

Appendix K
USCG Dry Cargo Residue EIS Depositional Area
Characterization – Detailed Spring 2007
Sampling and Analysis Plan

2 U.S. Coast Guard Dry Cargo Residue EIS Depositional 3 Area Characterization – Sampling and Analysis Plan

PREPARED FOR: U.S. Coast Guard

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DATE: March 30, 2007

4 Introduction

5 The United States Coast Guard (USCG) requires a systematic characterization of the
6 physical, chemical, and biological properties of bulk dry cargo residues deposited in the
7 Great Lakes. The data collected from this effort will be used to aid in the preparation of an
8 Environmental Impact Statement (EIS) suitable to satisfy the procedural and decision-
9 making requirements of the National Environmental Policy Act.

10 This Sampling and Analysis Plan (SAP) provides detailed procedures for the collection of
11 bulk sediment and benthic organism tissue samples as part of the Depositional Area
12 Characterization Task, which includes the Physical, Chemical, and Biological
13 Characterization subtasks, in the Scientific Investigation. The results of the field collection
14 activities and laboratory analyses will support the preparation of the EIS, as the data will be
15 used to establish the Existing Conditions within the area of concern and to evaluate the
16 Environmental Consequences of the alternatives.

17 Key Personnel Roles and Responsibilities

18 CH2M HILL will be responsible for the overall management of the field collection activities,
19 including coordination with the subcontractors. The roles and responsibilities of each
20 member of the project team are described in Table 1.

TABLE 1
Key Personnel Roles and Responsibilities

Name	Organization	Role	Responsibility
Dr. Jamie Maughan	CH2M HILL	Principal Director/Project Manager	Responsible for all work performed under this contract and is the primary point of contact for the project. Dr. Maughan will also oversee initial field sampling activities.
John Burgess	CH2M HILL	Deputy Project Manager	Serves as an alternate point of contact in Dr. Maughan's absence. John will also provide logistical support for field sampling activities and coordination with subcontractors.

TABLE 1
Key Personnel Roles and Responsibilities

Name	Organization	Role	Responsibility
Dr. John Coffey	CH2M HILL	Physical and Chemical Characterization Subtask Lead/Project Chemist	Quality Assurance/Quality Control. Dr. Coffey will also perform the Data Quality Evaluation.
Ryan Loveridge	CH2M HILL	Biological Characterization Subtask Lead and Field Team Leader	Sample collection task lead
Greg Kirkbride	U.S. Coast Guard	Technical Project Manager for the U.S. Coast Guard	U.S. Coast Guard point of contact. Mr. Kirkbride will also oversee initial field sampling activities.
TBD	U.S. Coast Guard	Contractor Oversight/Field Team Member	Provide support to field team and oversight of CH2M HILL staff

21 **Project Schedule**

22 Field sampling activities will begin on April 22, 2007 and will consist of sampling on several
 23 of the Great Lakes, travel time between sampling locations, and time spent docked at port to
 24 ship samples and obtain new supplies. Implementation of the proposed schedule is
 25 contingent upon weather conditions to ensure that field sampling is safe and effective. The
 26 proposed field sampling schedule is presented in Table 2.

TABLE 2
Proposed Schedule

Date	Activity
4/22	Mobilization in Duluth, MN
4/23	Pre-sail conference, depart home base, travel from Duluth to Trackline 2 (Silver Bay)
4/24	Sampling in Lake Superior at Trackline 2
4/24	Travel to Trackline 1 (Duluth) in Lake Superior
4/24	Sampling in Lake Superior at Trackline 1
4/25-26	Dock in Duluth, ship samples, obtain supplies if necessary
4/27-28	Travel to Trackline 3 in Lake Michigan
4/29	Sampling in Lake Michigan at Trackline 3
4/30	Travel to port in Milwaukee
5/1-2	Dock in Milwaukee, ship samples, obtain supplies if necessary

TABLE 2
Proposed Schedule

Date	Activity
5/3-4	Travel to Trackline 4 (Marblehead) in Lake Erie
5/5	Sampling in Lake Erie at Trackline 4
5/6	Travel to Trackline 5 (Cleveland) in Lake Erie
5/7	Sampling in Lake Erie at Trackline 5
5/7	Dock in Cleveland, ship samples, obtain supplies if necessary
5/7	De-mobilization in Cleveland
5/8	Finish de-mobilization
5/8 to 7/13	Prepare technical memoranda describing characterization results
7/13	Submit technical memoranda

27 Sample Locations

28 Potential depositional areas within each Trackline that were considered suitable for dry
29 cargo residue sampling were recommended by S.D. Mackey in Appendix II of *Great Lakes*
30 *Dry Cargo Sweepings Impact Analysis: Sidescan Sonar Data Acquisition Report* (Habitat
31 Solutions, 2006). CH2M HILL identified several criteria to consider in the selection of a
32 primary/preferred location and secondary/alternate location within each Trackline. These
33 criteria are listed below:

- 34 • Suspected sweeping location
- 35 • Suspected pile dimensions
- 36 • Suspected elevated COC concentration
- 37 • Logistics
- 38 • Habitat (depth and particle size of sediment)
- 39 • Suspected toxicity
- 40 • Surface or buried sweeping
- 41 • Relationship to exclusion zone
- 42 • Availability of suitable reference site
- 43 • Regional equity
- 44 • Target sweeping type
- 45 • Cumulative effects

46 The results of the evaluation using the criteria are summarized below. Site location numbers
47 correspond to those presented in Habitat Solutions (2006).

48 **Trackline 1 (Lake Superior, Duluth)**

- 49 • Suspected sweeping location - sites 2, 3, 4 are preferred
- 50 • Suspected pile dimensions - site 2 is preferred
- 51 • Suspected elevated COC concentration - no distinguishing factor among sites

- 52 • Logistics – no distinguishing factor among sites
- 53 • Habitat (depth and particle size of sediment) - ~250 ft
- 54 • Suspected toxicity – no distinguishing factor among sites
- 55 • Surface or buried sweeping – site 2 is buried
- 56 • Relationship to exclusion zone – no distinguishing factor among sites
- 57 • Availability of suitable reference site – site 5, where sample was previously collected
- 58 • Regional equity (selection of lakes) – Duluth; Lake Superior
- 59 • Target sweeping type – western coal and taconite; sites 2 and 3 had coal in samples, sites
- 60 1 through 4 had evidence of taconite
- 61 • Cumulative effects – sites 2 and 3

62 Based on this evaluation, the site 3 was selected as the primary location and site 1 was
63 selected as the secondary location:

64 Primary (site 3): 46 52.4466 N, 91 44.7593 W

65 Secondary (site 1): 46 52.6056 N, 91 45.2340 W

66 **Trackline 2 (Lake Superior, Silver Bay)**

- 67 • Suspected sweeping location – sites 1 and 2 preferred
- 68 • Suspected pile dimensions – all piles are of equivalent size
- 69 • Suspected elevated COC concentration – no distinguishing factor among sites
- 70 • Logistics – no distinguishing factor among sites
- 71 • Habitat (depth and particle size of sediment) - ~575 ft
- 72 • Suspected toxicity – no distinguishing factor among sites
- 73 • Surface or buried sweeping – no distinguishing factor among sites (all surface)
- 74 • Relationship to exclusion zone – no distinguishing factor among sites
- 75 • Availability of suitable reference site – southeast of suggested sites in sonar area
- 76 • Regional equity – Silver Bay; Lake Superior
- 77 • Target sweeping type - taconite
- 78 • Cumulative effects – no distinguishing factor among sites

79 Based on this evaluation, the site 1 was selected as the primary location and site 2 was
80 selected as the secondary location:

81 Primary (site 1): 47 19.6254 N, 90 49.0690 W

82 Secondary (site 2): 47 21.0935 N, 90 43.9297 W

83 **Trackline 3 (Lake Michigan)**

- 84 • Suspected sweeping location - sites 3 and 4 are preferred
- 85 • Suspected pile dimensions – site 3 preferred
- 86 • Suspected elevated COC concentration – no distinguishing factor among sites
- 87 • Logistics – no distinguishing factor among sites
- 88 • Habitat (depth and particle size of sediment) - site 4 in somewhat shallowest water
- 89 ~180 ft
- 90 • Suspected toxicity – no distinguishing factor among sites
- 91 • Surface or buried sweeping – no distinguishing factor among sites (all surface)
- 92 • Relationship to exclusion zone – no distinguishing factor among sites

- 93 • Availability of suitable reference site – east of site 3 in sonar area
- 94 • Regional Equity – Lake Michigan
- 95 • Target sweeping type – coal and taconite
- 96 • Cumulative effects – no distinguishing factor among sites

97 Based on this evaluation, the site 4 was selected as the primary location and site 4 was
 98 selected as the secondary location:

99 Primary (site 4): 42 06.0925 N, 87 20.0157 W

100 Secondary (site 3): 42 07.5671 N, 87 19.9431 W

101 **Trackline 4 (Lake Erie, Marblehead)**

- 102 • Suspected sweeping location - 2 types of sweepings
- 103 • Suspected pile dimensions – no distinguishing factor among sites
- 104 • Suspected elevated COC concentration – no distinguishing factor among sites
- 105 • Logistics – no distinguishing factor among sites
- 106 • Habitat (depth and particle size of sediment) - ~45 ft
- 107 • Suspected toxicity – no distinguishing factor among sites
- 108 • Surface or buried sweeping – not specified
- 109 • Relationship to exclusion zone – no exclusion zone for limestone
- 110 • Availability of suitable reference site – no distinguishing factor among sites
- 111 • Regional equity – Lake Erie
- 112 • Target sweeping type – limestone
- 113 • Cumulative effects – site 3 may have two types of sweepings

114 Based on this evaluation, the site 3 was selected as the primary location and site 1 was
 115 selected as the secondary location:

116 Primary (site 3): 41 33.3155 N, 82 31.3665 W

117 Secondary (site 1): 41 33.4468 N, 82 26.9643 W

118 **Trackline 5 (Lake Erie, Cleveland)**

- 119 • Suspected sweeping location - coal was found near site 3
- 120 • Suspected pile dimensions – no distinguishing factor among sites
- 121 • Suspected elevated COC concentration – no distinguishing factor among sites
- 122 • Logistics – no distinguishing factor among sites
- 123 • Habitat (depth and particle size of sediment) - ~65 ft
- 124 • Suspected toxicity – no distinguishing factor among sites
- 125 • Surface or buried sweeping – not specified
- 126 • Relationship to exclusion zone – no distinguishing factor among sites
- 127 • Availability of suitable reference site – south/south east of suggested sites
- 128 • Regional equity – Lake Erie
- 129 • Target sweeping type – eastern coal
- 130 • Cumulative effects – no distinguishing factor among sites

131 Based on this evaluation, the site 2 was selected as the primary location and site 3 was
 132 selected as the secondary location:

133 Primary (site 2): 41 53.7016 N, 81 39.4955 W

134 Secondary (site 3): 41 52.6881 N, 81 37.4201W

135 Mobilization Activities

136 The mobilization for the field operations will commence on the Lake Guardian on April 22,
137 2007. Prior to mobilization, sampling personnel will thoroughly review this SAP and the
138 Health and Safety Plan (HASP), and a copy of this SAP and the HASP will be kept on-site
139 for reference.

140 Activities to be performed in advance of the mobilization include the following:

- 141 • Conduct a reconnaissance of the Lake Guardian on March 9, 2007 to understand the
142 capabilities of the vessel and crew and confirm the resources available to the field team.
- 143 • Submit the Survey Plan Submittal Form to the EPA and Lake Guardian Personnel.
- 144 • Assemble and prepare equipment for transport to the field, as determined after the
145 reconnaissance of the Lake Guardian. All field equipment will be inspected and any
146 necessary maintenance or cleaning will be conducted prior to mobilization. All
147 appropriate documentation and record-keeping materials will be assembled.
- 148 • Arrange transportation for field personnel.
- 149 • Contact the receiving laboratories regarding when samples will be shipped. For Wendell
150 Pennington & Associates, complete and submit the Project Information Form
151 (Attachment 1).
- 152 • Confirm dates of expected sample shipment with laboratories to ensure samples can be
153 received at the appropriate laboratories on expected dates.
- 154 • With the Lake Guardian personnel, determine logistics for shipping samples to the
155 laboratories, such as the locations of Federal Express offices, arranging transportation to
156 Federal Express, the hours of operation, etc.

157 Field Sampling Activities

158 The Depositional Area Characterization field operations will commence on the Lake
159 Guardian on April 23, 2007. Sediment and benthic organisms will be collected from each
160 Trackline, as summarized below and in Table 3:

- 161 • Five sediment samples from each of the 5 tracklines (25 field samples total) will be
162 analyzed for physical characteristics and all chemicals detected in any of the sweepings
163 as reported in the Sweepings Characterization Memorandum (USCG, 2007). These
164 chemicals include metals and polyaromatic hydrocarbons (PAHs).
- 165 • Four sediment samples from each of the 5 tracklines (20 field samples total) will be
166 analyzed toxicologically with bioassays using the midge *Chironomus dilutus* (20-day
167 chronic exposure whole sediment assay) and the amphipod *Hyallela azteca* (28-day
168 chronic exposure whole sediment assay).

