O'BRIEN & GERE

December 19, 2012

Mr. David Bernardini
Manager, Safety, Health and the Environment
BAE Systems
Electronic Systems
1701 North Street
Endicott, New York 13760

RE: 90-Day Storage and Acid Dock Areas
Johnson City, New York

FILE: 11103/48377

Mr. Bernardini:

O'Brien & Gere Engineers is pleased to present this letter report to BAE Systems (BAE) providing a summary of the Resource Conservation and Recovery Act (RCRA) closure activities conducted at the former BAE facility in Johnson City, New York. Specifically, this letter provides a description of the cleaning and rinsate sampling conducted at the 90-day storage area and acid dock area, an evaluation of the rinsate sampling results and an evaluation of human health hazard associated with mercury in the 90-day storage area.

EXECUTIVE SUMMARY

In accordance with New York State Department of Environmental Conservation hazardous waste regulations [*i.e.*, closure plan requirements of 6 NYCRR 373-3.7(a)-(f)], BAE maintained a written closure plan, which required the facility to remove or decontaminate any contaminated structures or equipment upon facility closure. Based on the extensive cleaning, results of the sampling, and the human health hazard evaluation presented below, the closure activities performed by BAE at the 90-day storage area and the acid dock area have fulfilled the requirements provided in the written closure plan.

BACKGROUND

BAE relocated its operations at the Johnson City facility to the Huron Campus in Endicott, NY. Operations at the Johnson City facility typically generated more than 2,200 pounds of hazardous waste monthly, which resulted in a large quantity generator (LQG) status. Hazardous waste was stored in containers in a designated 90-day storage area prior to disposal, and also in an area known as the "acid dock".

Since the Johnson City facility was a LQG and is located above the Clinton Street-Ball Park Valley Aquifer System in Broome County, NY, it is subject to the closure plan requirements of 6 NYCRR 373-3.7(a)-(f) for its hazardous waste storage area (*i.e.*, 90-day hazardous waste storage area and acid dock area). In accordance with these regulations, the facility maintained a written closure plan, which required the facility to remove or decontaminate any contaminated structures or equipment upon facility closure. The facility's closure plan encompassed both the 90-day storage area and the acid dock area. Following closure, BAE is required to submit to the NYSDEC a certification that the facility has fulfilled the closure requirements provided in the written closure plan. The certification must be signed by the owner or operator and by an independent Professional Engineer registered in New York.

CLEANING AND RINSATE SAMPLING

In anticipation of closure activities, by email dated June 13, 2012, O'Brien & Gere, on behalf of BAE, submitted a closure approach to the NYSDEC to supplement the facility's written closure plan. The approach consisted of triple washing the concrete pads under the 90-day storage area and the acid dock, collecting a rinsate sample

from a sump in each of the two storage areas and analyzing the samples for volatile organic compounds (VOCs) semi-volatile organic compounds (SVOCs), metals (including mercury), and polychlorinated biphenyls (PCBs). O'Brien & Gere recommended comparing the results of the rinsate to the NYSDEC Class GA groundwater standards to evaluate whether concentrations of chemicals that may remain on the concrete pad are below levels that may result in unacceptable impacts to human health and the environment (*i.e.,* the materials are considered sufficiently decontaminated).

On July 25, 2012, a BAE representative met Clean Harbors' staff on site to begin the triple washing of the concrete pad. Upon completion of the washing, O'Brien & Gere collected a rinsate sample from a sump in each of the storage areas. The samples were submitted to a NYSDOH ELAP-certified laboratory (TestAmerica) for the following analysis:

- TCL VOCs by USEPA Method 8260
- TCL SVOCs by USEPA Method 8270
- PCBs by USEPA Method 8082
- Total Metals (including Mercury) by USEPA 6000/7000 series.

The VOC, SVOC and total metals analytical results from the sampling event are presented in **Table1** and were compared to the NYSDEC Class GA groundwater standards. The analytical results from the sample collected in the acid dock area were below the groundwater standards, and therefore, that area was considered to be sufficiently decontaminated to support closure at that time.

With respect to the 90-day storage area, VOC, SVOC and total metals analytical results from the sample collected in the 90-day storage area also were below the groundwater standards, with the exception of mercury. Accordingly, a second cleaning and sampling event was scheduled for the 90-day storage area.

PCBs were not detected in either sample; however, the reporting limit exceeded the Class GA groundwater standard for PCBs.[1]

On August 30, 2012, Clean Harbors pressure washed the concrete pad and sump using aggressive mercury cleaner (HgX®). The pad was triple washed and rinsed and a rinsate sample was collected from the sump. The sample was submitted to TestAmerica and analyzed for mercury and PCBs using the applicable methods listed above.

Although the mercury concentration was reduced from the July 2012 sampling event, mercury was detected at a concentration that exceeded the Class GA groundwater standard (**Table 1**). PCBs were not detected; however, the reporting limit again exceeded the Class GA groundwater standard.

HUMAN HEALTH HAZARD EVALUATION

Because the aggressive cleaning efforts did not result in detected mercury concentrations in the 90-day storage below the Class GA groundwater standard of 0.7µg/l, a human health evaluation of residual mercury in this area was conducted to evaluate whether the remaining mercury on the concrete pad may pose an unacceptable hazard to human health. This approach is based on the Risk-Based Clean Closure Memorandum from Elizabeth Cotsworth, Acting Director Office of Solid Waste to RCRA Senior Policy Advisors Regions I-X dated March 19, 1998.

This section presents and describes the methods used to quantify the potential health hazards posed to current and future human receptors that may be exposed to mercury residue present on the floor space of the 90-day

[1] It is noteworthy that two PCB wipe samples were collected by Delta Engineers from the 90-day storage area on May 9, 2012 following the removal of the hazardous waste, and one PCB wipe sample was collected from the acid dock area. Each wipe sample result was less than the reporting limit. A copy of the laboratory report was provided to O'Brien & Gere by BAE and is included as **Appendix A**.

storage area. This section also presents the numerical hazards calculated for receptors potentially exposed to residual mercury, and discusses the implications of these results with regard to the need for corrective action.

This human health hazard evaluation is organized into the following sections:

- Wipe Sampling Investigation
- Exposure Pathways and Selected Receptors
- Quantification of Exposure
- Data Evaluation
- Risk Characterization
- Conclusion

Wipe Sampling Investigation

Because the results of the July 2012 and August 2012 rinsate sampling indicated that residual levels of mercury were still present on the concrete in the 90-day storage area exceeding the Class GA groundwater standard, wipe sampling was conducted to further evaluate the potential health hazards from those residual levels of mercury. Wipe sampling was completed at the 90-day storage area on October 12, 2012 by O'Brien & Gere, using NIOSH Method 9100 to determine mercury concentrations in surface residue. The floor space area was measured and gridded into 10 equally-sized polygons, and a sample was collected systematically from each location based on presence of surficial cracks or high roughness (see **Figure 1** and **Appendix B**). Analytical results from the wipe samples were used to evaluate potential human health hazards from exposure to the surfaces.

Wipe materials consisted of 2 inch by 2 inch cotton gauze pads moistened with approximately 1-2 milliliters of deionized water. For each sample location, a paper cardboard template was placed on the surface with a 100 cm^2 area exposed for sampling. No irregular areas were present that would require special considerations. The surface area was first wiped with a moistened gauze pad using "S"-strokes from edge to edge direction and covering the entire surface. The wipe was then folded once and used to wipe the same area using "S"-strokes at right angles to the first wipe. The wipe was then folded again, and using the twice-folded pad, the area was wiped a third time using "S"-strokes in the original direction. The wipe was then placed into a pre-cleaned, laboratory-supplied jar, sealed, and properly labeled (sample identification, time, etc.). The cardboard template was discarded after each use. No quality assurance/quality control samples were collected. The samples were then submitted for analysis and shipped to TestAmerica, Syracuse, NY, for subsequent shipment to its Buffalo laboratory.

