 5% Significance Level		SE of Mean	5.9802E-4
		95% KM (t) UCL	0.0292
Assuming Gamma Distribution		95% KM (z) UCL	0.0291
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0315
Minimum	N/A	95% KM (bootstrap t) UCL	Infinity
Maximum	N/A	95% KM (BCA) UCL	0.033
Mean	N/A	95% KM (Percentile Bootstrap) UCL	N/A
Median	N/A	95% KM (Chebyshev) UCL	0.0307
SD	N/A	97.5% KM (Chebyshev) UCL	0.0319
k star	N/A	99% KM (Chebyshev) UCL	0.0341
Theta star	N/A		
Nu star	N/A	Potential UCLs to Use	

AppChi2	N/A	95% KM (t) UCL	0.0292
95% Gamma Approximate UCL	N/A	95% KM (% Bootstrap) UCL	N/A
95% Adjusted Gamma UCL	N/A		

Note: DL/2 is not a recommended method.

Fluoranthene

General Statistics

Number of Valid Samples	27	Number of Detected Data	12
Number of Unique Samples	12	Number of Non-Detect Data	15
		Percent Non-Detects	55.56%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0626	Minimum Detected	-2.771
Maximum Detected	1.74	Maximum Detected	0.554
Mean of Detected	0.489	Mean of Detected	-1.032
SD of Detected	0.438	SD of Detected	0.87
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.746	Shapiro Wilk Test Statistic	0.954
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.363	Mean	-1.505
SD	0.419	SD	1.095
95% DL/2 (t) UCL	0.501	95% H-Stat (DL/2) UCL	0.834
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.718
		SD in Log Scale	0.901
		Mean in Original Scale	0.28
		SD in Original Scale	0.344
		95% Percentile Bootstrap UCL	0.393
		95% BCA Bootstrap UCL	0.444
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	1.348	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	0.363		
nu star	32.36		
A-D Test Statistic	0.356	**Nonparametric Statistics**	
5% A-D Critical Value	0.744	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.744	Mean	0.301

5% K-S Critical Value	0.249	SD	0.341
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.073
		95% KM (t) UCL	0.426
Assuming Gamma Distribution		95% KM (z) UCL	0.421
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.419
Minimum	0.0626	95% KM (bootstrap t) UCL	0.491
Maximum	1.74	95% KM (BCA) UCL	0.468
Mean	0.48	95% KM (Percentile Bootstrap) UCL	0.438
Median	0.496	95% KM (Chebyshev) UCL	0.619
SD	0.294	97.5% KM (Chebyshev) UCL	0.757
k star	3.025	99% KM (Chebyshev) UCL	1.028
Theta star	0.159		
Nu star	163.3	Potential UCLs to Use	
AppChi2	134.8	95% KM (t) UCL	0.426
95% Gamma Approximate UCL	0.582		
95% Adjusted Gamma UCL	0.589		
Note: DL/2 is not a recommended method.			

Indeno(1,2,3-cd)pyrene

General Statistics

Number of Valid Samples	27	Number of Detected Data	7
Number of Unique Samples	7	Number of Non-Detect Data	20
		Percent Non-Detects	74.07%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0293	Minimum Detected	-3.53
Maximum Detected	0.0682	Maximum Detected	-2.685
Mean of Detected	0.0471	Mean of Detected	-3.107
SD of Detected	0.0159	SD of Detected	0.347
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.898	Shapiro Wilk Test Statistic	0.901
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.181	Mean	-2.422
SD	0.307	SD	1.242
95% DL/2 (t) UCL	0.282	95% H-Stat (DL/2) UCL	0.617
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-3.499
		SD in Log Scale	0.371