- 169 • Five sediment samples from each of the 5 tracklines (25 field samples total) will be
 170 sieved for infaunal and epifaunal benthic organisms. The benthic samples will be
 171 preserved with a 10% formaldehyde solution. The preserved samples will be identified
 172 and enumerated in the laboratory.
- 173 • A benthic tissue sample from each of the 5 tracklines plus one reference location (6 field
 174 samples total) will be collected and analyzed for bioaccumulative metals and PAHs.

TABLE 3
 Type and Number of Samples Collected at Each Trackline

Location	Physical Analysis	Chemical Analysis	Benthic Community Structure	Toxicological Bioassays	Epibenthic Tissue	Seabird Water Column Profile
Trackline 1 (Lake Superior – Duluth) Depositional Area	3	3	3	2	1	1
Trackline 1 Reference Area	2	2	2	2	Any reference	1
Trackline 2 (Lake Superior – Silver Bay) Depositional Area	3	3	3	2	1	1
Trackline 2 Reference Area	2	2	2	2	Any reference	1
Trackline 3 (Lake Michigan) Depositional Area	3	3	3	2	1	1
Trackline 3 Reference Area	2	2	2	2	Any reference	1
Trackline 4 (Lake Erie – Marblehead) Depositional Area	3	3	3	2	1	1
Trackline 4 Reference Area	2	2	2	2	Any reference	1
Trackline 5 (Lake Erie – Cleveland) Depositional Area	3	3	3	2	1	1
Trackline 5 Reference Area	2	2	2	2	Any reference	1

175 The location of the tracklines is presented in Section 4. Each trackline consists of a
 176 depositional area and a reference area. The reference area will be determined on the day of
 177 sampling as an area approximately 2,000 m away from the depositional area and without
 178 evidence of sweepings as determined previously by bottom mapping readings using
 179 sidescan sonar (i.e., the sonar readings collected last fall will be consulted to select a
 180 reference area away from each depositional area).

181 The sampling team will use the following procedure to collect all samples:

- 182 1. Prior to sampling, the primary and secondary depositional area coordinates will be
183 confirmed and submitted to the ship's captain and navigational officer.
- 184 2. Upon reaching the primary depositional area, the box corer device will be deployed to
185 the coordinates.
- 186 3. The box corer device will be retrieved and the quality of the sediment sample will be
187 inspected for acceptability (full sample with overlying water) and the presence of
188 sweepings. A photograph of the sediment profile through the box corer chamber wall
189 will be taken.
- 190 4. Physical characteristics will be measured through the chamber wall.
 - 191 a. Depth of sweepings deposition: If observable through the chamber wall, the bottom
192 of sweepings particle(s) to the top of the sediment profile in the box corer will be
193 measured to the nearest 0.1 cm.
 - 194 b. Biologically active zone: The top of the sediment profile to the bottom of the
195 biologically active zone will be measured to the nearest 0.1 cm.
 - 196 c. Degree of mixing, if observable.
- 197 5. A 6 inch by 6 inch grab sample of sediment from the biologically active zone
198 (approximately the top 6 inches) will be removed from the box corer using a
199 decontaminated metal trowel and stainless steel bowl and transported to the Primary
200 Productivity Room for sieving. If sweepings are identified during sieving or in the
201 overall box core sample, the benthic grab sample will be sieved separately, and the
202 removed organisms will be placed in a sample container and preserved with 10%
203 formaldehyde. Proceed to Step 9.
- 204 6. In the absence of sweepings, the ship's captain and navigational officer will be notified
205 and a second deployment of the box corer at the primary depositional area will be
206 attempted and steps 3 to 5 will be repeated.
- 207 7. If after the 2nd attempt no sweepings are identified, the ship's captain and navigational
208 officer will be notified to proceed to the secondary depositional area to deploy the box
209 corer and steps 3 to 5 will be repeated.
- 210 8. If after the 2nd attempt no sweepings are identified in the secondary depositional area,
211 the ship's captain and navigational officer will be notified to return to the primary
212 depositional area to deploy the box corer and steps 3 to 5 will be repeated.
- 213 9. If sweepings are identified in the box corer or the sieved samples in Step 5, or if no
214 sweepings are identified after the 2nd attempt at the secondary depositional areas and
215 the team has returned to the primary area, samples will be collected for chemical and
216 toxicological analysis from the remaining sediment in the box corer. Note: if sweepings
217 were not identified after Steps 6-8, a benthic grab sample will also be collected as
218 described in Step 5.
- 219 10. A photograph of the sediment in the sieve table will be taken prior to collection.
220 Sediment will be homogenized to ensure consistency in color and texture and used to fill
221 sample containers for physical and chemical analyses. All sediment samples will be

- 222 labeled using the sample nomenclature described in Section 9.2 and placed in coolers in
223 the refrigerated area.
- 224 11. At the first two box corer sample locations within the depositional area, sediment
225 samples will be collected for toxicological analysis and placed in two sample containers
226 (one for each species tested). All sediment samples will be labeled using the sample
227 nomenclature described in Section 9.2 and placed in coolers in the refrigerated area.
- 228 12. If there is not enough material from one box corer sample to fill all sample containers, a
229 second box corer sample from as near the same location as feasible will be collected and
230 partitioned as in step 5. The material from both box corer samples will be homogenized
231 and sampled.
- 232 13. Following the collection and storage of samples from the first location, the field team
233 will instruct the ship's captain and navigational officer to proceed to another location
234 within the primary depositional area (or secondary depositional area, if no sweepings
235 were identified in the primary area) to deploy the box corer. Three locations
236 (representing distinct sample locations) within the depositional area will be sampled. At
237 each location, the activities will proceed as in steps 3 to 5, where, if sweepings are not
238 identified, the box corer will be re-deployed up to 3 times. If after the third attempt
239 sweepings are not identified, sampling will continue as in step 10. Specific coordinates
240 for these locations will not be submitted to the ship's captain and navigational officer.
241 Rather, the dimensions of the depositional area will be known and a location at the
242 discretion of the field team, captain, and navigational officer will be selected. The
243 coordinates of each of the sample locations will be recorded.
- 244 14. Following the collection of all sediment and benthic community structure samples in the
245 depositional area, the benthic sled will be deployed for 20 minutes within the
246 boundaries of the depositional area and retrieved. Epibenthic organisms will be
247 collected and separated by type to the degree possible in the Primary Productivity
248 Room. If rinsing of benthic samples is required, de-ionized (DI) water (or lake water, if it
249 is filtered to prevent contamination with non-target organisms) can be used. Benthic
250 organisms sorted into groups will be placed in sample containers and labeled for
251 chemical analyses. A photograph of the benthic organisms will be taken prior to sample
252 collection. Sealed sample containers will be placed in coolers in the refrigerated area.
- 253 15. The field team will instruct the ship's captain and navigational officer to proceed to an
254 area approximately 2,000 m away from the depositional area, with bottom mapping
255 showing no evidence of sweepings, to represent a reference area. Sampling will continue
256 as in step 3, with the exception that if sweepings are identified, sampling will not be
257 continued and a new location will be selected. Two samples from the reference area will
258 be collected, representing two deployments of the box corer. Sample collection will
259 proceed as for the depositional areas, with the following exceptions:
- 260 a. Only one reference epibenthic tissue sample, as collected from the benthic sled for
261 chemical analysis, will be collected in the study, per the field team's discretion.
- 262 b. Sediment samples for toxicological analysis will be collected at both locations in the
263 reference area.

264 16. The Seabird water quality measurement device will be deployed at each depositional
265 and reference area for analysis of water quality parameters. Parameters are not specified
266 but are based on the capabilities of the instrument. At a minimum, water quality data
267 should include temperature and dissolved oxygen.

268 17. Following the completion of all sampling in the Trackline, samples will be stored in the
269 refrigerated area and prepared for overnight delivery.

270 18. At the next available docking facility, the field team will disembark and transport the
271 samples to an overnight shipper.

272 At each sample location, the following information will be recorded in a field log book and
273 transcribed electronically:

- 274 • Time/date/recorder/field team personnel
- 275 • Trackline, primary depositional /secondary depositional /reference area
- 276 • Location in GPS coordinates (provided by vessel's navigation equipment)
- 277 • Weather conditions, including wind speed, wave height, cloud cover, air temperature,
278 precipitation (once per day or as conditions change)
- 279 • Calibration and decontamination activities (once per day or as conditions change)
- 280 • Depth to bottom (provided by vessel's navigation equipment)
- 281 • Samples collected and analysis type (sample nomenclature will be used)
- 282 • Other relevant observations, such as sediment type or observed debris

283 Per the procedure listed above, the following equipment will be supplied by the
284 CH2M HILL field team and brought aboard the Lake Guardian:

- 285 • Digital camera
- 286 • Sieve table
- 287 • Metal mixing trowels and stainless steel bowls (2)
- 288 • Decontamination supplies - Alconox (1 quart), 2 spray bottles, scrubbers
- 289 • Foul weather gear - boots, gloves, jacket, pants (also supplied by the Lake Guardian, but
290 personal equipment will be brought aboard)
- 291 • Field notebooks (5)
- 292 • Meter stick or short (10-ft) measuring tape
- 293 • Medium aquarium net, for filtering lake water used as a rinse
- 294 • Preservative (formaldehyde; 2 L)
- 295 • Shipping supplies - packing tape (20 rolls), bubble wrap (20 rolls)
- 296 • Duct tape (5 rolls)

- 297 • 1-Gallon zipper Ziploc bags (500)

298 **Field Instrument Procedures**

- 299 • Field instruments for sediment and benthic tissue sampling and biological organisms
300 sorting will be provided by CH2M HILL and the Lake Guardian.
- 301 • Field instruments for water column profiling will be provided by the Lake Guardian and
302 operated by Lake Guardian personnel according to standard operating procedures
303 described in *Sampling and Analytical Procedures for GLNPO's Open Lake Water Quality*
304 *Survey of the Great Lakes* (EPA, 2007).
- 305 • CH2M HILL will provide appropriate decontaminated containers for sample collection.
- 306 • Instruments including various sediment samplers will be rinsed thoroughly between
307 samples to avoid cross-sample contamination.
- 308 • Sieving devices will also be rinsed appropriately between samples to avoid cross-sample
309 contamination.
- 310 • All instruments requiring calibration (i.e. Seabird) will be calibrated as required by the
311 standard operating procedures.
- 312 • Instruments will be decontaminated after each use and stored, if possible, in a clean bag
313 or storage case.

314 **Decontamination and Disposal**

315 **Disposal of Investigation-Derived Waste.** Non-hazardous debris, such as personal protective
316 equipment (PPE) waste, will be disposed of as regular wastes. Sediments collected from the
317 Great Lakes are considered non-hazardous, and unused or spilled portions will be rinsed
318 overboard.

319 **Field Equipment Decontamination.** Sampling equipment (e.g., sampling claws, sieves,
320 stainless steel bowls, etc.) will be decontaminated prior to sampling and between samples.
321 Less than ten gallons are anticipated to be generated for the entire sampling event. Sampling
322 equipment will be decontaminated by washing with Alconox solution, followed by potable
323 water or a distilled water rinse.

324 **Laboratory Analyses**

325 **Sample Types and Required Analyses.** Samples of both sediments and benthic organisms will
326 be collected from various Tracklines in Lake Superior, Lake Erie and Lake Michigan. The
327 required samples and associated analytical methods are provided in Table 4. Complete
328 tables of target analytes per method are given in Appendix A.

TABLE 4
Samples and Associated Analytical Methods

Matrix	Tracklines	Field Samples	MS	MSD	Field Dup	PAHs - 8270C SIM	Metals - 6020+ 7470A/7471A+9012B	TOC - 9060	Grain Size - ASTM D422-63	Density - ASTM E868-82	<i>Hyallela azteca</i> Toxicity	<i>Chironomus dilutus</i> Toxicity	Benthic ID and Enumeration
Sediment	Super. (2)	10	1	1	1	13	13	5	5	5	8	8	
	Mich.(1)	5	1	1	1	8	8	5	5	5	4	4	
	Erie (2)	10	1	1	1	13	13	5	5	5	8	8	
Benthics	Super. (2)	10	1	1	1	2	2						10
	Mich. (1)	5				1	1						5
	Erie (2)	10				2	2						10
	Ref.	1				1	1						

329 Samples for chemical and physical analyses will be shipped to Lancaster Laboratory of
 330 Lancaster, PA. Samples for toxicological testing will be shipped to EnviroSystems, Inc. of
 331 Hampton, New Hampshire. Identification and enumeration of benthic organisms will be
 332 performed by Wendell Pennington & Associates of Cookeville, TN.

333 **Sample Identification.** Samples are identified using a sample label affixed to the sample
 334 container by the field team leader. The following information will be included on the sample
 335 label:

- 336 • Laboratory
- 337 • Project
- 338 • Sample identification
- 339 • Station identification
- 340 • Preservation
- 341 • Analysis
- 342 • Lot control identification
- 343 • Sampler's initials, date, and time

344 The field team leader or designee will assign each analytical sample. Each sample will have
 345 a unique identification code such that the sample identification will indicate where, what
 346 matrix, and at what depth (if applicable) a sample was collected. These numbers will be

347 used to track the sample from collection, through laboratory analysis, and into the final
348 reports. Field duplicate samples will have a letter "D" at the end of the sample designation.
349 Field Blanks will have the letters "BK" at the end of the sample designation. Examples of
350 possible sample names are listed below.