Exposure Pathways and Selected Receptors

This section describes the current and probable future receptor populations considered for evaluation in the human health hazard evaluation of the 90-day storage area. The selection of receptors is based on an understanding of the environmental conditions at the facility and the current and reasonably anticipated future use of the 90-day storage area. Complete exposure pathways are those in which there is an established link (or potential for a link) between a contaminant source and a human receptor.

For the human health hazard evaluation of the 90-day storage area, both incidental ingestion and dermal contact pathways were evaluated for potential receptor exposure to mercury on the floor space of the pad. Incidental ingestion may occur when chemicals are inadvertently swallowed during hand-to-mouth events. Hand-to-mouth behaviors include fingernail biting, chewing the ends of pens, inserting objects (e.g., toys, food items) in the mouth, licking the mouth area, cigarette smoking, and other "mouthing" behaviors. Health assessments of mouthing behaviors are typically reserved for young children given that this receptor population has a high hand-to-mouth frequency (Xue et al. 2007; USEPA 2011). Although adults do not typically exhibit such behaviors, they do have their own types of mouthing behavior such as some of those described above. Incidental ingestion of a chemical from a contaminated surface is an exposure pathway occurring in two steps:

- Dermal contact with a contaminated surface; and
- Transfer of the contaminant from the fingers or hands into the mouth and subsequent ingestion.

Dermal exposure occurs when exposed skin comes in contact with a contaminated surface. The inhalation pathway was not evaluated in this health risk assessment. The 90-day storage area is open to the outside and consequently is subject to a high degree of air exchange. As such, respirable mercury particles that may be liberated from the floor space are likely to be transported out of the enclosure before any significant soil dust inhalation exposure can occur. Therefore, inhalation exposure is considered a *de minimis* exposure pathway.

Current/future trespasser: A trespasser is a person that gains access to the facility without permission. Although a security guard is present and the 90-day storage area is fenced and locked, a trespasser scenario was included in this evaluation to maintain conservatism in the exposure evaluation. A current/future trespasser may be an adolescent (12-<18 years) or an adult (>18 years).

Current/future security guard: Currently, a security guard is employed to keep watch over the site and to deter trespassing and other illegal or inappropriate actions. It is presumed that security measures will be maintained at the facility for the foreseeable future. Although security functions do not include regular access and patrol of the 90-day storage area, this exposure scenario was included in this evaluation to account for potential exposure to a security guard.

Future construction worker: The construction worker is selected as a receptor due to the potential for excavation or construction to occur at the 90-day storage area. The construction worker could be potentially exposed to mercury during construction activities in the future.

Quantification of Exposure

For each receptor, the estimated average daily dose (ADD) of mercury was calculated for incidental ingestion and dermal contact exposure pathways. In accordance with USEPA's *Risk Assessment Guidance for Superfund* (USEPA 1989), exposure factors were applied to estimate the ADD for human exposures via each pathway. For this evaluation, ADDs were calculated for a "reasonable maximum exposure" (RME) scenario. The RME relies on estimated upper-bound values for specific exposure parameters as a conservative and health protective measure. The upper-bound estimate is calculated by applying conservative assumptions, which results in conservative estimates of risk.

The exposure assessment methodology for this evaluation was extracted from the general approach presented in the United States Army Center for Health Promotion and Preventative Medicine's (USACHPPM) *Technical Guidance 312, Health Risk Assessment Methods and Screening Levels for Evaluating Office Worker Exposures to Contaminants on Indoor Surfaces Using Surface Wipe Data* (USACHPPM 2009). Although this technical guidance was developed for evaluating office worker exposures, the general methods for quantifying exposure can be applied to other human receptor populations and are generally consistent with the methods described in other indoor surface risk documents (e.g., May et al. 2002).

For quantifying exposure to mercury on the floor surface of the 90-day storage area by current and future human receptors, exposure parameters necessary to calculate health risks were selected based on RME assumptions, as discussed above. The exposure parameter values used to quantify exposure for each receptor are summarized in **Table 2**. Exposure equations for each receptor evaluated are presented in **Tables 3** through **6**.

Dermal Absorption Factor

The dermal absorption factor (ABS, unitless) represents the fraction of the constituent that may be absorbed through the skin during exposure. In general, metals are poorly absorbed through the skin. USEPA's Dermal Risk Assessment Guidance (RAGS, Part E, USEPA 2004) provides ABS values for two metals, arsenic and cadmium; no value is available for mercury. Therefore, the default ABS value of 0.01 (1%) for metals from USEPA, Region 3 (USEPA 1995) was selected and applied for mercury in this evaluation.

Averaging Time

The averaging time (AT, days) is the time period over which exposure is averaged. For exposure to non-carcinogenic chemicals such as mercury, the averaging time (AT-NC) is calculated as the exposure duration

(years) multiplied by 365 days per year (USEPA 1989, Exhibits 6-11 through 6-16). Therefore, the averaging time for exposure to non-carcinogenic substances varies by receptor and depends on exposure duration.

Body Weight

The body weight (BW, kg) estimates are receptor-specific for adults, adolescents, older children, and younger children. A default adult body weight of 70 kg (USEPA 1989, Exhibits 6-11 through 6-19) was applied for adult receptors (adult trespasser, security guard, and construction worker). For adolescent trespassers, a body weight of 59 kg was used. This value is based on the mean body weight of boys and girls aged 12-<18 years from a compendium of body weight studies of the general United States population compiled by the USEPA (USEPA 2011, Tables 8-22 through 8-24).

Exposure Duration

The exposure duration (ED) is an estimate of the time period over which a receptor is exposed and is typically expressed in years. Because the duration of exposure can vary greatly for construction workers and trespassers, there are no recommended ED values for these groups of receptors. Therefore, the selection of ED values was based on professional judgment. The ED values for each receptor population are discussed below.

- For the security guard, an ED of 25 years was applied. This duration is consistent with the USEPA-recommended value for industrial workers from USEPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA 2002, Exhibit 1-2) and RAGS Part E (USEPA 2004, Exhibit 3-5).
- For the construction worker, an ED of 0.33 years was applied. This value is based on professional judgment, assuming that 4 months is a conservative estimate of the duration of a representative construction project at the 90-day storage area.
- For the adolescent trespasser (12-<18 years), an ED value of 6 years will be applied. For the adult trespasser, an ED value of 24 years is assumed.

Exposure Frequency

Exposure frequency (EF, in days/year) is a receptor-specific estimate of how frequently exposure occurs. The EF values described below are based on best professional judgment for the majority of the receptor groups.

- For the security guard, an EF of 250 days/year was applied. This exposure frequency is consistent with the USEPA-recommended value for industrial workers from USEPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA 2002, Exhibit 1-2) and RAGS Part E (USEPA 2004, Exhibit 3-5).
- An EF of 60 days/year is assumed for the construction worker. This assumes that a construction project will require 12 weeks of a construction worker's time (working five days per week) over the course of his/her overall work duration.
- The EF for the adolescent and adult trespasser is 52 days/year, and assumes that a trespasser will visit the site two times weekly during the 13 summer weeks and once per week during the combined 26 spring and fall weeks.

Skin Surface Area - Dermal Contact

Skin surface area (SA) for dermal absorption (cm^2/event) represents the exposed surface area of the skin that may contact a surface per event, and is highly dependent on the age of the receptor and the nature of activity or work they are conducting. The SA values used in this health risk evaluation are as follows:

- The security guard is assumed to wear a short-sleeved shirt, long pants, and shoes. As such, the face, forearms, and hands are potentially available for dermal contact with the pad surface. The resulting 50th percentile SA value for the security guard is 2,479 cm^2 (USEPA 2004, Exhibit C-1).
- The SA value for the construction worker is 3,300 cm^2, and is consistent with USEPA guidance for construction workers and outdoor commercial/industrial workers (USEPA 2002, Exhibit 1-2; USEPA 2004, Exhibit C-1).