		Mean in Original Scale	0.0324
		SD in Original Scale	0.0131
		95% Percentile Bootstrap UCL	0.0365
		95% BCA Bootstrap UCL	0.0369
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	5.81	Data appear Normal at 5% Significance Level	
Theta Star	0.0081		
nu star	81.33		
A-D Test Statistic	0.382	Nonparametric Statistics	
5% A-D Critical Value	0.708	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.708	Mean	0.0397
5% K-S Critical Value	0.312	SD	0.0143
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00445
		95% KM (t) UCL	0.0472
Assuming Gamma Distribution		95% KM (z) UCL	0.047
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.047
Minimum	0.0293	95% KM (bootstrap t) UCL	0.0487
Maximum	0.0711	95% KM (BCA) UCL	0.0506
Mean	0.0542	95% KM (Percentile Bootstrap) UCL	0.0483
Median	0.0625	95% KM (Chebyshev) UCL	0.059
SD	0.0129	97.5% KM (Chebyshev) UCL	0.0674
k star	14.16	99% KM (Chebyshev) UCL	0.0839
Theta star	0.00383		
Nu star	764.5	Potential UCLs to Use	
AppChi2	701.4	95% KM (t) UCL	0.0472
95% Gamma Approximate UCL	0.0591	95% KM (Percentile Bootstrap) UCL	0.0483
95% Adjusted Gamma UCL	0.0594		
Note: DL/2 is not a recommended method.			

Phenanthrene

General Statistics

Number of Valid Samples	27	Number of Detected Data	10
Number of Unique Samples	10	Number of Non-Detect Data	17
		Percent Non-Detects	62.96%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	0.0364	Minimum Detected	-3.313
Maximum Detected	0.906	Maximum Detected	-0.0987
Mean of Detected	0.22	Mean of Detected	-2.016
SD of Detected	0.269	SD of Detected	0.999
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	3.3	Maximum Non-Detect	1.194
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	27
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	0
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	100.00%

UCL Statistics

Normal Distribution Test with Detected Values Only	Lognormal Distribution Test with Detected Values Only

Shapiro Wilk Test Statistic	0.696	Shapiro Wilk Test Statistic	0.936
5% Shapiro Wilk Critical Value	0.842	5% Shapiro Wilk Critical Value	0.842
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.239	Mean	-1.997
SD	0.33	SD	1.131
95% DL/2 (t) UCL	0.347	95% H-Stat (DL/2) UCL	0.722
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.657
		SD in Log Scale	0.891
		Mean in Original Scale	0.116
		SD in Original Scale	0.179
		95% Percentile Bootstrap UCL	0.175
		95% BCA Bootstrap UCL	0.219
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	0.859	Data Follow Appr. Gamma Distribution at 5% Significance Level	
Theta Star	0.256		
nu star	17.19		
A-D Test Statistic	0.628	Nonparametric Statistics	
5% A-D Critical Value	0.746	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.746	Mean	0.135
5% K-S Critical Value	0.273	SD	0.182
Data follow Appr. Gamma Distribution at 5% Significance Level		SE of Mean	0.0409
		95% KM (t) UCL	0.205
Assuming Gamma Distribution		95% KM (z) UCL	0.202
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.2
Minimum	0	95% KM (bootstrap t) UCL	0.276
Maximum	0.906	95% KM (BCA) UCL	0.213
Mean	0.212	95% KM (Percentile Bootstrap) UCL	0.205
Median	0.245	95% KM (Chebyshev) UCL	0.313
SD	0.185	97.5% KM (Chebyshev) UCL	0.391
k star	0.297	99% KM (Chebyshev) UCL	0.542
Theta star	0.713		
Nu star	16.05	Potential UCLs to Use	
AppChi2	7.995	95% KM (t) UCL	0.205
95% Gamma Approximate UCL	0.425		
95% Adjusted Gamma UCL	0.445		
Note: DL/2 is not a recommended method.			