351 **General Format:**

352 Location - Matrix - Depth - Sample Number - QC

353 LS1 = Lake Superior, Track 1

354 LS2 = Lake Superior, Track 2

355 LM1 = Lake Michigan, Track 1

356 LE1 = Lake Erie, Track 1

357 LE2 = Lake Erie, Track 2

358 **Matrix:**

359 DW = Decontamination Water

360 SD = Sediment

361 TS = Benthic Tissue

362 **Depth to Bottom:**

363 200M = 200 meters

364 **Sample Station Number:**

365 01-10 = Station 01 - 10

366 **QC:**

367 D = Field Duplicate

368 FB = Field Blank

369 EB = Equipment Blank

370 BU = Backup Sample (held for possible future analysis)

371 MS= Matrix Spike

372 MSD = Matrix Spike Duplicate

373 **Examples:**

374 LS2-SD-120-02-D (Lake Superior Sediment Sample, Track line 2, 120 m depth, Station 02,
375 Duplicate)

376 LE1-TS-31-05-MS (Lake Erie Tissue Sample, Track line 1, 31 m depth, Station 05, Matrix
377 Spike)

378 **Field and Laboratory QC Samples**

379 The type and frequencies of specific QC samples performed by the laboratory depend on the
380 specified analytical method. Internal QC methods require performance on a sample batch
381 basis and include analyses of method blanks, laboratory control samples, and actual
382 environmental samples as duplicates, matrix spikes, and matrix spike duplicates. Additional
383 QC is incorporated into the analytical sequence. Table 5 gives a brief description of the QC
384 sample requirements.

TABLE 5
Field and Laboratory QC Samples

Sample Type	Methods	Frequencies	Criteria
<i>Field QC Samples</i>			
Shipment Temperature on Arrival	All	One per shipping cooler	4 degrees C +/- 2 degs
Field Blanks (decontamination water)	PAH, Total Metals and TOC	One per each of three Lakes	Less than the analyte RL
Field Duplicates	All	Sediments - One per each of three lakes. Benthos - One	30% RPD for waters and 50% for solid materials
<i>Laboratory QC Samples</i>			
Matrix Spike/Matrix Spike Duplicates	PAH and Metals Only	Sediment - 1 per each of three lakes. Benthos – One	Per the method and analyte (see Appendix A)
Method Blanks	All	One per analytical batch	Per the method and analyte (see Appendix A)
Laboratory Control Samples	All	One per analytical batch	Per the method and analyte (see Appendix A)
Surrogate Spikes	PAH	One per sample	Per the method and surrogate compound (see Appendix A)
Interference Check Sample	Metals - ICP	One per batch	Per the method and analyte (see Appendix A)

385 Instrument Calibration

386 **Field Instruments.** The only field equipment that may require calibration is the Seabird water
387 column profiler and it will be operated and maintained by Lake Guardian according to
388 standard operating procedures described in *Sampling and Analytical Procedures for GLNPO's*
389 *Open Lake Water Quality Survey of the Great Lakes* (EPA, 2007). The Seabird equipment will be
390 uniquely identified by using either the manufacturer's serial number or other means. Any
391 calibration performed, including the results of calibrations and records of repairs will be
392 recorded in the field logbook.

393 **Laboratory Calibration Procedures.** Laboratory calibration requirements are addressed in the
394 Laboratory specific method SOPs and in the promulgated analytical methods.

395 Sampling Procedures, Handling and Custody

396 Sample containers with blank labels will be sent to the field locations prior to the sampling
397 events. Laboratories will supply the correct types of sample containers and preservatives (if
398 required). Due to the potential presence of limestone or other carbonaceous materials in the

399 samples, preservatives will not be added to the sample containers for chemical analyses. The
400 only exception to this is for total metals analyzed in field blanks (decontamination water).
401 Samples of benthic organisms for identification and enumeration will also be preserved
402 with a small amount of formaldehyde diluted to 10%. Samples for toxicity bioassays will not
403 be preserved. Samples will be collected and maintained at a temperature of 4°C. or less. If
404 possible, samples will be shipped to the laboratories on a daily basis. As samples are
405 collected, the field team will complete all information on the sample container label. The
406 information will include laboratory name, project name, sample identification, preservation,
407 date and time of sample collection, and sampler's signature. Table 6 provides a listing of
408 suggested sample IDs, bottle types, and required analyses expected for this sample event.

409 The field team that collects the samples will retain custody of the samples in the field.
410 Samples will remain in the possession of and in view of a member of the field team until
411 they are placed in a designated secure area (e.g., refrigerated area) or shipped to the
412 laboratory.

413 Samples should be packaged and shipped as follows:

- 414 1. Place glass bottles in individual bubble wrap bags.
- 415 2. Line the interior cavity of an insulated shipping container (cooler) with one clear
416 30-gallon bag (at least 2-mil, or 0.002-inch, thick).
- 417 3. Fill the polyethylene bag one quarter full of ice or "blue ice" packs before placing
418 another liner in the cooler.
- 419 4. Place sample containers within the inner bag, leaving space between containers.
- 420 5. Tie off the inner liner and finish filling the cooler with ice, so as to maintain a shipping
421 temperature of 4 ± 2 ° C.
- 422 6. Place the required paperwork, COC records going to the laboratory, inside a resealable
423 freezer bag and tape it to the inside of the cooler lid.
- 424 7. Close the cooler, seal it with strapping tape or ribbon, and place at least two custody
425 seals over the edges (one on the front and one on the back hinge).
- 426 8. Deliver the cooler and a standard airbill to an express carrier for overnight delivery (if
427 applicable).

428 **Sample Shipping**

429 **Sample Custody during Shipment.** Completion of sample custody forms and sample
430 packaging for shipments are performed in the field. Designated field staff will complete and
431 verify Chain of Custody (COC) forms and pack samples for shipment at the end of each
432 sampling day. When shipping or transferring samples, the shipping container(s) will have at
433 least two custody seals affixed. One custody seal will be placed on the front of the container
434 and one on the back in a manner that would indicate if the container had been opened
435 during transit. Each container will be clearly marked with a sticker containing the
436 originator's address.

437 Sample Shipment and Handling

438 Samples will be delivered to the designated laboratories by a common carrier such as
439 Federal Express. Hard plastic ice chests or coolers with similar durability will be used for
440 shipping samples. The coolers must be able to withstand a 4-foot drop onto solid concrete in
441 the position most likely to cause damage. The samples must be cushioned to cause the least
442 amount of damage if such a fall occurs.

443 Samples must be properly packaged for shipment and dispatched to the appropriate
444 laboratory for analysis with a separate signed COC form enclosed in each sample box or
445 cooler.

446 Samples collected as part of the field sampling activities will be shipped to the following
447 addresses:

448 Lancaster Laboratories (chemical):
449 2425 New Holland Pike
450 Lancaster, PA 17605-2425
451 Point of Contact: Jennifer Good at (717) 656-2300

452 EnviroSystems, Incorporated (toxicological):
453 1 Lafayette Road
454 Hampton, New Hampshire 03842
455 Point of Contact: Ken Simon at (603) 926-3345

456 Pennington & Associates, Inc. (benthic identification and enumeration):
457 570 East 10th Street
458 Cookeville, TN 38501
459 Point of Contact: Wendell Pennington at (931)-526-6038

460 Sample Containers, Volumes, and Preservation Requirements

461 A complete listing of sample containers, volumes and preservation requirements are
462 provided in Table 6 below. Due to the potential presence of limestone or other carbonaceous
463 materials in the samples, preservatives will not be added to the sample containers for
464 chemical analyses. The only exception to this is for total metals analyzed in field blanks
465 (decontamination water). Samples of benthic organisms for identification and enumeration
466 will also be preserved with a small amount of formaldehyde diluted to 10%. Samples for
467 toxicity bioassays will not be preserved. All samples will be packed in ice and shipped to the
468 laboratory as soon as possible after the sample is collected (same day shipment is preferred).

TABLE 6
Sample Container and Preservation Requirements

Sample Type/Matrix	Parameters	Container	Analytical Methods	Preservative	
Sediments	SVOCs	16oz Amber Glass	SW8270C	4° C.	
	PAHs		SW8270C SIM		
	Total Metals		SW6020		
	Cyanide		SW9012A		
	Mercury		SW7471A		
	TOC		SW9060		
	Grain Size	16oz Amber Glass	ASTM D422-63	4° C.	
	Bulk Density		ASTM E868-82		
		<i>Hyallolela azteca</i> 28-day sediment toxicity test for survival and growth	1 Gallon plastic bucket	ASTM 2001, EPA 2000, and APHA 1998	4° C.
		<i>Chironomus dilutus</i> 20-day sediment toxicity test for survival and growth	1 Gallon plastic bucket	ASTM 2001, EPA 2000, and APHA 1998	4° C.
Benthic Organisms	SVOCs	16oz Amber Glass	SW8270C	4° C.	
	PAHs		SW8270C SIM		
	Total Metals		SW6020		
	Cyanide		SW9012A		
	Mercury		SW7471A		
	Organism ID and Enumeration	Double-lined and sealed Ziploc bag	See Project Information form in Attachment 1	10% formaldehyde	
Decontamination Water	PAHs	16oz Amber Glass	SW8270C	4° C.	
	TOC		SW8270C SIM		
			SW9060		
	Total Metals (except Hexavalent Chromium)	1-L Plastic or Glass	Water: Add nitric acid to pH<2	Add nitric acid to pH<2	
			SW6010	4° C.	
			SW9010B		
			SW7470A		

469 Data Quality Objectives and Quality Assurance Program

470 **Data Quality Objectives.** Samples of sediments and benthic organisms will be collected from
471 various Dry Cargo Sweepings depositional areas previously identified in Lake Superior,
472 Lake Michigan and Lake Erie (See Section 4) in order support preparation of the Dry Cargo
473 Sweepings EIS. Given this overall objective, this sampling and analysis effort has been
474 designed to:

- 475 • Collect representative samples from Tracklines in Lakes Superior, Michigan and Erie
- 476 • Provide analytical data for identified key chemical, physical and biological parameters
477 for input to the Dry Cargo Sweepings EIS.
- 478 • Yield data of sufficient quality to support project decisions regarding the need for
479 further study or impact control strategies.

480 Therefore, the overall data quality objectives of this effort are to generate data of sufficient
481 quality to allow for (1) comparison of chemical concentration of cargo sediment samples to
482 established ecological criteria, (2) direct measurement of toxicological /biological impacts
483 via established protocols (3) physical and chemical characteristics of the sweepings
484 depositional areas.

485 Key to meeting this overall data quality objective is the selection of analytical and
486 toxicological methods of appropriate sensitivity to allow criteria comparisons or to
487 determine toxic effects. Of similar importance is the selection of sampling methods that
488 ensure representative samples of sediments and organisms.

489 **Measurement Quality Objectives.** The physical, chemical and biological parameters selected
490 for this study are summarized in Table 4. The following section addresses how standard
491 data quality indicators (representativeness, bias, accuracy, precision, sensitivity,
492 comparability and completeness), will be monitored and controlled in this effort.

493 **Precision** is the degree of agreement among replicate measurements of the same property.
494 For this study, field duplicate samples will be collected for all parameters. In the assessment
495 of overall precision, the laboratory will often use reference samples (e.g. laboratory control
496 samples or laboratory duplicate samples) to assess precision associated with sample
497 preparation and analysis.

498 **Bias** is the systematic measurement of processes that cause errors in one direction for a
499 particular measurement. Bias is measured through analysis of standards of known
500 concentrations, through proper instrument calibration, and in some cases, inter-laboratory
501 comparisons. For this study, bias will be controlled in the laboratory by QC measures
502 (instrument calibration standards, method blanks etc.) associated with each method. Specific
503 goals for laboratory QC measures are given in the analytical method or in Appendix B.

504 **Sensitivity** is defined as the minimum concentration above which the data user has
505 reasonable confidence that the parameter was consistently detected and quantified.
506 Analytical reporting limits are developed from method detection limits which are measured
507 per 40 CFR Part 136. In the cases of toxic organics and metals, the reporting limits for each
508 analyte should be approximately 2 to 5 times lower (where possible by the method) than the
509 concentration of concern identified previously identified for sediments. Specific

510 concentration criteria for chemicals in benthic organisms have calculated and target
511 reporting limits that have been set to those identified for sediments.

512 **Representativeness** is the degree to which a measurement accurately and precisely
513 represents a condition or characteristic of a population at the sampling location. This
514 measure is qualitative and the degree of representativeness depends on the sampling
515 strategy and selection of locations.

516 **Completeness** – In general, a completeness goal of 100% is desired. A completeness of 100%
517 would indicate that analyses were completed for all methods and analytes planned for each
518 sampling location, and that all of the resulting data was useable. However, many factors
519 (weather, sample location accessibility, matrix effects) generally force the actually
520 completeness to a lower value. For this effort, the completeness goal is 90%.

521 **Comparability** is an expression of the level of confidence that two or more data sets can be
522 used to support a common analysis of a condition or characteristic. For this effort, the data
523 being collected for sediments will be compared chemical and toxicological data previously
524 collected (USCG, 2007) using identical analytical and toxicological methodologies. In order
525 to ensure comparability with future efforts, if necessary, SOPs for sampling will be
526 employed and updated to reflect actual practice and standard, and the analytical
527 methodology employed will be well documented.