- For the adolescent trespasser, the SA value for exposure is 4,308 cm^2 based on the 50th percentile average male and female adult surface area (for years 12 through 17) for the face, forearms, hands, and lower legs (USEPA 2004, Exhibit C-1). The adult trespasser SA is 4,849 cm^2, the sum of 50th percentile values for the adult face, forearms, hands, and lower legs (USEPA 2004, Exhibit C-1).

Skin Surface Area - Incidental Ingestion

The skin surface area for incidental ingestion (cm^2/event) represents the amount of skin that could make contact with a contaminated surface and be subsequently ingested by a receptor. The palmar surface area (wrist crease to fingertips) of both hands was considered available to come in contact with the mouth (or food item) based on fingernail biting or food item ingestion behaviors. The SA value selected for all receptors in this evaluation, 326 cm^2, is based on a study of palmar surface areas of hands of 18 males, as described in USACHPPM (2009).

Fraction of Exposed Skin Surface Area that Contacts the Surface

This term (F_d) describes the fraction of available dermal surface area that actually comes in contact with a contaminated surface. The value selected for this evaluation (0.3, or 30%) is based on a study of consecutive palmar hand contacts with tools and smooth surfaces, as described in USACHPPM (2009). Given that no data are available for estimating F_d for other body parts, 0.3 was also applied as a reasonable fraction for other body parts potentially contacting the floor of the 90-day storage area.

Fraction of Exposed Skin Surface Area that Contacts the Mouth

The F_f term describes the proportion of available dermal surface area that may come in contact with the mouth during mouthing behaviors. The F_f value of 0.08 (8%) applied in this evaluation is based on fingertip/fingernail biting behavior, and assumes that the one-half of the joint at the distal end of each finger makes contact with the mouth (USACHPPM 2009).

Fraction of Dust Transferred from Surface to Skin

The fraction of dust transferred from the contaminated surface to the skin (FT_{ss}) is the proportion of dust that has contacted the skin expected to remain on the skin. The value of 0.063 (6.3%) selected for the security guard and adult trespasser is based on an empirical study of repetitive hand presses on a smooth (glass) surface, as described in USACHPPM (2009). The FT_{ss} value for adolescent trespassers and construction workers was set to a higher value (0.1, or 10%) given that: 1) moisture can increase the transfer of a surface contaminant to the skin, 2) children are more likely to contact surfaces with wet hands or skin than adults, and 3) construction workers are likely to perspire during work activities, thereby enhancing contaminant transfer for these receptors. This value is supported by a study conducted by May et al. (2002) which recommended a value of 0.1 for construction /industrial workers.

Fraction of Dust Transferred from Skin to Mouth

The fraction of dust transferred from the skin to the mouth (FT_{sm}) is the proportion of dust transferred into the mouth from the fraction of the dermal skin surface that contacts the mouth. The FT_{sm} value selected for use in this evaluation (0.4, or 40%) is based on a study of hand-to-mouth transfer of three different, small-diameter test substances via fingertip applications to the lower lips, as described in USACHPPM (2009).

Event Frequency- Dermal Contact

The event frequency for dermal contact (EV_{derm}, events/day) describes the number of times that a receptor makes a distinct contact with a contaminated surface. There is uncertainty associated with this parameter, and valuation is largely based on site-specific considerations and professional judgment (May et al. 2002). The values selected for EV_{derm} in this evaluation are as follows, and are based on best professional judgment.

- The security guard is assumed to make direct contact with the 90-day storage area floor space one time during the course of his/her work shift (EV_{derm}=1).
- An EV_{derm} value of 6 events/day was selected for the construction worker. This value assumes that the construction worker makes a discrete contact with the floor space every 20 minutes over the course of two hours.

- For the adolescent trespasser, the number of dermal contact events was set to 6 times per day. This value assumes that the adolescent trespasser is present in the 90-day storage area for one hour, and makes a discrete contact with the floor space every 10 minutes. For the adult trespasser, contact is assumed to occur 3 times per day (contact event every 20 minutes over the course of one hour).

Event Frequency– Incidental Ingestion

The event frequency for incidental ingestion (EV_{ing}, events/day) describes the number of times a receptor introduces a contaminated body part (e.g., hand, fingers) to their mouth. As discussed in Section 3, hand-to-mouth events may occur from a variety of mouthing activities. Like EV_{derm}, EV_{ing} is based on site-specific conditions and best professional judgment. Values selected for the evaluation of the 90-day storage area are described below.

- For the security guard, an EV_{ing} value of 3 events/day was selected, and assumes that the security guard makes three hand-to-mouth events during his/her portion of the work shift at the 90-day storage area.
- An EV_{ing} value of 6 events/day was selected for the construction worker. This value assumes that the construction worker makes three hand-to-mouth contacts every 20 minutes over the course of two hours.
- The EV_{ing} value for the adolescent trespasser was set to 6 events/day, and assumes that the adolescent trespasser makes a hand-to-mouth contact every 10 minutes over the course of one hour. For the adult trespasser, a hand-to-mouth contact is assumed to occur once every 20 minutes over the course of one hour (EV_{ing}=3).

Data Evaluation

For wipe samples collected from the 90-day storage area, mercury was reported at concentrations above the laboratory detection limit in all 10 wipe samples, with concentrations ranging between 5.4 µg/wipe (5.4 µg/100 cm^2) at BAE-WOO3-101212 and 373 µg/wipe (5.4 µg/100 cm^2) at BAE-WOO8-101212. Wipe sample results for each sampling point are presented in **Appendix C**.

Statistical methods were applied to the data to develop an exposure point concentration (EPC) for mercury. The EPC is a conservative estimate of a contaminant concentration to which a receptor may be exposed, and is typically represented as the upper confidence limit of the mean (UCL) concentration. USEPA's ProUCL statistical software package (Version 4.1, USEPA 2010) was used to determine the data distribution and calculate the EPC for mercury. ProUCL is a publicly available software tool developed by a USEPA contractor and has been approved by the USEPA for use in calculating upper-bound statistical parameters. For computing the EPCs, ProUCL runs goodness-of-fit tests for normal, lognormal, and gamma distributed data sets using parametric, non-parametric, and bootstrapping methods. At the conclusion of a ProUCL run, the software program recommends the most appropriate UCL to use given the distribution type. The UCL recommended by ProUCL was subsequently applied as the EPC.

The EPC for mercury was calculated as 173 µg/wipe (173 µg/100 cm^2). This value was used as the basis for generating hazard estimates from mercury exposure at the 90-day storage area. The ProUCL output file for mercury is provided in **Appendix D**. It should be noted that the mercury EPC was adjusted for wipe sample efficiency. That is, wipe samples are unlikely to remove 100 percent of a contaminant on an impacted surface and, therefore, the wipe sample concentration must be adjusted upward to account for contaminant residue still remaining on the surface following wiping. This health risk evaluation applied a wipe sample efficiency of 75 percent, based on the recommendation for metals in USACHPPM (2009).

Risk Characterization

The potential toxicological effects induced by a given dose of a chemical are classified according to two criteria: non-cancer effects and cancer effects. Constituent-specific toxicity values are used to calculate potential effects for these two types of effects. Following USEPA guidance on selection of human health toxicity values (USEPA 2003), toxicity information was extracted from the first "tier" resource, USEPA's Integrated Risk Information System (IRIS). The oral and dermal doses derived from the mercury EPC were combined with peer-reviewed toxicity values to ascertain the potential for adverse effects posed to each receptor.