Pyrene

General Statistics			
Number of Valid Samples	27	Number of Detected Data	12
Number of Unique Samples	12	Number of Non-Detect Data	15
		Percent Non-Detects	55.56%
Raw Statistics		Log-transformed Statistics	

Minimum Detected	0.0375	Minimum Detected	-3.283
Maximum Detected	6.92	Maximum Detected	1.934
Mean of Detected	0.855	Mean of Detected	-1.253
SD of Detected	1.93	SD of Detected	1.32
Minimum Non-Detect	0.0261	Minimum Non-Detect	-3.646
Maximum Non-Detect	0.611	Maximum Non-Detect	-0.493
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	25
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	2
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	92.59%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.437	Shapiro Wilk Test Statistic	0.921
5% Shapiro Wilk Critical Value	0.859	5% Shapiro Wilk Critical Value	0.859
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.475	Mean	-1.666
SD	1.303	SD	1.169
95% DL/2 (t) UCL	0.903	95% H-Stat (DL/2) UCL	0.752
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-1.943
		SD in Log Scale	1.173
		Mean in Original Scale	0.433
		SD in Original Scale	1.313
		95% Percentile Bootstrap UCL	0.917
		95% BCA Bootstrap UCL	1.218
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.482	Data appear Lognormal at 5% Significance Level	
Theta Star	1.773		
nu star	11.57		
A-D Test Statistic	1.354	**Nonparametric Statistics**	
5% A-D Critical Value	0.78	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.78	Mean	0.454
5% K-S Critical Value	0.258	SD	1.285
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.259
		95% KM (t) UCL	0.896
Assuming Gamma Distribution		95% KM (z) UCL	0.88
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.879
Minimum	0.0375	95% KM (bootstrap t) UCL	3.011
Maximum	6.92	95% KM (BCA) UCL	1.002
Mean	0.863	95% KM (Percentile Bootstrap) UCL	0.945
Median	0.857	95% KM (Chebyshev) UCL	1.583
SD	1.255	97.5% KM (Chebyshev) UCL	2.071
k star	1.06	99% KM (Chebyshev) UCL	3.031
Theta star	0.814		
Nu star	57.24	Potential UCLs to Use	
AppChi2	40.85	95% KM (BCA) UCL	1.002

95% Gamma Approximate UCL	1.209
95% Adjusted Gamma UCL	1.236

Note: DL/2 is not a recommended method.

Arsenic

General Statistics

Number of Valid Samples	20	Number of Detected Data	15
Number of Unique Samples	13	Number of Non-Detect Data	5
		Percent Non-Detects	25.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	1.5	Minimum Detected	0.405
Maximum Detected	5.1	Maximum Detected	1.629
Mean of Detected	3.157	Mean of Detected	1.098
SD of Detected	1.034	SD of Detected	0.336
Minimum Non-Detect	1	Minimum Non-Detect	0
Maximum Non-Detect	3.4	Maximum Non-Detect	1.224
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	15
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	5
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	75.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.945	Shapiro Wilk Test Statistic	0.965
5% Shapiro Wilk Critical Value	0.881	5% Shapiro Wilk Critical Value	0.881
Data appear Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	2.59	Mean	0.772
SD	1.359	SD	0.679
95% DL/2 (t) UCL	3.115	95% H-Stat (DL/2) UCL	2.8
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	2.429	Mean in Log Scale	0.934
SD	1.468	SD in Log Scale	0.422
95% MLE (t) UCL	2.996	Mean in Original Scale	2.764
95% MLE (Tiku) UCL	3.561	SD in Original Scale	1.141
		95% Percentile Bootstrap UCL	3.172
		95% BCA Bootstrap UCL	3.199
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	7.986	Data appear Normal at 5% Significance Level	
Theta Star	0.395		
nu star	239.6		
A-D Test Statistic	0.28	**Nonparametric Statistics**	
5% A-D Critical Value	0.737	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.737	Mean	2.781
5% K-S Critical Value	0.222	SD	1.103

Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.258
		95% KM (t) UCL	3.226
Assuming Gamma Distribution		95% KM (z) UCL	3.205
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	3.199
Minimum	1.485	95% KM (bootstrap t) UCL	3.227
Maximum	5.1	95% KM (BCA) UCL	3.375
Mean	2.933	95% KM (Percentile Bootstrap) UCL	3.255
Median	2.95	95% KM (Chebyshev) UCL	3.904
SD	1.021	97.5% KM (Chebyshev) UCL	4.39
k star	7.636	99% KM (Chebyshev) UCL	5.345
Theta star	0.384		
Nu star	305.4	Potential UCLs to Use	
AppChi2	265.9	95% KM (t) UCL	3.226
95% Gamma Approximate UCL	3.369	95% KM (Percentile Bootstrap) UCL	3.255
95% Adjusted Gamma UCL	3.406		
Note: DL/2 is not a recommended method.			

Copper

General Statistics

Number of Valid Samples	20	Number of Unique Samples	19

Raw Statistics		Log-transformed Statistics	
Minimum	3	Minimum of Log Data	1.099
Maximum	1260	Maximum of Log Data	7.139
Mean	89.9	Mean of log Data	3.121
Median	23.85	SD of log Data	1.34
SD	277.1		
Coefficient of Variation	3.082		
Skewness	4.387		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.309	Shapiro Wilk Test Statistic	0.892
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	197	95% H-UCL	144.3
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	130.5
95% Adjusted-CLT UCL	256.7	97.5% Chebyshev (MVUE) UCL	164.7
95% Modified-t UCL	207.2	99% Chebyshev (MVUE) UCL	231.8
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.43	Data do not follow a Discernable Distribution (0.05)	
Theta Star	209.3		
nu star	17.18		
Approximate Chi Square Value (.05)	8.802	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	191.8
Adjusted Chi Square Value	8.33	95% Jackknife UCL	197
		95% Standard Bootstrap UCL	187.1
Anderson-Darling Test Statistic	2.719	95% Bootstrap-t UCL	1153

Anderson-Darling 5% Critical Value	0.81	95% Hall's Bootstrap UCL	752.8
Kolmogorov-Smirnov Test Statistic	0.342	95% Percentile Bootstrap UCL	211.2
Kolmogorov-Smirnov 5% Critical Value	0.206	95% BCA Bootstrap UCL	281.6
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	359.9
		97.5% Chebyshev(Mean, Sd) UCL	476.8
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	706.3
95% Approximate Gamma UCL	175.5		
95% Adjusted Gamma UCL	185.4		
Potential UCL to Use		Use 99% Chebyshev (Mean, Sd) UCL	706.3

Lead

General Statistics

Number of Valid Samples	20	Number of Detected Data	17
Number of Unique Samples	16	Number of Non-Detect Data	3
		Percent Non-Detects	15.00%

Raw Statistics		Log-transformed Statistics	
Minimum Detected	6.8	Minimum Detected	1.917
Maximum Detected	153	Maximum Detected	5.03
Mean of Detected	38.79	Mean of Detected	3.278
SD of Detected	38.59	SD of Detected	0.887
Minimum Non-Detect	6	Minimum Non-Detect	1.792
Maximum Non-Detect	7	Maximum Non-Detect	1.946
Note: Data have multiple DLs - Use of KM Method is recommended		Number treated as Non-Detect	4
For all methods (except KM, DL/2, and ROS Methods),		Number treated as Detected	16
Observations < Largest ND are treated as NDs		Single DL Non-Detect Percentage	20.00%