528 Data Reduction, Validation, and Reporting

529 **Field Data Reporting.** Field data reduction from the Seabird will be performed by Lake
530 Guardian personnel according to standard operating procedures described in *Sampling and*
531 *Analytical Procedures for GLNPO's Open Lake Water Quality Survey of the Great Lakes* (EPA,
532 2007).

533 **Laboratory Data Reporting.** Laboratory data reduction will be done manually or by using
534 appropriate application software. Quantitation procedures specified for each method must
535 be followed. If data reduction is done manually, the documentation must include the
536 formulas used. Any application software used for data reduction must have been previously
537 verified by the laboratory for accuracy. Documentation of the software's verification must
538 be maintained on file in the laboratory. All documentation of data reduction must allow re-
539 creation of the calculations.

540 All data will undergo a minimum of three levels of review at the laboratory prior to release.
541 The analyst performing the tests shall initially review 100 percent of the data. After the
542 analyst's review has been completed, 100 percent of the data shall be reviewed
543 independently by a senior analyst or by the section supervisor for accuracy, compliance
544 with calibration, and QC requirements, holding time compliance, and for completeness.
545 Analyte identification and quantitation must be verified. Calibration and QC results will be
546 compared with the applicable control limits. Reporting limits should be reviewed to make
547 sure they meet the project objectives. Results of multiple dilutions should be reviewed for
548 consistency. Any discrepancies must be resolved and corrected. Laboratory qualifiers will
549 be applied when there are non-conformances that could potentially affect data usability.
550 These qualifiers must be properly defined as part of the deliverables. All issues that are
551 relevant to the quality of the data must be addressed in a case narrative. The hard-copy and

552 electronic laboratory reports for all samples and analyses will contain the information
553 necessary to perform data evaluation.

554 **Hardcopy and Electronic Deliverables (EDD).** Within the timeframe specified in the laboratory
555 statement of work, contract, or purchase order from sample receipt, the laboratory shall
556 deliver hardcopy documentation as specified in Appendix B at Level III. In addition the
557 laboratory shall deliver one electronic copy of the data as specified in the format described
558 in Appendix B via compact disc or e-mail in ASCII format within the same timeframe.

559 All electronic data files shall match the final hard copy results. CH2M HILL requires receipt
560 of final hard copy results in conjunction with submittal of electronic files.

561 All raw data will be maintained on file in the laboratory and will be available upon request.
562 Complete documentation of sample preparation and analysis and associated QC
563 information will be maintained in a manner that allows easy retrieval in the event that
564 additional validation or information is required. All data generated using gas
565 chromatography/mass spectrometry must be maintained on magnetic tapes and will be
566 made available upon request. All documentation must be retained for a minimum of 10
567 years after data acquisition.

568 **Data Verification and Validation.** Before the analytical results are released by the laboratory,
569 both the sample and QC data will be reviewed carefully to verify sample identity,
570 instrument calibration, detection limits, dilution factors, numerical computations, accuracy
571 of transcriptions, and chemical interpretations. Additionally, the QC data will be reduced
572 and spike recoveries will be included in control charts, and the resulting data will be
573 reviewed to ascertain whether they are within the laboratory-defined limits for accuracy
574 and precision. Any non-conforming data will be discussed in the data package cover letter
575 and case narrative. The laboratory will retain all of the analytical and QC documentation
576 associated with each data package.

577 The data also are verified to assess whether the EDDs and the hard-copy data deliverables
578 are consistent with one another to ensure an accurate database.

579 One hundred percent of the laboratory data reporting packages will be validated.

580 The data package will be validated by the Project Chemist using the QC criteria established
581 in this SAP or in the analytical method and using a process analogous to that outlined in the
582 following guidance documents:

- 583 • *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA,
584 2002)
- 585 • *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA,
586 1999)

587 The data review and validation process is independent of the laboratory's checks; it focuses
588 on the usability of the data to support the project data interpretation and decision-making
589 process.

590 Sample results that do not meet the acceptance limit criteria will be indicated with a
591 qualifying flag, which is a one or two-letter abbreviation that indicates a possible problem

592 with the data. All data will have only one associated data qualifying flag. Flags used in the
593 text may include the following:

594 **U** Undetected. Samples were analyzed for this analyte, but it was not detected above the
595 method detection limit (MDL) or instrument detection limit (IDL).

596 **UJ** Detection limit estimated. Samples were analyzed for this analyte, but the results were
597 qualified as not detected. The result is estimated.

598 **J** Estimated. The analyte was present, but the reported value may not be accurate or
599 precise.

600 **R** Rejected. The data are unusable. (Note: Analyte or compound may or may not be
601 present.)

602 **X** Excluded. The data are associated with re-runs and dilutions and are excluded because
603 another useable result exists. (There can only be a single valid result per parameter per
604 sample.)

605 It is important to note that laboratory qualifying flags are included on the data summary
606 forms (Form I) that are submitted by the laboratory. However, during the data review and
607 validation process, the laboratory qualifying flags are evaluated and replaced with the
608 project-specific validation flags.

609 **Data Quality Evaluation.** The Project Chemist or a designee will perform the Data Quality
610 Evaluation (DQE). The DQE process is used to assess the effect of the overall analytical
611 process on the usability of the data. The two major categories of data evaluation are
612 laboratory performance and matrix interferences. The evaluation of laboratory performance
613 is a check for compliance with the method requirements. It is a straight-forward
614 examination—either the laboratory did, or did not, analyze the samples within the limits of
615 the analytical method. The evaluation of the matrix interferences is more subtle and
616 involves analysis of several results, including surrogate spike recoveries, matrix spike
617 recoveries, and duplicate sample results. The project team will evaluate the data validation
618 results. This evaluation will assess how the data, as qualified by the data validation, can be
619 used on the project.

620 Once each of the data packages has been validated, and the data validation worksheets
621 completed, then the entire data set will be evaluated for overall trends in data quality and
622 usability. Information summarized as part of the DQE may include chemical compound
623 frequencies of detection, dilution factors that might affect data usability, and patterns of
624 target compound distribution. The data set also will be evaluated to identify potential data
625 limitations or uncertainties in the laboratory.

626 **Reconciliation with Project Objectives.** The final activity of the DQE process is to assess
627 whether the data meet the planned objectives for the project. The final results, as adjusted
628 for the findings of any data validation and data evaluation, will be checked against the
629 objectives, and an assessment will be made as to whether the data are of sufficient quality to
630 support the objectives. The decision as to data sufficiency may be affected by the overall
631 precision, accuracy, and completeness of the data as demonstrated by the data validation
632 process.

633 Data Management

634 The electronic data will be used to generate validation reports, risk assessment calculations,
635 modeling results, data summary tables, maps and other figures. The data users must have
636 rapid access to stored data; data entry capabilities, manage sample data using unique
637 sample identification numbers; establish a sample inventory of new data collected and
638 provide methods of sample inventory reconciliation; store and provide sample-specific
639 attributes, including location identifiers, sample type and media, and sample date; and
640 provide reporting and delivery formats to support data analysis and reduction.

641 **Archiving.** Hardcopy and electronic versions will be archived in project files and on
642 electronic archive tapes for the duration of the project. In addition, all data and reference
643 material that support the analysis and documentation in the EIS will be included in the
644 Administrative Record. The Administrative Record will be transferred to the USCG as it
645 relates the Dry Cargo Residue Sweeping action, and can become the backup data used in
646 court proceedings to validate the NEPA process and support the Coast Guard's decision.

647 **Data Flow and Transfer.** The data flow from the laboratory and field to the project staff and
648 data users will be sufficiently documented to ensure that data are properly tracked,
649 reviewed, and validated for use. As mentioned all data and reference material that support
650 the analysis and documentation in the EIS will also be included in the Administrative
651 Record, which will be transferred to the USCG.

652 **Project Data Management System.** Selected field data and laboratory data identified in
653 Appendix C will be uploaded and maintained in streamlined relational database using the
654 Microsoft Access platform. This system will be located on the project server and tape back-
655 ups will be made incrementally and in full per the standing CH2M HILL policy.

656 **Record Keeping.** In addition to the data management procedures outlined in previous
657 section for analytical data, the laboratory will ensure that they maintain electronic and
658 hardcopy records sufficient to recreate each analytical event.

659 The minimum records the laboratory will keep contain the following:

- 660 • Raw data, including instrument printouts, bench work sheets, and/or chromatograms
661 with compound identification and quantitation reports.
- 662 • Laboratory-specific written SOPs for each analytical method and QA/QC function in
663 place at the time of analysis of project samples.

664 Field data will be maintained in the following:

- 665 • Field Log Books
- 666 • Field Instrument (Seabird) Data Hardcopy or CD

667 The field logbook will be maintained to document all field activities. All entries in the
668 logbook will be made in waterproof ink. Corrections will be made by drawing a single line
669 through the entry, initialing, and dating the revision. All logbooks will be permanently
670 bound and contain consecutively numbered pages. Blank pages will be marked through,
671 dated, and initialed at the bottom. The individual responsible for documenting the day's
672 field activities will sign and date the bottom of each page.

673 **References**

- 674 U.S. Coast Guard (USCG). 2007. *USCG Dry Cargo Sweepings Scientific Investigation: Sweepings*
675 *Characterization – Chemical Analyses*. February.
- 676 U.S. Environmental Protection Agency (EPA). 2007. *Sampling and Analytical Procedures for*
677 *GLNPO's Open Lake Water Quality Survey of the Great Lakes*. Great Lakes National Program
678 Office. EPA 905-R-05-001. January.
- 679 Habitat Solutions. 2006. *Great Lakes Dry Cargo Sweepings Impact Analysis: Sidescan Sonar Data*
680 *Acquisition*. Prepared for Volpe National Transportation System Center, Parsons
681 Brinckerhoff Quade & Douglas, Inc., and CH2M HILL. December.

Appendix A. Target Analytes and Analytical Methods for Chemical Analyses

Compounds	LLI LOQ	Units	MS/MSD Accuracy (%)	MS/MSD Precision (% RPD)	LCS/LCSD Accuracy (%)	LCS/LCSD Precision (% RPD)	Surrogate Recoveries
General Chemistry							
Mercury	0.10	mg/kg	80-120	20	66-132	20	
TOC Solids/Sludges Combustion	170	mg/kg	27-132	20	40-148	19	
Total Cyanide (solid)	0.50	mg/kg	59-124	22	90-110	17	
Bulk Density	0.30	g/cc	75-125	20			
Mercury	0.0002	mg/l	80-120	20	80-120	20	
Total Organic Carbon (Quad)	2.0	mg/l	62-148	20	80-120	20	
Specific Gravity	0.020		75-125	100			
Total Cyanide (water)	0.010	mg/l	83-111	20	90-110	20	
TAL Metals							
Arsenic	2	mg/kg	75-125	20	66-101	20	
Cadmium	0.25	mg/kg	75-125	20	81-119	20	
Chromium	2	mg/kg	75-125	20	73-127	20	
Copper	1	mg/kg	75-125	20	82-118	20	
Lead	1	mg/kg	75-125	20	82-118	20	
Nickel	2	mg/kg	75-125	20	82-118	20	
Selenium	2	mg/kg	75-125	20	74-126	20	
Silver	0.5	mg/kg	75-125	20	66-134	20	
Zinc	2	mg/kg	75-125	20	79-121	20	
Arsenic	0.00200	mg/l	75-125	20	80-120	20	
Cadmium	0.00025	mg/l	86-116	20	80-120	20	
Chromium	0.00200	mg/l	75-125	20	90-110	20	
Copper	0.00100	mg/l	75-125	20	80-120	20	
Lead	0.00100	mg/l	75-125	20	90-113	20	
Nickel	0.00200	mg/l	75-125	20	90-111	20	
Selenium	0.00200	mg/l	75-125	20	80-120	20	
Silver	0.00050	mg/l	75-125	20	90-118	20	
Zinc	0.02000	mg/l	80-121	20	90-111	20	
SVOAs by SW8270 SIM							
Anthracene	0.05	ug/kg	51-138	30	52-128	30	Nitrobenzene-d5 42-142
Benzo(a)anthracene	0.05	ug/kg	37-158	30	59-134	30	2-Fluorobiphenyl 48-122
Benzo(a)pyrene	0.05	ug/kg	39-145	30	59-126	30	Terphenyl-d14 51-155
Chrysene	0.05	ug/kg	29-158	30	57-122	30	
Dibenz(a,h)anthracene	0.05	ug/kg	23-156	30	51-143	30	
Fluoranthene	0.05	ug/kg	29-158	30	57-128	30	
Fluorene	0.05	ug/kg	61-124	30	66-122	30	
Phenanthrene	0.05	ug/kg	50-139	30	64-118	30	
Pyrene	0.05	ug/kg	25-175	30	65-127	30	
Anthracene	0.050	ug/l	17-153	30	64-126	30	Nitrobenzene-d5 50-153
Benzo(a)anthracene	0.050	ug/l	52-135	30	68-129	30	2-Fluorobiphenyl 52-132
Benzo(a)pyrene	0.050	ug/l	1-155	30	63-131	30	Terphenyl-d14 58-141
Chrysene	0.050	ug/l	58-129	30	69-128	30	
Dibenz(a,h)anthracene	0.050	ug/l	17-153	30	55-142	30	
Fluoranthene	0.050	ug/l	57-129	30	69-131	30	
Fluorene	0.050	ug/l	61-129	30	71-124	30	
Phenanthrene	0.050	ug/l	76-124	30	70-125	30	
Pyrene	0.050	ug/l	44-146	30	69-130	30	
Physical Properties							
Grain Size to 1 um							
0.001 mm	1	% Passing					
0.002 mm	1	% Passing					
0.005 mm	1	% Passing					
0.02 mm	1	% Passing					
0.05 mm	1	% Passing					
0.064 mm	1	% Passing					
0.075 mm	1	% Passing					
0.15 mm	1	% Passing					
0.3 mm	1	% Passing					
0.6 mm	1	% Passing					
1.18 mm	1	% Passing					
19 mm	1	% Passing					
2.36 mm	1	% Passing					
3.35 mm	1	% Passing					
37.5 mm	1	% Passing					
4.75 mm	1	% Passing					
75 mm	1	% Passing					