Toxicity Assessment

Toxicity values typically employed to calculate baseline non-carcinogenic hazards for oral and dermal exposure are termed reference doses (RfDs). An oral RfD of 0.0003 mg/kg-day for mercuric chloride (and other mercury salts) from IRIS was used to estimate both oral and dermal hazard to mercury exposure in the 90-day storage area given that no RfD has been promulgated for elemental mercury. The oral RfD was used to assess hazards from dermal exposure (in addition to oral exposure) because: 1) dermal toxicity data are not available, and 2) oral toxicity data can be adjusted to reflect the dermally absorbed dose. Although mercuric chloride and other mercury salts are absorbed across the gastrointestinal tract poorly, elemental mercury is well-absorbed (USEPA 2004). Therefore, no adjustment of the oral RfD for mercury was conducted to assess the dermal exposure pathway.

In addition to chemical hazards, USEPA reviews and evaluates available data regarding the potential carcinogenic effects of a chemical, and assigns a "carcinogenicity" classification according to a weight of evidence classification scheme. Based on this scheme, the USEPA has classified mercuric chloride and other mercury salts as Group C, denoting that there is inadequate evidence of carcinogenicity in humans; elemental mercury is classified as Group D, which are chemicals for which there is insufficient information to evaluate their carcinogenicity. As such, cancer slope factors (CSFs) for mercury are not available and mercury was evaluated for non-cancer hazards only.

Risk Estimation

In this section, the toxicity and exposure assessments are summarized and integrated into numerical values that may be used to evaluate the likelihood of adverse health effects in receptors potentially exposed to mercury in the 90-day storage area. For each receptor potentially exposed via incidental ingestion and/or dermal contact, a hazard quotient (HQ) was calculated as the ratio of the total ADD (or intake) of mercury and the RfD (i.e., ADD/RfD). A total HQ of less than 1 indicates that it is highly unlikely that chronic non-cancer toxic effects would occur for a given receptor. If the total HQ exceeds 1, there may be concern for non-carcinogenic effects, and further action may be warranted.

Tables 3 through **6** present the hazards for the receptors selected for evaluation. The calculated hazards from potential exposure to mercury for each receptor are as follows:

- Adolescent trespasser: HQ=0.2
- Adult trespasser: HQ=0.2
- Security guard: HQ=0.3
- Construction worker: HQ=0.006

The results of the risk characterization indicate that the calculated non-carcinogenic hazard for each human receptor population from potential exposure to mercury in the 90-day storage area is below the acceptable regulatory risk threshold of 1. Therefore, the potential hazards from incidental ingestion and dermal contact posed by residual levels of mercury on the floor surface of the 90-day storage area are acceptable for current or future receptor populations. Although there is a degree of uncertainty associated with the exposure assessment, this evaluation applied conservative estimates for several exposure variables that likely result in an overestimation of the actual hazards.

Human Health Hazard Evaluation Conclusion

Residual levels of mercury in the 90-day storage area do not pose an unacceptable health hazard to current and future human receptors. Consequently, no remedial action is required to address residual mercury on the floor surface of this area based on human health concerns.

CONCLUSIONS

With the exception of mercury in the 90-day storage area, detected analytical results were below their applicable groundwater standard, and are therefore considered to not pose an unacceptable risk to human health and the environment. The concentrations of mercury in the 90-day storage area were further evaluated by conducting a human health hazard evaluation, which demonstrated there are no unacceptable health hazards posed to current and future human receptors from potential exposure to mercury. Based on the extensive cleaning, results of the sampling, the human health hazard evaluation presented above, and our conversation on December 18, 2012, the closure activities performed by BAE at the 90-day storage area and the acid dock area have fulfilled the requirements provided in the written closure plan.

Appendix E presents O'Brien & Gere's professional engineer certification that the closure activities performed by BAE at the 90-day storage area and the acid dock area have fulfilled the requirements provided in the written closure plan. This certification page should also be signed by BAE and sent via email, per our conversation with Mr. Rogers (NYSDEC) on December 18, 2012, along with this letter report to the NYSDEC to obtain their approval of the closure.

If you should have any questions regarding this report, please do not hesitate to contact Christy Rosenbarker or me at (315) 956-6100.

Very truly yours,

O'BRIEN & GERE ENGINEERS, INC.

Douglas M. Crawford, P.E.
Vice President

Attachments: Tables 1 - 6
Figure 1
Appendix A
Appendix B
Appendix C
Appendix D
Appendix E

cc: Michael Rondinelli – O'Brien & Gere
Christy Rosenbarker – O'Brien & Gere

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[redacted]

Tables

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Table 1
Results Table
Former BAE Johnson City Location
OBG Sample Dates: July 25, 2012 and August 30, 2012

Analyte	NYSDEC Class GA (ug/L)	7/25/2012 Result (ug/L)	7/25/2012 Filtered Results (ug/L)	8/30/2012 Result (ug/L)	8/30/2012 Filtered Result (ug/L)
90-Day Storage Area					
Bis(2-ethylhexyl) phthalate	5	**54 J**	---	NA	NA
Arsenic	25	16	ND	NA	NA
Barium	1000	240	21	NA	NA
Cadmium	5	5	ND	NA	NA
Chromium	50	45	7.5	NA	NA
Di-n-butyl phthalate	50	**320**	---	NA	NA
Lead	25	**100**	ND	NA	NA
Mercury	0.7	**64**	**20**	**14**	**19**
PCB-1260	0.09	**0.82**	ND	ND	---
Acid Dock					
Acetone	50	9.3 J	---	NA	NA
Arsenic	25	5.8 J	6.9 J	NA	NA
Barium	1000	49	26	NA	NA
Bis(2-ethylhexyl) phthalate	5	**46 J**	---	NA	NA
Bromodichloromethane	50	6.2	---	NA	NA
Cadmium	5	4.3	2.5	NA	NA
Chloroform	7	**13**	---	NA	NA
Chromium	50	46	8.5	NA	NA
Dibromochloromethane	50	3.3	---	NA	NA
Lead	25	**96**	7.5	NA	NA
Mercury	0.7	ND	---	NA	NA
PCB-1260	0.09	ND	---	NA	NA
Sample Blank					
Acetone	50	4.3 J	---	NA	NA
Barium	1000	24	---	NA	NA
Bromodichloromethane	50	13	---	NA	NA
Bromoform	50	0.66 J	--	NA	NA
Chloroform	7	**28**	---	NA	NA
Dibromochloromethane	50	6.2	---	NA	NA
Lead	25	3.1 J	---	NA	NA

Note:
Bold Font - Indicates exceeds of NYSDEC Class GA Standards
ND - indicates compound not detected above its reporting limit
J - Indicates estimated concentration
"---" - filtered samples were not re-analyzed for these compounds
NA - compounds were not analyzed during this sampling event

Table 2
Input Parameters for Estimating Mercury Exposure Hazards in the 90-Day Area
BAE Systems, Johnson City, New York