UCL Statistics

Normal Distribution Test with Detected Values Only		Lognormal Distribution Test with Detected Values Only	
Shapiro Wilk Test Statistic	0.762	Shapiro Wilk Test Statistic	0.961
5% Shapiro Wilk Critical Value	0.892	5% Shapiro Wilk Critical Value	0.892
Data not Normal at 5% Significance Level		Data appear Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	33.45	Mean	2.96
SD	37.74	SD	1.126
95% DL/2 (t) UCL	48.04	95% H-Stat (DL/2) UCL	52.85
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	28.55	Mean in Log Scale	2.978
SD	42.83	SD in Log Scale	1.096
95% MLE (t) UCL	45.11	Mean in Original Scale	33.52
95% MLE (Tiku) UCL	45.04	SD in Original Scale	37.68
		95% Percentile Bootstrap UCL	47.5
		95% BCA Bootstrap UCL	50.36
Gamma Distribution Test with Detected Values Only		Data Distribution Test with Detected Values Only	
k star (bias corrected)	1.242	Data appear Gamma Distributed at 5% Significance Level	

Theta Star	31.24		
nu star	42.21		
A-D Test Statistic	0.504	Nonparametric Statistics	
5% A-D Critical Value	0.756	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.756	Mean	34
5% K-S Critical Value	0.213	SD	36.35
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	8.379
		95% KM (t) UCL	48.48
Assuming Gamma Distribution		95% KM (z) UCL	47.78
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	48.24
Minimum	0	95% KM (bootstrap t) UCL	58.11
Maximum	153	95% KM (BCA) UCL	50.53
Mean	32.98	95% KM (Percentile Bootstrap) UCL	49.38
Median	23	95% KM (Chebyshev) UCL	70.52
SD	38.15	97.5% KM (Chebyshev) UCL	86.32
k star	0.198	99% KM (Chebyshev) UCL	117.4
Theta star	166.5		
Nu star	7.92	Potential UCLs to Use	
AppChi2	2.689	95% KM (BCA) UCL	50.53
95% Gamma Approximate UCL	97.13		
95% Adjusted Gamma UCL	106.4		

Note: DL/2 is not a recommended method.

TEQ_ng/kg

General Statistics

Number of Valid Samples	20	Number of Unique Samples	20

Raw Statistics		Log-transformed Statistics	
Minimum	0.871	Minimum of Log Data	-0.138
Maximum	8.539	Maximum of Log Data	2.145
Mean	2.078	Mean of log Data	0.463
Median	1.127	SD of log Data	0.685
SD	1.918		
Coefficient of Variation	0.923		
Skewness	2.333		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.671	Shapiro Wilk Test Statistic	0.811
Shapiro Wilk Critical Value	0.905	Shapiro Wilk Critical Value	0.905
Data not Normal at 5% Significance Level		Data not Lognormal at 5% Significance Level	
Assuming Normal Distribution		Assuming Lognormal Distribution	
95% Student's-t UCL	2.82	95% H-UCL	2.838
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	3.391
95% Adjusted-CLT UCL	3.023	97.5% Chebyshev (MVUE) UCL	4.001
95% Modified-t UCL	2.857	99% Chebyshev (MVUE) UCL	5.199
Gamma Distribution Test		Data Distribution	
k star (bias corrected)	1.746	Data do not follow a Discernable Distribution (0.05)	

Theta Star	1.191		
nu star	69.82		
Approximate Chi Square Value (.05)	51.59	Nonparametric Statistics	
Adjusted Level of Significance	0.038	95% CLT UCL	2.784
Adjusted Chi Square Value	50.35	95% Jackknife UCL	2.82
		95% Standard Bootstrap UCL	2.763
Anderson-Darling Test Statistic	1.832	95% Bootstrap-t UCL	3.333
Anderson-Darling 5% Critical Value	0.752	95% Hall's Bootstrap UCL	3.425
Kolmogorov-Smirnov Test Statistic	0.276	95% Percentile Bootstrap UCL	2.891
Kolmogorov-Smirnov 5% Critical Value	0.196	95% BCA Bootstrap UCL	3.104
Data not Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	3.948
		97.5% Chebyshev(Mean, Sd) UCL	4.757
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	6.346
95% Approximate Gamma UCL	2.813		
95% Adjusted Gamma UCL	2.882		
Potential UCL to Use		Use 95% Chebyshev (Mean, Sd) UCL	3.948