PROJECT ANALYSES FORM
Pennington and Associates, Inc.
P.O. Box 2887, Cookeville TN 38502-2887
Phone: 931-526-6038 Fax: 931-528-4167
email: kingpenn@citlink.net

PROJECT INFORMATION

Company name: CH2M HILL **phone:** 617-523-2260
Mailing address: 25 New Chardon Street Ste. 300 **email:** Ryan.Loveridge@ch2m.com
 Boston, MA 02113 **fax:** 773-693-4882

Contact person: Ryan Loveridge **phone:** Same as above
Mailing address: Same as above **email:** Same as above
fax: Same as above

Send data to: Contact Person **email data?** Yes

Billing information: Invoice per subcontract

Purchase Order No.: _____

Project Name/No.: USCG Dry Cargo Sweepings EIS

Collection location: State: (Great Lakes) **County:** USA **Drainage:** _____

Number of samples: 25 **Sample type:** Benthics sorted

Data need by (date): June 29, 2007 **Quoted price/sample**

Bill will be paid in (# days) per subcontract **30** **60** **90**

DATA ANALYSES

Standard Operating Procedures to follow: State: Not Applicable Year: _____

Tolerance values: North Carolina Hilsenhoff Other

Biotic Index actual calculated value assigned abundance value

Level of taxonomic resolution: Family Genus Species

Use actual values Assigned values

Metrics Calculated (check all that apply)

- | | | | |
|---|-------------------------------------|---|-------------------------------------|
| Biotic index | <input checked="" type="checkbox"/> | % diptera | <input type="checkbox"/> |
| EPT index | <input checked="" type="checkbox"/> | % filterers | <input type="checkbox"/> |
| Ratio Scrapers to Filt. Collectors | <input type="checkbox"/> | % shredders | <input checked="" type="checkbox"/> |
| Ratio of Shredders to total organisms | <input checked="" type="checkbox"/> | Indicator Assemblage Index (reference site) | <input type="checkbox"/> |
| Ratio of EPT and Chironomidae Abundance | <input checked="" type="checkbox"/> | Florida Index | <input type="checkbox"/> |
| Percent Contribution of Dominant Taxa | <input checked="" type="checkbox"/> | Jaccard Coefficient | <input checked="" type="checkbox"/> |
| Community loss index(need reference site) | <input type="checkbox"/> | Percent Similarity | <input checked="" type="checkbox"/> |
| % oligochaetes and chironomids | <input checked="" type="checkbox"/> | Diversity Indices | <input checked="" type="checkbox"/> |
| % Clingers | <input type="checkbox"/> | Shannon | <input checked="" type="checkbox"/> |
| No. of Chironomidae taxa | <input checked="" type="checkbox"/> | Pielou | <input checked="" type="checkbox"/> |

list below any additional specific metrics not shown and any additional instructions

- Mean number of individuals per taxon
- % intolerant species
- % oligochaetes
- ETO taxa (ephemeroptera, trichoptera, odonates)
- % non-insects
- Number of crustacean and molluscs
- % crustaceans and molluscs
- % suspension feeders
- Abundance (excluding *Chironomidae* and *Tubificidae*)
- Number of samples with no organisms present

SAMPLES CAN NOT BE COMPLETED UNTIL THIS FORM HAS BEEN RETURNED. THANKS.

Signature: _____

Date: _____

682
683
684

Appendix B
Hardcopy Laboratory Data Deliverables

685 Hardcopy deliverables, in summary format, equivalent to those specified in the latest
686 versions of USEPA Contract Laboratory Program Statements of Work for Organics and
687 Inorganics Analyses or CLP-like, are preferred. Alternate reporting formats require
688 approval from the Project Chemist. The laboratory data report should be organized in
689 format that facilitates identification and retrieval of data. A *Level 1* will include, at a
690 minimum, the following information (when applicable):

- 691 • Cover Letter complete with the following information:
 - 692 – Title of report and laboratory unique report identification (Sample Delivery Group
 - 693 Number)
 - 694 – Project name, site location
 - 695 – Name and location of laboratory and second-site or subcontracted laboratory
 - 696 – Client name and address
 - 697 – Statement of authenticity and official signature and title of person authorizing report
 - 698 release
- 699 • Table of contents
- 700 • Summary of samples received that correlates field sample IDs with the laboratory IDs
- 701 • Laboratory qualifier flags and definitions
- 702 • Field identification number
- 703 • Date received
- 704 • Date prepared
- 705 • Date analyzed (and time of analysis if the holding time is less than or equal to 48 hours)
- 706 • Preparation and analytical methods
- 707 • Result for each analyte (dry weight basis for soils)
- 708 • Percent solids results for soil samples
- 709 • Dilution factor (provide both diluted and undiluted results when available)
- 710 • Sample-specific reporting limit adjusted for sample size, dilution/concentration
- 711 • Sample-specific MDL adjusted for sample size, dilution/concentration (when project
- 712 objectives require reporting less than the RL)
- 713 • Units

714 A *Level 2* report will consist of all the elements included in a Level 1 deliverable plus those
715 outlined below:

- 716 • Case Narrative that addresses the following information at a minimum;
 - 717 – Sample receipt discrepancies, such as temperature exceedances, etc.

-
- 718 – Descriptions of all non conformances in the sample receipt, handling, preparation,
719 analytical and reporting processes and the corrective action taken in each occurrence.
- 720 – Identification and justification for sample dilution
- 721 • Surrogate percent recoveries
- 722 • MS/MSD and LCS spike concentrations, native sample results, spiked sample results,
723 percent recoveries, and RPDs between the MS and MSD results. Associated QC limits
724 must also be provided.
- 725 • Method blank results
- 726 • Analytical batch reference number that cross references samples to QC sample analyses
- 727 • Executed chain of custody and sample receipt checklist
- 728 A *Level 3* report will consist of all the elements included in Level 1 and 2 reports plus those
729 outlined below:
- 730 • Analytical sequence or laboratory run log that contains sufficient information to
731 correlate samples reported in the summary results to the associated method QC
732 information, such as initial and continuing calibration analyses.
- 733 • Confirmation results
- 734 • Calibration blank results for inorganic analyses (required in hardcopy format only)
- 735 • ICP interference check sample true and measured concentrations and percent recoveries
736 (required in hardcopy format only)
- 737 • Method of standard addition results (if applicable; required in hardcopy format only)
- 738 • Post-digestion spike recoveries (if applicable; required in hardcopy format only)
- 739 • Internal standard recovery and retention time information, as applicable
- 740 • Initial calibration summary, including standard concentrations, RFs, average RFs, RSDs
741 or correlation coefficients, and calibration plots or equations, if applicable (required in
742 hardcopy format only)
- 743 • Continuing calibration verification summary, including expected and recovered
744 concentrations and percent differences (required in hardcopy format only)
- 745 • Instrument Tuning and mass calibration information for gas chromatography/mass
746 spectrometry and ICP/ mass spectrometry analyses
- 747 • Any other method-specific QC sample results

748

749

Appendix C
EDD Specification

750 The electronic data deliverable (EDD) file from the laboratory will be a comma-delimited
751 ASCII (CDA) file in the format listed below. There will be one file per hard copy report and
752 the filename of the EDD file will be in the format REPORTID.txt or REPORTID.csv, where
753 REPORTID is the hard copy report identifier of sample delivery group.

754 The first row of the EDD will contain the 47 field name values as listed in the EDD
755 Specification Table

756 The EDD Specification Table lists the attributes of the columns for each row of the CDA file.
757 The fields should be reported in the order indicated.

758 The **Data Type** column describes the value in the field as either text (alphanumeric), number
759 (numeric only), date (format: mm/dd/yyyy), or time (24-hour format hh:mm). If the field is
760 conditional or optional and there is no value to be reported, report a null (i.e., no) value. For
761 a text field, do not report a zero-length string (i.e., "").

762 The **Data Length** column contains the maximum length of a text value for the particular
763 data field.

764 The **Rqmt** column contains a code indicating whether the value is required (R) for all rows,
765 optional (O) for all rows, or conditional (C) and depends on the type of result reported.

766 The VVL (Valid Value List) column contains a flag to indicate whether the data field has (Y)
767 or does not have (N) a valid value list provided by CH2M HILL associated with it.

768 Modification Notes:

769 **Changes as of May 2005 Revision:**

- 770 1. Change the length requirement of LabSampleID (Field No. 9) to 12.
- 771 2. Change the length requirement of SDG (Field No. 3) to 15.
- 772 3. Change the length requirement for LeachLot (Field No. 45) to 10.
- 773 4. Change the length requirement of AnalysisLot (Field No. 46) to 10.
- 774 5. Change the length requirement of CalRefID (Field No. 47) to 10.
- 775 6. Change the description of the FieldID field (Field No. 4) to clarify the contents of the
776 field.
- 777 7. Change the description of the NativeID field (Field No. 5) to clarify the contents of the
778 field.
- 779 8. Change the description of the LRType field (Field No. 7) to clarify the contents of the
780 field.
- 781 9. Change the description of the CAS field (Field No. 21) to clarify the contents of the field.
- 782 10. Change the description of the LabQualifier field (Field No. 30) to clarify the contents of
783 the field.
- 784 11. Change the description of the Basis field (Field No. 37) to clarify the contents of the field.

785 12. The list of fields that uniquely identify each row was changed to include LabSampleID.

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
1	VersionCode	text	15	R	Y	Code identifying the version of the EDD deliverable.
2	LabName	text	10	R	Y	Identification code for the laboratory performing the work. This value is used to distinguish among different facilities.
3	SDG	text	15	R	N	Sample delivery group designation. Always populated for all samples, including QC.
4	FieldID	text	30	R	N	Client sample ID as appears on COC with optional lab-assigned suffixes and/or prefixes to make it unique. If the sample identifier on the COC and the prefix/suffix is greater than 20 characters, abbreviate the value but make it unique. For laboratory QC samples (i.e., method blanks, lab control samples), use a unique lab sample identifier.
5	NativeID	text	30	R	N	Client sample ID, <u>exactly</u> as on the COC. <u>No</u> prefix or suffix allowed on client sample IDs. Used to identify the native sample from which other samples are derived (e.g., QAQCType = "LR", "MS", or "SD"). For laboratory QC samples (i.e., method blanks, lab control samples), use the FieldID value that was assigned. However, for lab blank spike duplicate samples, use the FieldID value that was assigned to the associated lab blank spike sample.
6	QAQCType	text	2	R	Y	This is the code for the sample type. Any field sample that is not used as lab QC and is not otherwise marked on the COC should have the designation of "N" (normal field sample). No suffix allowed (i.e., do not add numbers as suffixes to the QAQCType values as is called for in the ERPIMS guidelines). Note that if all analyses for a given sample are diluted, then the first dilution should be designated as the normal sample. If more dilutions are required, then the next dilution should be designated as the first true dilution with a QAQCType value of "LR" and a LRType value of "DL" (see LRType, below).

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
7	LRTYPE	text	3	C	Y	This is the code for laboratory replicate sample type. Values are: blank (if QAQCType value is not "LR"), "DL" (dilution), "RE" (re-analysis), "D" (inorganic duplicate), "CF" (confirmation). For multiple dilutions or re-analyses of the same sample, append the replicate number after the LRTYPE value (i.e., "RE", "RE2", "RE3", etc.).
8	Matrix	text	5	R	Y	Sample matrix code. Valid values are as follows: "AIR", "WATER", "SOIL", unless otherwise provided by the project data manager and marked on the COC. The use of "liquid", "solid", etc. for lab QC is not allowed.
9	LabSampleID	text	12	R	N	Laboratory sample ID that is assigned by the laboratory. Prefix or suffix is allowed. This is where dilutions or re-extractions are noted. Ex: "D97-11111RE" is acceptable.
10	AnalysisMethod	text	20	R	Y	Analysis method code. This is the identifier of the analytical method that was performed on the sample. Example: SW8260A. Generic names such as "EPA" should not be used.
11	ExtractionMethod	text	20	R	Y	Preparation method code. A value in this field is required. If the preparation is described in the method, use "METHOD". If there is no separate preparation required, use "NONE". Note that Total and Dissolved metal analyses are differentiated by the value in this column. Note that Total, TCLP, and SPLP analyses are now differentiated by the value in the LeachMethod column (see below).
12	SampleDate	date		C	N	Date of sample collection. Value is required for all samples sent to the laboratory and samples derived from those samples. Format: mm/dd/yyyy
13	SampleTime	time		C	N	Time of sample collection. Value is required for all samples sent to the laboratory and samples derived from those samples. 24-hour format: hh:mm

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
14	ReceiveDate	date		C	N	Date of sample receipt in the lab. Value is required for all samples sent to the laboratory and samples derived from those samples. Format: mm/dd/yyyy
15	ExtractDate	date		C	N	Date of sample preparation (extraction or digestion). Value is required if the ExtractionMethod field value is other than "NONE". Format: mm/dd/yyyy
16	ExtractTime	time		C	N	Time of sample preparation. Value is required if the ExtractionMethod field value is other than "NONE". 24-hour format: hh:mm
17	AnalysisDate	date		R	N	Date of sample analysis. Value is required for all records. Format: mm/dd/yyyy
18	AnalysisTime	time		R	N	Time of sample analysis. Value is required for all records. 24-hour format: hh:mm
19	PercentSolids	number		R	N	Percent solids within the sample. Should be zero for water samples.
20	LabLotCtlNum	text	10	C	N	Identifier of an autonomous group of environmental samples and associated QC samples prepared together. For example, its value can be a digestion or extraction batch ID. If there is no separate extraction or preparation performed, leave this field blank.
21	CAS	text	20	C	N	CAS number of analyte, if available.
22	ParamID	text	12	R	Y	Parameter identifier code for the parameter listed in the Analyte field.
23	Analyte	text	60	R	N	Name of analyte, chemical name.
24	Result	text	10	R	N	Result of the analysis. Surrogate analytes will be reported in units of percent. All others will be reported in sample concentration units. If undetected, report the adjusted MDL or adjusted RL, depending on the project. (Reported as a text field to preserve significant figures.)
25	ExpectedValue	number		C	N	"100" for surrogates; "0" (zero) for blanks; spike level plus parent result for LCS, and MS/MSD; parent value for lab duplicate; etc.