Parameter	Adolescent (12-18 yrs.) Trespasser		Adult Trespasser		Security Guard		Construction Worker	
	Value	Reference	Value	Reference	Value	Reference	Value	Reference
ABS (unitless) - Dermal absorption factor for mercury =	0.01	USEPA, Region 3, 1995	0.01	USEPA, Region 3, 1995	0.01	USEPA, Region 3, 1995	0.01	USEPA, Region 3, 1995
AT-NC (days) - Averaging time (non-cancer) =	2190	USEPA 1989; Exhibits 6-11 through 6-19	8760	USEPA 1989, Exhibits 6-11 through 6-19	9125	USEPA 1989; Exhibits 6-11 through 6-19	120	USEPA 1989; Exhibits 6-11 through 6-19
BW (kg) - Body weight =	59	USEPA 2011, Tables 8-22 to 8-24	70	USEPA 1989, Exhibits 6-11 through 6-19	70	USEPA 1989; Exhibits 6-11 through 6-19	70	USEPA 1989; Exhibits 6-11 through 6-19
CF (unitless) - Units conversion (mg/µg) =	0.001	Unit conversion	0.001	Unit conversion	0.001	Unit conversion	0.001	Unit conversion
ED (years) - Exposure duration =	6	Best professional judgment	24	Best professional judgment	25	USEPA 2004; Exhibit 3-5	0.33	Best professional judgment
EF (days/year) - Exposure frequency =	52	Best professional judgment	52	Best professional judgment	250	USEPA 2004, Exhibit 3-5	60	Best professional judgment
EV_{derm} (events/day) - Event frequency associated with dermal contact =	6	Best professional judgment	3	Best professional judgment	1	Best professional judgment	6	Best professional judgment
EV_{ing} (events/day) - Event frequency associated with incidental ingestion =	6	Best professional judgment	3	Best professional judgment	3	Best professional judgment	6	Best professional judgment
F_d (unitless)- Fraction of exposed skin surface area that contacts the surface =	0.3	USACHPPM 2009	0.3	USACHPPM 2009	0.3	USACHPPM 2009	0.3	USACHPPM 2009
F_i (unitless) - Fraction of available skin area that contacts the mouth =	0.08	USACHPPM 2009	0.08	USACHPPM 2009	0.08	USACHPPM 2009	0.08	USACHPPM 2009
FT_{sm} (unitless) - Fraction of dust transferred from skin to mouth =	0.4	USACHPPM 2009	0.4	USACHPPM 2009	0.4	USACHPPM 2009	0.4	USACHPPM 2009
FT_{ss} (unitless) - Fraction of dust transferred from surface to skin =	0.1	Best professional judgment	0.063	USACHPPM 2009	0.063	USACHPPM 2009	0.1	May et al. 2002
η (unitless) - Surface wipe removal efficiency =	0.75	USACHPPM 2009	0.75	USACHPPM 2009	0.75	USACHPPM 2009	0.75	USACHPPM 2009
RfD_d (mg/kg-day) - Dermal reference dose for mercury =	0.0003	USEPA 2012	0.0003	USEPA 2012	0.0003	USEPA 2012	0.0003	USEPA 2012
RfD_o (mg/kg-day) - Oral reference dose for mercury =	0.0003	USEPA 2012	0.0003	USEPA 2012	0.0003	USEPA 2012	0.0003	USEPA 2012
SA_d (cm^2/event)- Skin surface area for dermal absorption =	4308	USEPA 2004, Exhibit C-1	4849	USEPA 2004, Exhibit C-1	2479	USEPA 2004, Exhibit C-1	2479	USEPA 2004; Exhibit C-1
SA_g (cm^2/event) - Skin surface area for ingestion (palmar side of hands) =	326	USACHPPM 2009	326	USACHPPM 2009	326	USACHPPM 2009	326	USACHPPM 2009

References:

May, L.M., B. Gaborek, T. Pitrat, and L. Peters. 2002. Derivation of risk based wipe surface screening levels for industrial scenarios. The Science of the Total Environment 288:65-80.

USACHPPM. 2009. Technical Guide 312: Health Risk Assessment Methods and Screening Levels for Evaluating Office Worker Exposures to Contaminants on Indoor Surfaces Using Surface Wipe Data. June 2009

USEPA. 1989. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final*. EPA/540/1-89/002. Office of Solid Waste and Emergency Response, Washington, DC. December 1989

USEPA. Region 3. 1995. *Technical Guidance Manual. Risk Assessment, Assessing Dermal Exposure from Soil, Existing Guidance*. EPA/903-K-95-003. Office of Superfund Programs, Hazardous Waste Management Division. Philadelphia, PA. December 1995

USEPA. 2004. *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final*. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, DC. July 2004

USEPA. 2011. *Exposure Factors Handbook. 2011 Edition*. EPA/600/R-090/052F. Office of Research and Development. Washington, DC. September 2011.

USEPA. 2012. *Regional Screening Level Summary Table*. April 2012.

Table 3
Calculation of Mercury Hazards for an Adolescent Trespasser in the 90-Day Area
BAE Systems, Johnson City, New York

Exposure Pathway	Chronic Daily Intake/Dose Equation
	$C_s = C_{wipe}/\eta$ where: C_s ($\mu g/m^2$) = Surface loading adjusted for wipe removal efficiency C_{wipe} ($\mu g/cm^2$) = Surface wipe sample result
Incidental Ingestion	Ingestion Average Daily Intake (ADI_i) = $(C_s \times SA_g \times F_d \times FT_{ss} \times FT_{sm} \times F_f \times EV_{ing} \times EF \times ED \times CF)/(BW \times AT)$ Ingestion Hazard = ADI_i/RfD_o
Dermal Contact	Dermal Absorbed Dose (DAD) = $(C_s \times SA_d \times F_d \times FT_{SS} \times ABS \times EV_{derm} \times EF \times ED \times CF)/(BW \times AT)$ Dermal Hazard = ADI_d/RfD_d

Constituent of Potential Concern	C_{wipe} ($\mu g/cm^2$)	Cs ($\mu g/cm^2$)	Ingestion ADI mg/kg-day	Oral RfD (mg/kg-day)	Incidental Ingestion Hazard	Dermal Absorbed Dose (DAD) mg/kg-day	Dermal RfD (mg/kg-day)	Dermal Hazard	Total Receptor Hazard (unitless)
Mercury	1.73	2.31	1.05E-05	3.00E-04	3E-02	4.32E-05	3.00E-04	1E-01	2E-01

Table 4
Calculation of Mercury Hazards for an Adult Trespasser in the 90-Day Area
BAE Systems, Johnson City, New York

Exposure Pathway	Chronic Daily Intake/Dose Equation
	$C_s = C_{wipe}/\eta$
	where:
	C_s ($\mu g/m^2$) = Surface loading adjusted for wipe removal efficiency
	C_{wipe} ($\mu g/cm^2$) = Surface wipe sample result
Incidental Ingestion	Ingestion Average Daily Intake (ADI_i) = $(C_s \times SA_g \times F_d \times FT_{ss} \times FT_{sm} \times F_f \times EV_{ing} \times EF \times ED \times CF)/(BW \times AT)$
	Ingestion Hazard = ADI_i/RfD_o
Dermal Contact	Dermal Absorbed Dose (DAD) = $(C_s \times SA_d \times F_d \times FT_{ss} \times ABS \times EV_{derm} \times EF \times ED \times CF)/(BW \times AT)$
	Dermal Hazard = ADI_d/RfD_d

Constituent of Potential Concern	C_{wipe} ($\mu g/cm^2$)	Cs ($\mu g/cm^2$)	Ingestion ADI mg/kg-day	Oral RfD (mg/kg-day)	Incidental Ingestion Hazard	Dermal Absorbed Dose (DAD) mg/kg-day	Dermal RfD (mg/kg-day)	Dermal Hazard	Total Receptor Hazard (unitless)
Mercury	1.73	2.31	1.11E-05	3.00E-04	4E-02	5.16E-05	3.00E-04	2E-01	2E-01

Table 5
Calculation of Mercury Hazards for a Security Guard in the 90-Day Area
BAE Systems, Johnson City, New York

Exposure Pathway	Chronic Daily Intake/Dose Equation
	$C_s = C_{wipe}/\eta$ where: C_s ($\mu g/m^2$) = Surface loading adjusted for wipe removal efficiency C_{wipe} ($\mu g/cm^2$) = Surface wipe sample result
Incidental Ingestion	Ingestion Average Daily Intake (ADI_i) = $(C_s \times SA_g \times F_d \times FT_{ss} \times FT_{sm} \times F_f \times EV_{ing} \times EF \times ED \times CF)/(BW \times AT)$ Ingestion Hazard = ADI_i/RfD_o
Dermal Contact	Dermal Absorbed Dose (DAD) = $(C_s \times SA_d \times F_d \times FT_{ss} \times ABS \times EV_{derm} \times EF \times ED \times CF)/(BW \times AT)$ Dermal Hazard = ADI_d/RfD_d