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
26	Units	text	10	R	Y	Units of measure used in the analysis. Report "PERCENT" for surrogate analytes and concentration units for all others.
27	Dilution	number		R	N	Total dilution reported in the analysis. Default value should be 1 (one). This value should reflect changes to sample preparation amounts as defined by the method (e.g., less sample used for standard VOC analysis).
28	MDL	number		C	N	Minimum detection limit adjusted for preparation and dilution. Note that this value may be the method detection limit or the instrument detection limit, depending on the method and the project requirements. This value is not adjusted for percent moisture.
29	RL	number		C	N	Reporting limit adjusted for preparation and dilution. Value is not adjusted for percent moisture. Equivalent to PQL.
30	LabQualifier	text	6	R	N	Lab qualifier for the results, as reported on the hard copy. Use "=" as first (or only) qualifier value for detected results if there are no other qualifiers for the result.
31	Surrogate	text	1	R	Y	Is the chemical a surrogate? Report "Y" for yes or "N" for no.
32	Comments	text	240	O	N	Comment field
33	ParValUncert	text	16	C	N	Radiological parameter value uncertainty.
34	Recovery	number		C	N	Percent recovery for MS, SD, LCS, LCSD, and surrogate compounds.
35	LowerControlLimit	number		C	N	Lower control limit value for spiked compounds, expressed in units of Percent. A value in this field is required if there is a value in the Recovery field (Field No. 34).
36	UpperControlLimit	number		C	N	Upper control limit value for spiked compounds, expressed in units of Percent. A value in this field is required if there is a value in the Recovery field (Field No. 34).
37	Basis	text	1	R	Y	Weight basis for soil (or solid) sample analysis. Use "D" for dry-weight basis, "W" for wet-weight basis, or "X" if not applicable.

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
38	ConcQual	text	1	R	Y	Concentration qualifier. Use "=" for detects, "J" for estimated value (value between detection limit and reporting limit), "U" for undetected result, or "E" for exceeded result.
39	MDLAdjusted	number		C	N	Minimum detection limit adjusted for preparation, dilution and percent moisture . See the description of the MDL field (Field No. 28) for an explanation of the contents of this field.
40	RLAdjusted	number		C	N	Reporting limit adjusted for preparation, dilution and percent moisture . Equivalent to PQL
41	SampleDescription	text	30	C	N	Full sample identifier value as it appears on the COC. In some cases, this may be the name of the sampling location instead of the sample. Required for all samples that are either collected in the field and specified on the COC, or derived from samples that are collected in the field and specified on the COC.
42	LeachMethod	text	20	R	Y	Analytical method used for leaching the sample. This applies to TCLP, SPLP, or other leaching or pre-extraction leaching procedures. Use "NONE" if the sample was not leached.
43	LeachDate	date		C	N	Date that the leaching method was performed (start date for multi-date leaching procedures). Value is required if the LeachMethod field value is other than "NONE". Format: mm/dd/yyyy.
44	LeachTime	time		C	N	Time that the leaching procedure started. Value is required if the LeachMethod field value is other than "NONE". 24-hour format: hh:mm.
45	LeachLot	text	10	C	N	Identifier of an autonomous group of environmental samples and associated QC samples leached at the same time. Value is required if the LeachMethod field value is other than "NONE". If the sample was not leached, leave this field blank.
46	AnalysisLot	text	10	R	N	Identifier of an autonomous group of environmental samples and associated QC samples analyzed together. A value in this field is mandatory (i.e., it should not be blank).

EDD SPECIFICATION TABLE

Field Number	Field Name	Data Type	Data Length	Rqmt	VVL	Description and Comments
47	CalRefID	text	10	C	N	Identifier of a group of environmental and QC samples linked by a common set of calibration records. All results with the same CalRefID value will have had the same initial calibration run.

786 Each row is uniquely identified by the values in the following fields:

- 787 • FieldID
- 788 • LabSampleID
- 789 • AnalysisMethod
- 790 • ExtractionMethod
- 791 • LeachMethod
- 792 • ParamID

793 If an analytical sample must be diluted or reanalyzed and reported in addition to the
 794 original analytical sample, the diluted or reanalyzed sample should have a FieldID value
 795 that is different that that of the original sample. This can be accomplished through the
 796 addition of a suffix to the original FieldID that establishes a new and unique FieldID for the
 797 associated records.

798 Example Valid Values

799 The project data manager will provide the laboratory with a list of valid values that the
 800 laboratory will use in constructing the EDD. Listed below are some example valid values.

Field Name	Valid Value	Meaning
VersionCode	4.20AFCEE3	Format 4.20, AFCEE data values. LabQualifier field contains the laboratory qualifier values defined in the AFCEE QAPP, version 3.0.
VersionCode	4.20EPACLP	Format 4.20, EPA data values. LabQualifier field contains the standard EPA CLP lab qualifiers.
QAQCType	N	Normal, environmental sample
QAQCType	LB	Laboratory method blank
QAQCType	MS	Laboratory matrix spike sample
QAQCType	SD	Laboratory matrix spike duplicate
QAQCType	LR	Laboratory replicate (dilution, re-analysis, duplicate)
QAQCType	BS	Laboratory method blank spike
QAQCType	BD	Laboratory method blank spike duplicate
LRTYPE	DL	First dilution sample
LRTYPE	DL2	Second dilution sample
LRTYPE	DL3	Third dilution sample
LRTYPE	RE	First re-analysis/re-extraction sample
LRTYPE	RE2	Second re-analysis/re-extraction sample
LRTYPE	RE3	Third re-analysis/re-extraction sample
LRTYPE	D	Inorganic duplicate sample
LRTYPE	CF	First confirmation analysis sample
LRTYPE	CF2	Second confirmation analysis sample

Field Name	Valid Value	Meaning
LRTYPE	CF3	Third confirmation analysis sample
AnalysisMethod	SW8260A	Volatiles by method 8260A in EPA SW846.
AnalysisMethod	SW8270	Semivolatiles by method 8270 in EPA SW846.
AnalysisMethod	SW6010	ICP metals by method 6010 in EPA SW846.
AnalysisMethod	SW7060	GFAA Arsenic by method 7060 in EPA SW846.
ExtractionMethod	FLDFLT	Field filtration for dissolved metals analysis
ExtractionMethod	C3050	CLP-modified SW3050 acid digestion for metals analysis in soil samples.
ExtractionMethod	SW1311	TCLP extraction
ExtractionMethod	DISWAT	Distilled water extraction for analytes in soil samples.
ExtractionMethod	SW3510	Separatory funnel extraction
ExtractionMethod	SW3540	Soxhlet extraction
ExtractionMethod	TOTAL	Digestion of unfiltered waters for total metals analysis
ParamID	ACE	Acetone
ParamID	AS	Arsenic
ParamID	BHCGAMMA	gamma-BHC (Lindane)
ParamID	BZ	Benzene
ParamID	CDS	Carbon disulfide
ParamID	PB	Lead
ParamID	PHENOL	Phenol
ParamID	SE	Selenium
ParamID	TCE	Trichloroethene

CH2M HILL FIELD SAFETY INSTRUCTIONS

These Field Safety Instructions (FSI) will be kept onsite during field activities and will be reviewed as necessary. The FSI will be amended or revised as project activities or conditions change or when supplemental information becomes available. The FSI adopts, by reference, the Standards of Practice (SOPs) in the CH2M HILL *Corporate Health and Safety Program, Program and Training Manual*, as appropriate. In addition, these FSI may adopt procedures from the project Work Plan. The Designated Safety Coordinator (DSC) is to be familiar with these SOPs and the content of these instructions. CH2M HILL's personnel and subcontractors must sign **Attachment 1**.

Project Information and Description

PROJECT NO: 356297

CLIENT: US Coast Guard

PROJECT/SITE NAME: U.S. Coast Guard Dry Cargo Sweepings EIS

SITE ADDRESS: Great Lakes/Various boat launches

CH2M HILL PROJECT MANAGER: John Burgess/BOS

CH2M HILL OFFICE: 25 New Chardon St.
Suite 300
Boston, MA 02114

DATE FSI PREPARED: March 23, 2007

DATE(S) OF SITE WORK: April 22 through September 15, 2007

SITE DESCRIPTION AND HISTORY: CH2M HILL is providing technical services to the Coast Guard to gather scientific data for water quality, sediment and dry cargo sweepings (coal, taconite, and limestone) in support of future dry cargo sweeping policy decisions. CH2M HILL field staff will be onboard an EPA research vessel and a commercial water craft (docked) to assist collection of water quality, sediment and biological data, and to gather information about commercial shipping practices.

DESCRIPTION OF SPECIFIC TASKS PERFORMED BY CH2M HILL: CH2M HILL staff will be conducting materials sampling (lake sediment and micro-invertebrate samples) from an EPA research vessel and observing deck and below deck cleaning of a commercial cargo vessel on the Great Lakes.

1 Project Organization and Responsibilities

1.1 Client

Contact Name:	Greg Kirkbride
Phone:	1-202-372-1479

1.2 CH2M HILL

Project Manager:	John Burgess/BOS
Health and Safety Manager (HSM):	Steve Wehrsphann/PIT
Designated Safety Coordinator (DSC)	Brent Brown/MKE and Ryan Leverage/BOS

The DSC is responsible for verifying that the project is conducted in a safe manner including the following specific obligations:

- Verify these FSI are current and amended when project activities or conditions change
- Verify CH2M HILL site personnel and subcontractor personnel read these FSI and sign **Attachment 1** “Employee Signoff Form” prior to commencing field activities
- Verify CH2M HILL site personnel have completed any required specialty training (e.g., Initial Safety Coordinator, Hazard Communication, Fire Extinguisher, Dangerous Goods, etc.) and medical surveillance as identified in Section 2
- Verify compliance with the requirements of these Field Safety Instructions.
- Act as the project “Emergency Response Coordinator” and perform the responsibilities outlined in Section 4
- Verify that safety meetings are conducted and documented in the project file initially and as needed throughout the course of the project (e.g., as tasks or hazards change)

1.3 Project HS&E Change Management Form

*This evaluation form should be reviewed on a **continual basis** to determine if the current site-specific HASP adequately addresses ongoing project work, and it should be modified whenever new tasks are contemplated or changed conditions are encountered.*

Project Tasks: **Material Sampling, Biological Sampling, and Observation of Ship Operations** Task Manager: **John Burgess/BOS**

Project Number: **356297**

Project Name: U.S. Coast Guard Dry Cargo Sweepings EIS

<i>Evaluation Checklist</i>		Yes	No
1.	Has CH2M HILL staff changed?		
2.	Has a new subcontractor been added to the project?		
3.	Is any chemical or product to be used that is not listed in Attachment 2 of the plan?		
4.	Are all tasks addressed in Section 1.1 of the site-specific HASP?		
5.	Have new contaminants or higher than anticipated levels of original contaminants been encountered?		
6.	Has other safety, equipment, activity, or environmental hazards been encountered that are not addressed in Section 2.1 of the plan?		

If the answer is “YES” to Questions 1-3, a HASP revision is NOT needed. Please take the following actions:

- Confirm that the staff’s medical and training status is current—check training records at: <http://www.int.ch2m.com/hands> (or contact your regional SPA) and confirm subcontractor qualifications.
- Confirm with the project KA that subcontractor safety performance has been reviewed and is acceptable.
- Confirm with H&S that subcontractor safety procedures have been reviewed and are acceptable.

If the answer is “YES” to Questions 4-6, a HASP revision MAY BE NEEDED. To determine if a revision is needed, please contact HS&E directly or complete the field project start-up form at: <http://www.int.ch2m.com/hsdocgen/fppricing.asp>.