Constituent of Potential Concern	C_{wipe} ($\mu g/cm^2$)	Cs ($\mu g/cm^2$)	Ingestion ADI mg/kg-day	Oral RfD (mg/kg-day)	Incidental Ingestion Hazard	Dermal Absorbed Dose (DAD) mg/kg-day	Dermal RfD (mg/kg-day)	Dermal Hazard	Total Receptor Hazard (unitless)
Mercury	1.73	2.31	5.56E-05	3.00E-04	2E-01	4.41E-05	3.00E-04	1E-01	3E-01

Table 6
Calculation of Mercury Hazards for a Construction Worker in the 90-Day Area
BAE Systems, Johnson City, New York

Exposure Pathway	Chronic Daily Intake/Dose Equation
	$C_s = C_{wipe}/\eta$
	where:
	C_s ($\mu g/m^2$) = Surface loading adjusted for wipe removal efficiency
	C_{wipe} ($\mu g/cm^2$) = Surface wipe sample result
Incidental Ingestion	Ingestion Average Daily Intake (ADI_i) = $(C_s \times SA_g \times F_d \times FT_{ss} \times FT_{sm} \times F_f \times EV_{ing} \times EF \times ED \times CF)/(BW \times AT)$
	Ingestion Hazard = ADI_i/RfD_o
Dermal Contact	Dermal Absorbed Dose (DAD) = $(C_s \times SA_d \times F_d \times FT_{SS} \times ABS \times EV_{derm} \times EF \times ED \times CF)/(BW \times AT)$
	Dermal Hazard = ADI_d/RfD_d

Constituent of Potential Concern	C_{wipe} ($\mu g/cm^2$)	Cs ($\mu g/cm^2$)	Ingestion ADI mg/kg-day	Oral RfD (mg/kg-day)	Incidental Ingestion Hazard	Dermal Absorbed Dose (DAD) mg/kg-day	Dermal RfD (mg/kg-day)	Dermal Hazard	Total Receptor Hazard (unitless)
Mercury	1.73	2.31	5.59E-07	3.00E-04	2E-03	1.33E-06	3.00E-04	4E-03	6E-03

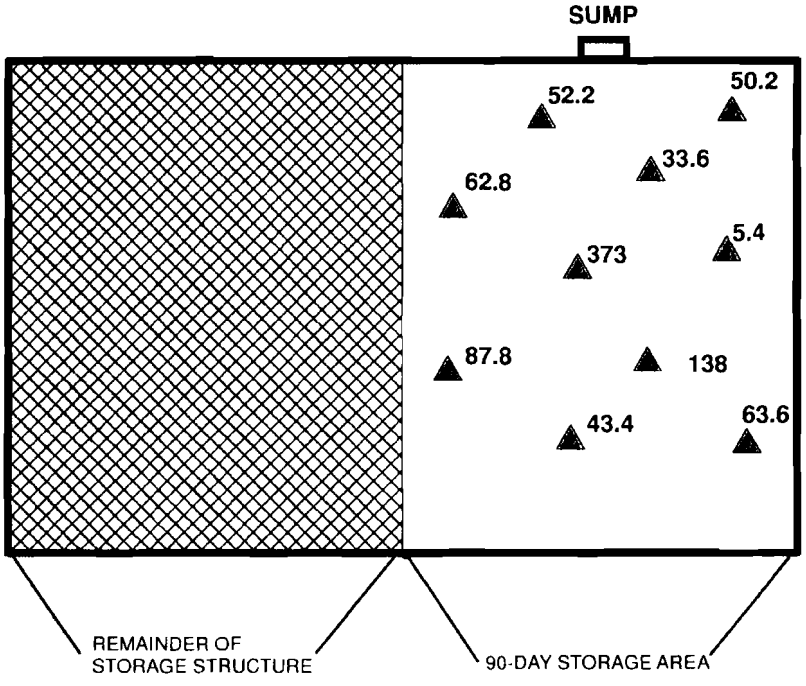
[redacted]

Figures

FIGURE 1

90-DAY STORAGE AREA

(APPROXIMATELY 14' x 18')



Values reported in units of µg/100 cm^2

This document was developed in color. Reproduction in B/W may not represent the data as intended.

SAMPLE LOCATIONS ARE APPROXIMATED

MAP LOCATION

BAE SYSTEMS CONTROLS INC.
600 MAIN STREET
JOHNSON CITY, NEW YORK 13790

WIPE SAMPLE LOCATIONS AND MERCURY DETECTION RESULTS

NOVEMBER 2012
11103.48377

O'BRIEN & GERE

PLOTDATE: 11/12/2012 11:22:54 AM MortonAK

P:\Bae Systems 11103\STDS\GIS\MXD\WipeSampleLocations.mxd

[redacted]

Appendix A

Upstate Laboratories, Inc.

Analytical Report

Date: *24-May-12*

CLIENT:	Delta Engineers	**Client Sample ID:**	090501-IH, 90 day HAZ -North
Lab Order:	U1205375	**Collection Date:**	5/9/2012 3:00:00 PM
Project:	2005.239.137		
Lab ID:	U1205375-001	**Matrix:**	WIPE

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCB'S IN WIPES BY EPA 8082			Lab Code: **8082_WIPE**			Analyst: **EA**
[Prep for PCB Wipes by N5503	Prep Code: N5503_WIPE	Prep Date: 5/14/2012 2:50:37 PM		Prep By: DMH]		
Aroclor 1016	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1221	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1232	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1242	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1248	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1254	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1260	ND	0.30		µg/wipe	1	5/16/2012
ICP METALS IN A WIPE			Lab Code: **6010B-WIPE**			Analyst: **MRA**
[Wipe Prep for Metals : ICP	Prep Code: 3050_WIPE	Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Barium	80	43		µg/ft²	1	5/17/2012 4:57:56 PM
Cadmium	.18	0.72		µg/ft²	1	5/17/2012 4:57:56 PM
Chromium	3.8	7.2		µg/ft²	1	5/17/2012 4:57:56 PM
Lead	12	14		µg/ft²	1	5/17/2012 4:57:56 PM
Silver	.13	7.2	Q	µg/ft²	1	5/17/2012 4:57:56 PM
SOIL AND SOLID METALS BY ICP-MS			Lab Code: **6020_WIPE**			Analyst: **LET**
[Wipe Prep for Metals : ICP	Prep Code: 3050_WIPE	Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Selenium	86	0.72		µg/ft²	1	5/21/2012 3:53:00 PM
TOTAL MERCURY - WASTE (WIPE)			Lab Code: **7471A_WIPE**			Analyst: **ALW**
[Total Mercury Prep - Soil/Solid/Waste	Prep Code: 7471APRWIPE	Prep Date: 5/14/2012 1:37:26 PM		Prep By: ARO]		
Mercury	81.5	0.0288		µg/ft²	1	5/21/2012 3:35:15 PM
TCL SEMIVOLATILE ORGANICS BY EPA 8270D			Lab Code: **8270_TCL_WIPE**			Analyst: **LD**
[Wipe Pr. Sonication BNA by EPA 3550A	Prep Code: 3550_BNAWIPE	Prep Date: 5/14/2012 2:52:54 PM		Prep By: DMH]		
(3+4)-Methylphenol	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
1,2,4-Trichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
1,2-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
1,3-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
1,4-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
2,4,5-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
2,4,6-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
2,4-Dichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM
2,4-Dimethylphenol	ND	330		µg/wipe	1	5/16/2012 2:03:00 AM

Approved By: KMA **Date:** 5/24/12

Qualifiers:

#	Accreditation not offered by NYS DOH for this parameter	*	Low Level
**	Value exceeds Maximum Contaminant Value	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
Q	Outlying QC recoveries were associated with this parameter	S	Spike Recovery outside accepted recovery limits

Upstate Laboratories, Inc.