2 Hazard Controls

This section provides safe work practices and control measures used to reduce or eliminate potential hazards. These practices and controls are to be implemented by the party in control of either the site or the particular hazard. CH2M HILL employees and subcontractors must remain aware of the hazards affecting them regardless of who is responsible for controlling the hazards. CH2M HILL employees and subcontractors who do not understand any of these provisions should contact the DSC for clarification.

In addition to the controls specified in this section, Project-Activity Self-Assessment Checklists are contained in Attachment 6. These checklists are to be used to assess the adequacy of CH2M HILL and subcontractor site-specific safety requirements. The objective of the self-assessment process is to identify gaps in project safety performance, and prompt for corrective actions in addressing these gaps. Self-assessment checklists should be completed early in the project, when tasks or conditions change, or when otherwise specified by the HSM. The self-assessment checklists, including documented corrective actions, should be made part of the permanent project records, and be promptly submitted to the HSM.

Project-specific frequency for completing self-assessments: **Initially and if tasks or conditions change..**

2.1 Physical Hazards

2.1.1 Field Vehicle

- Familiarize yourself with rental vehicle features.
 - Mirror adjustments
 - Seat adjustments
 - Cruise control features, if offered.
 - Pre-program radio stations.
- Adjust headrest to proper position.
- Always wear seatbelt while operating vehicle.
- Inquire; and obtain, a vehicle pass from the client if required.
- Observe warning signs, yield to traffic, and observe all posted plant traffic signs.
- Pull off the road, put the car in park and turn on flashers before talking on a mobile phone.
- Maintain both a First Aid kit and Fire Extinguisher in the field vehicle at all times.
- Close car doors slowly and carefully.
 - Fingers can get pinched in doors or the truck.

2.1.2 Manual Lifting

- Proper lifting techniques must be used when lifting any object.
 - Make sure the path of travel is clear prior to the lift.
 - Split heavy loads into smaller loads.
 - Use mechanical lifting aids whenever possible.
 - Have someone assist with the lift -- especially for heavy or awkward loads.
- A manual lifting training program is available through the Basic Training Program.
 - [Virtual Office/ Company Resources/ Corporate Groups/ Health, Safety & Environment/ Training & Medical/ Training Courses/ Computer Based Training/ Lifting.](#)

2.1.3 Working Above or Near Water

- Fall protection should be provided to prevent personnel from falling into water. Where fall protection systems are not provided and the danger of drowning exists, U.S. Coast Guard-approved personal flotation devices (PDFs), or life jacket, shall be worn.
- Inspect PDFs prior to use. Do not use defective PDFs.
- A life-saving skiff must be provided for emergency rescue.
- A minimum of one ring buoy with 90 feet of 3/8-inch solid-braid polypropylene (or equal) rope must be provided for emergency rescue.

2.1.4 Inclement Weather

- Work may proceed in light rain- wear rain gear.
- Exposure to slips, trips and falls is increased during rainy and snowing conditions.
- Take cover in field vehicle during adverse weather conditions (High winds, heavy rain, lightning).
- Work shall cease and cover sought in the event of lightning or tornado warnings.
 - Identify "Take Shelter" areas before starting project.
 - Work may proceed in light rain- wear rain gear.
- Notify the Project Manager and Client Representative after shelter has been sought.

2.1.5 Boating Operations (If utilizing private watercraft).

(Reference CH2M HILL SOP HSE-601 *Boat Operations*)

- Public exposure shall be minimized through the use of warning buoys, lights, and signage. Underwater hazards (e.g., pump line) shall be marked at the surface within 200 feet.
- All operations involving boating will be directed by qualified and experienced boater as the team leader.
- All persons participating in boating operations will be directed by the SSC.
- All personnel shall wear their Personnel Floatation Devices (PFD) at all times while they are on the water.
- The boating team will include at least one person qualified in First Aid.
- All personnel shall wear bright colors (for example: hunter orange, yellow, etc.) to enhance their visibility to one another.
- Remain seated in the boat whenever possible.
- Team Leader has final authority on operations with regards to weather and water conditions
- Safe means of boarding or leaving a boat or a platform will be provided to prevent slipping and falling.
- Employees should be instructed on safe use of the boat.
- Work requiring the use of a boat will not take place at night or during inclement weather.
- The boat/barge must be operated according to U.S. Coast Guard regulations for:
 - speed
 - lighting
 - right-of-way, etc.
- Boat must be equipped with adequate railing.
- Since conditions are generally wet and muddy, care will be taken to keep work area as clean as possible to avoid slips, trips and falls.
- The engine should be shut off before refueling.
- Do not smoke while refueling.

2.1.6 Steep Slopes

- Always avoid steep slope areas whenever possible. "Climbing" in steep slope areas should be minimized and limited to that which does not require the use of climbing equipment.
- Exercise caution in relying on rocks and trees/tree stumps to support yourself—they may be loose.
- Whenever possible, switchback your way up/down steep areas.
- Maintain a slow pace with firm footing.
- Caution should be used when using machinery and/or working around potentially unstable slopes.
- If steep terrain must be negotiated, sturdy shoes or boots that provide ankle support should be used.

2.2 Physiological Hazards

2.2.1 Sprains

- If the sprain is minor, the victim may be able to walk with little or no assistance.
- To reduce the swelling of a minor sprain, you must put ice on the injury (of course, be careful of frostbite and hypothermia in cold weather).
- You will also need to tape the injured joint using sports tape or an ace bandage and allow the injured person to take ibuprofen (only if they are not allergic to aspirin), if they intend to walk out.
- On the other hand, major sprains may appear to be fractures and should be treated as such.
- Splint the injury and plan the best way to get the victim to medical care.

2.3.2 Cuts and Scrapes

- Take the time to wash the cut with soap and water, or an antiseptic towelette.
- Cleaning the wound immediately will help prevent infection later

2.3.3 Cramps

- If someone experiences muscle cramps, have him or her sit or lie down and relax.
- Massage and stretch the sore muscle slowly, gently, and carefully.
- Have him or her drink water, eat a little, and start again slowly.
- Drinking a sports drink like Gatorade will help replace salts that are lost because of sweating.
- Replacing these salts may help reduce the muscle cramps and prevent them from recurring.

2.3.4 Blisters

- Blisters most commonly occur on the feet, especially if someone uses inappropriate socks, wet socks or boots, or boots that do not fit or are not broken in.
- Preventing blisters is the most important first aid: if someone feels a "hot spot" starting (from friction between the skin and the boot) stop immediately and do something about it.
- Place a thin layer of moleskin or (believe it or not) duct tape on the affected area.
- If you don't take care of the hot spot, it will become a blister: in this case, use the moleskin, but with a hole in it, so that you don't place adhesive directly over the blister.
- You want to minimize pressure on the blister by building up protective padding around it, but not too much or you'll cause more problems.
- Generally you should not pop blisters, both because they can become infected, and because they may become more painful as you continue to walk.

2.3.5 Headaches

- Headaches result from many different things: dehydration, sunlight, tension, etc.
- You can best treat the headache by treating the cause, if you know it.
- Suggest that the person affected take aspirin, acetaminophen (e.g., Tylenol), or ibuprofen (e.g., Advil), drink water, eat a little, and, if possible, take a rest break.
- Wearing sunglasses may prevent headaches from too much sunlight.

2.3.6 Nosebleeds

- Nosebleeds more commonly occur in cold than in hot weather because of the very dry air.
- If someone gets a nosebleed, try to stop the bleeding by pinching the nostrils with your fingers.
- Be patient, because nosebleeds often take a while to stop.
- If pinching the nostrils doesn't work, you may insert a small, clean pad of gauze into the affected nostril, and pinch it again.
- If someone is prone to nosebleeds, especially in cold weather, it may help to wear a bandanna over the nose/mouth. As he or she breathes out, the bandanna traps some warmer, moist air, which may be enough to prevent a nosebleed.

2.4 Biological Hazards

2.4.1 Bees and other insect stings

- Bees and other stinging insects may be encountered almost anywhere and may present a serious hazard, particularly to people who are allergic.
- Watch for and avoid nests.
- Keep exposed skin to a minimum.
- Carry a kit if you have had allergic reactions in the past, and inform the SSC and/or buddy.
- If a stinger is present, remove it carefully with tweezers.
- Wash and disinfect the wound, cover it, and apply ice.
- Watch for allergic reaction; seek medical attention if a reaction develops.

2.4.2 Poison Ivy and Poison Sumac

- Poison ivy, poison oak, and poison sumac typically are found in brush or wooded areas.
- They are more commonly found in moist areas or along the edges of wooded areas.
- Become familiar with the identity of these plants.
- Wear protective clothing that covers exposed skin and clothes.
- Avoid contact with plants and the outside of protective clothing. If skin contacts a plant, wash the area with soap and water immediately.
- If the reaction is severe or worsens, seek medical attention. **SEE ATTACHMENT 7** for more details.

2.4.3 Ticks

- Ticks typically are in wooded areas, bushes, tall grass, and brush.
- Ticks are black, black and red, or brown and can be up to one-quarter inch in size.
- Wear tightly woven light-colored clothing with long sleeves and pant legs tucked into boots; spray **only outside** of clothing with permethrin or permamone and spray skin with only DEET; and check yourself frequently for ticks.
- If bitten by a tick, grasp it at the point of attachment and carefully remove it.
- After removing the tick, wash your hands and disinfect and press the bite areas.
- Save the removed tick.
- Report the bite to human resources.
- Look for symptoms of Lyme disease or Rocky Mountain spotted fever (RMSF).
- Lyme: a rash might appear that looks like a bullseye with a small welt in the center.
- RMSF: a rash of red spots under the skin 3 to 10 days after the tick bite.
- In both cases, chills, fever, headache, fatigue, stiff neck, and bone pain may develop.
- If symptoms appear, seek medical attention.
- **SEE ATTACHMENT 7** for more details.

2.3.5 Bloodborne Pathogens (Reference CH2M HILL SOP HS-36, *Bloodborne Pathogens*)

Exposure to bloodborne pathogens may occur when rendering first aid or CPR, or when coming into contact with landfill waste or waste streams containing potentially infectious material. Exposure controls and personal protective equipment (PPE) are required as specified in CH2M HILL SOP HS-36, *Bloodborne Pathogens*. Hepatitis B vaccination must be offered before the person participates in a task where exposure is a possibility.

2.3.6 Other Anticipated Biological Hazards:

None

2.5 General Hazards

2.5.1 General Practices and Housekeeping (Reference CH2M HILL SOP HS-209 *General Practices*)

- Site work should be performed during daylight hours whenever possible. Work conducted during hours of darkness require enough illumination intensity to read a newspaper without difficulty.
- Good housekeeping must be maintained at all times in all project work areas.
- Common paths of travel should be established and kept free from the accumulation of materials.
- Keep access to aisles, exits, ladders, stairways, scaffolding, and emergency equipment free from obstructions.
- Provide slip-resistant surfaces, ropes, and/or other devices to be used.
- Specific areas should be designated for the proper storage of materials.
- Tools, equipment, materials, and supplies shall be stored in an orderly manner.
- As work progresses, scrap and unessential materials must be neatly stored or removed from the work area.
- Containers should be provided for collecting trash and other debris and shall be removed at regular intervals.
- All spills shall be quickly cleaned up. Oil and grease shall be cleaned from walking and working surfaces.

2.5.2 Hazard Communication (Reference CH2M HILL SOP HS-107, *Hazard Communication*)

The DSC is to perform the following:

- Complete an inventory of chemicals brought on site by CH2M HILL using **Attachment 2**.
- Confirm that an inventory of chemicals brought on site by CH2M HILL subcontractors is available.
- Request or confirm locations of Material Safety Data Sheets (MSDSs) from the client, contractors, and subcontractors for chemicals to which CH2M HILL employees potentially are exposed.
- Before or as the chemicals arrive on site, obtain an MSDS for each hazardous chemical.
- Label chemical containers with the identity of the chemical and with hazard warnings, and store properly.
- Give employees who either use or are exposed to hazardous chemicals site-specific HAZCOM training. Refer to guidelines in **Attachment 3**.
- Store all materials properly, giving consideration to compatibility, quantity limits, secondary containment, fire prevention, and environmental conditions.

2.5.3 Shipping and Transportation of Chemical Products

(Reference CH2M HILL's *Procedures for Shipping and Transporting Dangerous Goods*)

Chemicals brought to the site might be defined as hazardous materials by the U.S. Department of Transportation (DOT). All staff who ship the materials or transport them by road must receive CH2M HILL training in shipping dangerous goods. All hazardous materials that are shipped (e.g., via Federal Express) or are transported by road must be properly identified, labeled, packed, and documented by trained staff. Contact the HSM or the Equipment Coordinator for additional information.

2.5.4 Manual Lifting (Reference CH2M HILL, SOP HS-112 *Lifting*)

- Proper lifting techniques must be used when lifting any object.
 - Plan storage and staging to minimize lifting or carrying distances.
 - Split heavy loads into smaller loads.
 - Use mechanical lifting aids whenever possible.
 - Have someone assist with the lift -- especially for heavy or awkward loads.
 - Make sure the path of travel is clear prior to the lift.

2.5.5 Fire Prevention (Reference CH2M HILL, SOP HS-208, *Fire Prevention*)

- Fire extinguishers shall be provided so that the travel distance from any work area to the nearest extinguisher is less than 100 feet. When 5 gallons or more of a flammable or combustible liquid is being used, an extinguisher must be within 50 feet. Extinguishers must:
 - be maintained in a fully charged and operable condition,
 - be visually inspected each month, and
 - undergo a maintenance check each year.
- The area in front of extinguishers must be kept clear.