Analytical Report

Date: *24-May-12*

CLIENT:	Delta Engineers	**Client Sample ID:**	090502-IH, 90 day Haz - South
Lab Order:	U1205375	**Collection Date:**	5/9/2012 2:55:00 PM
Project:	2005.239.137		
Lab ID:	U1205375-002	**Matrix:**	WIPE

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCB'S IN WIPES BY EPA 8082			Lab Code: **8082_WIPE**			Analyst: **EA**
[Prep for PCB Wipes by N5503	Prep Code: N5503_WIPE	Prep Date: 5/14/2012 2:50:37 PM		Prep By: DMH]		
Aroclor 1016	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1221	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1232	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1242	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1248	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1254	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1260	ND	0.30		µg/wipe	1	5/16/2012
ICP METALS IN A WIPE			Lab Code: **6010B-WIPE**			Analyst: **MRA**
[Wipe Prep for Metals : ICP	Prep Code: 3050_WIPE	Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Barium	29	43		µg/ft²	1	5/17/2012 5:03:17 PM
Cadmium	.05	0.72		µg/ft²	1	5/17/2012 5:03:17 PM
Chromium	1.6	7.2		µg/ft²	1	5/17/2012 5:03:17 PM
Lead	38	14		µg/ft²	1	5/17/2012 5:03:17 PM
Silver	.038	7.2	Q	µg/ft²	1	5/17/2012 5:03:17 PM
SOIL AND SOLID METALS BY ICP-MS			Lab Code: **6020_WIPE**			Analyst: **LET**
[Wipe Prep for Metals : ICP	Prep Code: 3050_WIPE	Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Selenium	42	0.72		µg/ft²	1	5/21/2012 3:53:00 PM
TOTAL MERCURY - WASTE (WIPE)			Lab Code: **7471A_WIPE**			Analyst: **ALW**
[Total Mercury Prep - Soil/Solid/Waste	Prep Code: 7471APRWIPE	Prep Date: 5/14/2012 1:37:26 PM		Prep By: ARO]		
Mercury	380	0.0288		µg/ft²	1	5/21/2012 3:37:18 PM
TCL SEMIVOLATILE ORGANICS BY EPA 8270D			Lab Code: **8270_TCL_WIPE**			Analyst: **LD**
[Wipe Pr. Sonication BNA by EPA 3550A	Prep Code: 3550_BNAWIPE	Prep Date: 5/14/2012 2:52:54 PM		Prep By: DMH]		
(3+4)-Methylphenol	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
1,2,4-Trichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
1,2-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
1,3-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
1,4-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
2,4,5-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
2,4,6-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
2,4-Dichlorophenol	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM
2,4-Dimethylphenol	ND	330		µg/wipe	1	5/16/2012 2:27:00 AM

Approved By: KMN **Date:** 5/24/12

Qualifiers:

#	Accreditation not offered by NYS DOH for this parameter	*	Low Level
**	Value exceeds Maximum Contaminant Value	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
Q	Outlying QC recoveries were associated with this parameter	S	Spike Recovery outside accepted recovery limits

Upstate Laboratories, Inc.

Analytical Report

Date: *24-May-12*

CLIENT:	Delta Engineers	**Client Sample ID:**	090505-IH Acid Dock, C
Lab Order:	U1205375	**Collection Date:**	5/9/2012 2:40:00 PM
Project:	2005.239.137		
Lab ID:	U1205375-005	**Matrix:**	WIPE

Analyses	Result	Limit	Qual	Units	DF	Date Analyzed
PCB'S IN WIPES BY EPA 8082				Lab Code: **8082_WIPE**		Analyst: **EA**
[Prep for PCB Wipes by N5503 Prep Code: N5503_WIPE		Prep Date: 5/14/2012 2:50:37 PM		Prep By: DMH]		
Aroclor 1016	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1221	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1232	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1242	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1248	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1254	ND	0.30		µg/wipe	1	5/16/2012
Aroclor 1260	ND	0.30		µg/wipe	1	5/16/2012
ICP METALS IN A WIPE				Lab Code: **6010B-WIPE**		Analyst: **MRA**
[Wipe Prep for Metals : ICP Prep Code: 3050_WIPE		Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Barium	10	43		µg/ft²	1	5/17/2012 5:18:28 PM
Cadmium	.34	0.72		µg/ft²	1	5/17/2012 5:18:28 PM
Chromium	5.7	7.2		µg/ft²	1	5/17/2012 5:18:28 PM
Lead	21	14		µg/ft²	1	5/17/2012 5:18:28 PM
Silver	.075	7.2	Q	µg/ft²	1	5/17/2012 5:18:28 PM
SOIL AND SOLID METALS BY ICP-MS				Lab Code: **6020_WIPE**		Analyst: **LET**
[Wipe Prep for Metals : ICP Prep Code: 3050_WIPE		Prep Date: 5/14/2012 2:37:36 PM		Prep By: ARO]		
Selenium	19	0.72		µg/ft²	1	5/21/2012 3:53:00 PM
TOTAL MERCURY - WASTE (WIPE)				Lab Code: **7471A_WIPE**		Analyst: **ALW**
[Total Mercury Prep - Soil/Solid/Waste Prep Code: 7471APRWIPE		Prep Date: 5/14/2012 1:37:26 PM		Prep By: ARO]		
Mercury	4.6	0.0288		µg/ft²	1	5/21/2012 3:43:24 PM
TCL SEMIVOLATILE ORGANICS BY EPA 8270D				Lab Code: **8270_TCL_WIPE**		Analyst: **LD**
[Wipe Pr. Sonication BNA by EPA 3550A Prep Code: 3550_BNAWIPE		Prep Date: 5/14/2012 2:52:54 PM		Prep By: DMH]		
(3+4)-Methylphenol	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
1,2,4-Trichlorobenzene	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
1,2-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
1,3-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
1,4-Dichlorobenzene	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
2,4,5-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
2,4,6-Trichlorophenol	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
2,4-Dichlorophenol	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM
2,4-Dimethylphenol	ND	330		µg/wipe	1	5/16/2012 3:38:00 AM

Approved By: KMA **Date:** 5/24/12

Qualifiers:

#	Accreditation not offered by NYS DOH for this parameter	*	Low Level
**	Value exceeds Maximum Contaminant Value	B	Analyte detected in the associated Method Blank
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
Q	Outlying QC recoveries were associated with this parameter	S	Spike Recovery outside accepted recovery limits

[redacted]

Appendix B

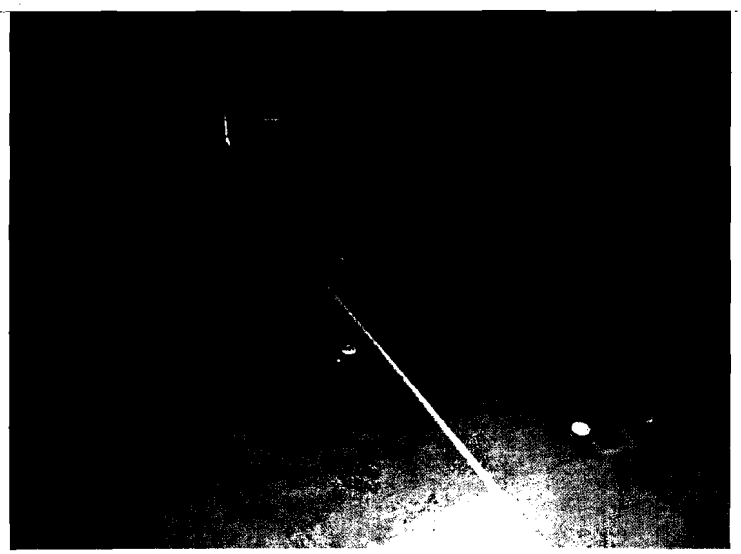
APPENDIX B – PHOTOGRAPHIC LOG

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
BAE Systems	Johnson City, New York	48377

PHOTO NO.	DATE:
1	10/12/11

DESCRIPTION

Wipe sample locations (facing east) 6 and 8 (left) and 1 through 4 (right).



CLIENT NAME:	SITE LOCATION:	PROJECT NO.
BAE Systems	Johnson City, New York	48377

PHOTO NO.	DATE:
2	10/12/11

DESCRIPTION

Wipe sample locations (facing southeast) 5-7 (left) and 2 (right).

APPENDIX B – PHOTOGRAPHIC LOG

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
BAE Systems	Johnson City, New York	48377

PHOTO NO.	DATE:
3	10/12/11

DESCRIPTION

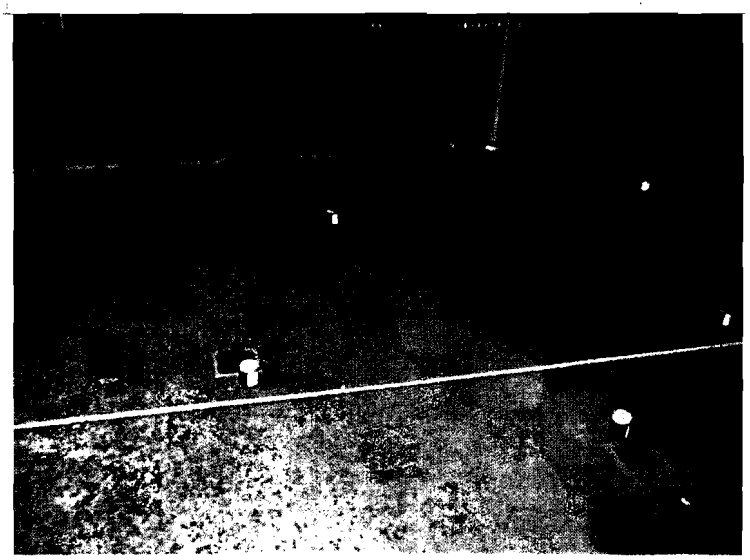
Wipe sample locations (facing northeast) 3 through 5 (top) and 10 (bottom).

CLIENT NAME:	SITE LOCATION:	PROJECT NO.
BAE Systems	Johnson City, New York	48377

PHOTO NO.	DATE:
4	10/12/11

DESCRIPTION

Wipe sample locations (facing southwest) 7 through 10 (top) and 4 (bottom).



[redacted]

Appendix C

Detection Summary

Client: O'Brien & Gere Inc of North America
Project/Site: BAE4837

TestAmerica Job ID: 480-26624-1

5

Client Sample ID: BAE-WOO1-101212 — Lab Sample ID: 480-26624-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	50.2		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO2-101212 — Lab Sample ID: 480-26624-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	33.6		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO3-101212 — Lab Sample ID: 480-26624-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	5.4		0.40	0.16	ug/Wipe	1		7471A	Total/NA

Client Sample ID: BAE-WOO4-101212 — Lab Sample ID: 480-26624-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	138		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO5-101212 — Lab Sample ID: 480-26624-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	63.6		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO6-101212 — Lab Sample ID: 480-26624-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	52.2		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO7-101212 — Lab Sample ID: 480-26624-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	62.8		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WOO8-101212 — Lab Sample ID: 480-26624-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	373		40.0	16.2	ug/Wipe	100		7471A	Total/NA

Client Sample ID: BAE-WOO9-101212 — Lab Sample ID: 480-26624-9

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	87.8		8.0	3.2	ug/Wipe	20		7471A	Total/NA

Client Sample ID: BAE-WO10-101212 — Lab Sample ID: 480-26624-10

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Mercury	43.4		8.0	3.2	ug/Wipe	20		7471A	Total/NA

[redacted]

Appendix D

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Mercury

General Statistics

Number of Valid Observations	10	Number of Distinct Observations	10

Raw Statistics		Log-transformed Statistics	
Minimum	5.4	Minimum of Log Data	1.686
Maximum	373	Maximum of Log Data	5.922
Mean	91	Mean of log Data	4.046
Geometric Mean	57.16	SD of log Data	1.078
Median	57.5		
SD	105.1		
Std. Error of Mean	33.22		
Coefficient of Variation	1.155		
Skewness	2.567		

Relevant UCL Statistics

Normal Distribution Test		Lognormal Distribution Test	
Shapiro Wilk Test Statistic	0.664	Shapiro Wilk Test Statistic	0.909
Shapiro Wilk Critical Value	0.842	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	
95% Student's-t UCL	151.9	95% H-UCL	329.9
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	241.5
95% Adjusted-CLT UCL (Chen-1995)	174.5	97.5% Chebyshev (MVUE) UCL	305.2
95% Modified-t UCL (Johnson-1978)	156.4	99% Chebyshev (MVUE) UCL	430.4

Gamma Distribution Test		Data Distribution	
k star (bias corrected)	0.917	Data appear Gamma Distributed at 5% Significance Level	
Theta Star	99.22		
MLE of Mean	91		
MLE of Standard Deviation	95.02		
nu star	18.34		
Approximate Chi Square Value (.05)	9.639	Nonparametric Statistics	
Adjusted Level of Significance	0.0267	95% CLT UCL	145.6
Adjusted Chi Square Value	8.563	95% Jackknife UCL	151.9
		95% Standard Bootstrap UCL	141.9
Anderson-Darling Test Statistic	0.559	95% Bootstrap-t UCL	291.5
Anderson-Darling 5% Critical Value	0.744	95% Hall's Bootstrap UCL	415
Kolmogorov-Smirnov Test Statistic	0.224	95% Percentile Bootstrap UCL	148.2
Kolmogorov-Smirnov 5% Critical Value	0.273	95% BCA Bootstrap UCL	174
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	235.8
		97.5% Chebyshev(Mean, Sd) UCL	298.5

	A	B	C	D	E	F	G	H	I	J	K	L
53	Assuming Gamma Distribution								99% Chebyshev(Mean, Sd) UCL			421.6
54	95% Approximate Gamma UCL (Use when n >= 40)					173.2						
55	95% Adjusted Gamma UCL (Use when n < 40)					194.9						
56												
57	Potential UCL to Use								Use 95% Approximate Gamma UCL			173.2
58												
59	Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.											
60	These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)											
61	and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.											
62												

[redacted]

Appendix E

PROFESSIONAL ENGINEER AND FACILITY CERTIFICATION

Facility: BAE Systems (BAE)

Facility Address: 600 Main Street
Johnson City, NY 13790

Facility ID#: NYD002235182

Pursuant to the closure plan requirement of 6 NYCRR 373-3.7(c), BAE maintained a written closure plan that required the facility to decontaminate any contaminated structures or equipment. Based on extensive cleanings conducted by BAE, results of sampling events, and a human health hazard evaluation, I hereby certify that the closure activities performed by BAE at the 90-day storage area and the acid dock area have fulfilled the requirements provided in BAE's written closure plan..

O'BRIEN & GERE ENGINEERS, INC.

Douglas M. Crawford, P.E.
Vice President

Date: December 19, 2012
Registration No.: 066649
State: New York

BAE SYSTEMS

12/20/2012

Doug Garner
Safety, Health and Environment Vice President