- Post “Exit” signs over exiting doors, and post “Fire Extinguisher” signs over extinguisher locations.
- Combustible materials stored outside should be at least 10 feet from any building.
- Solvent waste and oily rags must be kept in a fire resistant, covered container until removed from the site.
- Flammable/combustible liquids must be kept in approved containers, and must be stored in an approved storage cabinet.

2.5.6 Electrical (Reference CH2M HILL, SOP HS-206, *Electrical*)

- Only qualified personnel are permitted to work on unprotected energized electrical systems.
- Only authorized personnel are permitted to enter high-voltage areas.
- Do not tamper with electrical wiring and equipment unless qualified to do so. All electrical wiring and equipment must be considered energized until lockout/tagout procedures are implemented.
- Inspect electrical equipment, power tools, and extension cords for damage prior to use. Do not use defective electrical equipment, remove from service.
- All temporary wiring, including extension cords and electrical power tools, must have ground fault circuit interrupters (GFCIs) installed.
- Extension cords must be:
 - equipped with third-wire grounding.
 - covered, elevated, or protected from damage when passing through work areas.
 - protected from pinching if routed through doorways.
 - not fastened with staples, hung from nails, or suspended with wire.
- Electrical power tools and equipment must be effectively grounded or double-insulated UL approved.
- Operate and maintain electric power tools and equipment according to manufacturers' instructions.
- Maintain safe clearance distances between overhead power lines and any electrical conducting material unless the power lines have been de-energized and grounded, or where insulating barriers have been installed to prevent physical contact. Maintain at least 10 feet from overhead power lines for voltages of 50 kV or less, and 10 feet plus ½ inch for every 1 kV over 50 kV.
- Protect all electrical equipment, tools, switches, and outlets from environmental elements.

2.5.7 Stairways and Ladders (Reference CH2M HILL, SOP HS-214, *Stairways and Ladders*)

- Stairway or ladder is generally required when a break in elevation of 19 inches or greater exists.
- Personnel should avoid using both hands to carry objects while on stairways; if unavoidable, use extra precautions.
- Ladders must be inspected by a competent person for visible defects prior to each day’s use. Defective ladders must be tagged and removed from service.
- Ladders must be used only for the purpose for which they were designed and shall not be loaded beyond their rated capacity.
- Only one person at a time shall climb on or work from an individual ladder.
- User must face the ladder when climbing; keep belt buckle between side rails
- Ladders shall not be moved, shifted, or extended while in use.
- User must use both hands to climb; use rope to raise and lower equipment and materials
- Straight and extension ladders must be tied off to prevent displacement
- Ladders that may be displaced by work activities or traffic must be secured or barricaded
- Portable ladders must extend at least 3 feet above landing surface
- Straight and extension ladders must be positioned at such an angle that the ladder base to the wall is one-fourth of the working length of the ladder
- Stepladders are to be used in the fully opened and locked position
- Users are not to stand on the top two steps of a stepladder; nor are users to sit on top or straddle a stepladder
- Fall protection should be considered when working from extension, straight, or fixed ladders greater than six feet from lower levels and both hands are needed to perform the work, or when reaching or working outside of the plane of ladder side rails.

3 Personal Protective Equipment (PPE)

(Reference CH2M HILL SOP HS-117, *Personal Protective Equipment*)

Note that PPE is required when exposed to the general hazards listed below. Because certain tasks (e.g., welding, energized work, etc.) require specialized PPE, refer to Section 2 for task-specific PPE requirements.

PPE Specifications ^a

Hazard	PPE
General entry to boat or working on/near shore.	ANSI approved steel-toe leather work boots, long pants, shirt with minimum of 3” sleeve, safety glasses, and hardhat, Personal Floatation Device (PFD) and orange vest. Sun Screen lotion as needed.
Skin absorption of harmful substances, severe cuts or lacerations, severe abrasions, punctures, chemical burns, thermal burns and harmful temperature extremes.	Leather gloves for material handling. Nitrile surgical style gloves for sediment and biological sampling.
Working around heavy equipment or other noisy machinery, or if you must raise your voice to be heard while communicating with persons near you, hearing protection is required.	ANSI approved ear plugs.
Danger of foot injuries due to falling or rolling objects, objects piercing the sole, or when the feet are exposed to electrical hazards.	Sturdy footwear or ANSI approved steel-toed leather work boots.
Potential for head injury from impact, falling or flying objects.	ANSI approved hardhat when potential for overhead hazards exist.
Flying particles, liquid chemicals, acids or caustic liquids.	ANSI approved safety glasses with side shield.

Reasons for Upgrading or Downgrading Level of Protection

Upgrade ^b	Downgrade
<ul style="list-style-type: none"> Request from individual performing tasks. Change in work tasks that will increase potential for injury. Known or suspected presence of dermal hazards. 	<ul style="list-style-type: none"> Situation is less hazardous than originally thought. Change in site conditions that decreases the hazard. Change in work task that will reduce potential for injury.

^a CH2M HILL will provide PPE only to CH2M HILL employees.

^b Performing tasks that require respiratory protection is permitted only when the PPE requirements have been approved by the HSM, and a DSC qualified at that level is present.

4 Emergency Response

(Reference CH2M HILL, SOP HS-12, *Emergency Response*)

4.1 Pre-Emergency Planning

The DSC performs the applicable pre-emergency planning tasks before starting field activities and coordinates emergency response with CH2M HILL onsite parties, the facility, and local emergency-service providers as appropriate.

- Review the facility emergency and contingency plans where applicable.
- Determine what onsite communication equipment is available (e.g., two-way radio, air horn).
- Determine what offsite communication equipment is needed (e.g., nearest telephone, cell phone).
- Confirm and post emergency telephone numbers, evacuation routes, assembly areas, and route to hospital; communicate the information to onsite personnel.
- Communicate emergency procedures for personnel injury, exposures, fires, explosions, and releases.
- Field Trailers: Post “Exit” signs above exit doors, and post “Fire Extinguisher” signs above locations of extinguishers. Keep areas near exits and extinguishers clear.
- Designate one vehicle as the emergency vehicle; place hospital directions and map inside; keep keys in ignition during field activities.
- Inventory and check site emergency equipment, supplies, and potable water.

4.2 Emergency Equipment and Supplies

The DSC should verify that these supplies are available, as needed, and in proper working order and mark the locations of emergency equipment on the site map, when a map is provided.

Emergency Equipment and Supplies	Location
20 lb (or two 10-lb) fire extinguisher (A, B, and C classes)	All boats & field vehicle.- Verify location
First aid kit	All boats and field vehicle- Verify location
Personal Eye wash	All boats and field vehicle- Verify location
Potable water	Bring with on boats if not already equipped
Bloodborne-pathogen kit	All boats and field vehicle- Verify location
Additional equipment (specify): Cell phone	On Designated Safety Coordinator

4.3 Incident Response- **Verify Actions with EPA and Commercial Cargo Vessel**

In fires, explosions, or chemical releases, actions to be taken include the following:

- Shut down CH2M HILL operations and evacuate the immediate area.
- Notify appropriate response personnel.
- Account for personnel at the designated assembly area(s).
- Assess the need for site evacuation, and evacuate the site as warranted.

Instead of implementing a work-area evacuation, note that small fires or spills posing minimal safety or health hazards may be controlled.

4.4 Evacuation Procedures- **Verify with EPA and Commercial Cargo Vessel**

- Evacuation routes and assembly areas will be designated by the DSC before work begins.
- Personnel will assemble at the assembly area(s) upon hearing the emergency signal for evacuation.
- The DSC and a “buddy” will remain on the site after the site has been evacuated (if safe) to inform local responders of the nature and location of the incident.
- The DSC will account for all personnel at the assembly area.

- The DSC will write up the incident as soon as possible after it occurs and submit a report to the Corporate Director of Health and Safety.

4.5 Emergency Medical Treatment- **Verify with EPA and Commercial Cargo Vessel**

The procedures listed below may also be applied to non-emergency incidents. Injuries and illnesses (including overexposure to contaminants) must be reported to Human Resources. If there is doubt about whether medical treatment is necessary, or if the injured person is reluctant to accept medical treatment, contact the CH2M HILL medical consultant. During non-emergencies, follow these procedures as appropriate.

- Notify appropriate emergency response authorities listed in **Attachment 4** (e.g., 911).
- The DSC will assume charge during a medical emergency until the ambulance arrives or until the injured person is admitted to the emergency room.
- Prevent further injury.
- Initiate first aid and CPR where feasible.
- Get medical attention immediately.
- Make certain that the injured person is accompanied to the emergency room.
- When contacting the medical consultant, state that the situation is a CH2M HILL matter, and give your name and telephone number, the name of the injured person, the extent of the injury or exposure, and the name and location of the medical facility where the injured person was taken.
- Report incident as outlined in Section 4.6

4.6 Incident Notification and Reporting

- Upon any project incident (fire, spill, injury, near miss), immediately notify the PM and HSM. Call emergency beeper number if HSM is unavailable.
- For CH2M HILL work-related injuries or illnesses, contact and help Human Resources administrator complete an Incident Report Form (IRF). IRF must be completed within **24 hours** of incident.
- For CH2M HILL subcontractor incidents, complete the Subcontractor Accident/Illness Report Form and submit to the HSM.
- Notify and submit reports to client as required in contract.

4.7.1 Serious Incident Reporting

(Reference CH2M HILL, SOP HSE&Q-601, *Serious Incident Reporting*)

- Serious Incidents must be reported in accordance with CH2M HILL Standard of Practice, *Serious Incident Reporting Process*, immediately. Serious incidents are those that involve any of the following:
 - Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
 - Kidnap/missing person
 - Acts or threats of terrorism
 - Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 in damage.
 - Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment

The purpose of this basic flowchart is to provide direction on the standard notification and reporting process for incidents and serious incidents. This process ensures timely notification to the appropriate Business Group Management and allows for **positive control** over flow of information, so that the incident is handled effectively, efficiently, and in conjunction with appropriate corporate entities.

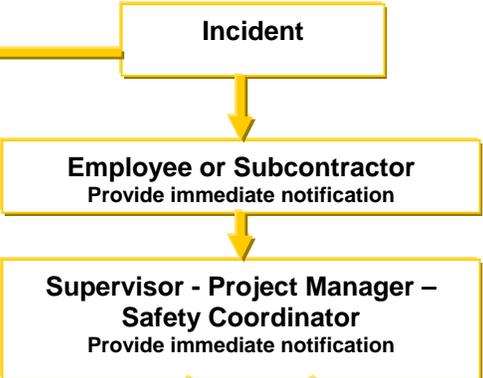
- Incident:**
- Injury or illness
 - Hazardous substance exposure
 - Damage to property
 - Fire or explosion
 - Spill, release, potential violation, or permit exceedance
 - A "near-miss"

If incident involves a **CH2M HILL employee** – also notify the Human Resource Representative (HRR)

The HRR is responsible for completing the Incident Report Form (IRF) for incidents where injuries to CH2M HILL employees are involved. The HSE&Q Manager is responsible for completing the IRF for all other incidents. **The IRF must be completed within 24 hours of the incident.**

IMPORTANT

"Primary" responsibility for notification and reporting of WBG incidents is through the WBG, not the Theater or Regional Management.



- Serious Incident:**
- Work related death, or life threatening injury or illness of a CH2M HILL employee, subcontractor, or member of the public
 - Kidnap/missing person
 - Acts or threats of terrorism
 - Event that involves a fire, explosion, or property damage that requires a site evacuation or is estimated to result in greater than \$ 500,000 US in damage.
 - Spill or release of hazardous materials or substances that involves a significant threat of imminent harm to site workers, neighboring facilities, the community or the environment.

CRISIS MANAGER:
 If the incident meets the "Serious Incident" criteria, contact the Crisis Manager (720.286.4911)

WBG / Geographic Regional HSE&Q Manager
 Determine the level of communication and direct incident investigation

WBG Geographic Region Manager
 Ensure that unnecessary communication of serious incidents is kept to a minimum - Allocate time to provide guidance and follow incident through to resolution.

Third Party – Incidents outside of our contractual obligations do not need to be communicated, unless they are serious and/or may affect CH2M HILL. The WBG HSE&Q Manager will determine the level of communication necessary for third party incidents.

WBG Leadership Team

- Provide decision-making assistance or direction for incident resolution

Post-emergency incident communications regarding serious incidents at a CH2M HILL office or project (regardless of the party involved) shall be considered sensitive in nature and must be controlled in a confidential manner.

5 Approval

This FSI has been written for use by CH2M HILL and their subcontractors only. CH2M HILL claims no responsibility for its use by others unless that use has been specified and defined in project or contract documents. The FSI is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if those conditions change.

5.1 Original Plan

Written By: Ryan Loveridge/BOS

Date: March 22, 2007

Approved By: Steve Beck/MKE

Date: September 15, 2006



5.2 Revisions

Revisions Made By:

Date:

Revisions to Plan:

Revisions Approved By:

Date:

6 Attachments

Attachment 1: Employee Signoff Form – Field Safety Instructions

Attachment 2: Emergency Contacts

Emergency Contacts

24-hour CH2M HILL Emergency Beeper – 720/286-4911

Medical Emergency – 911

CH2M HILL Medical Consultant

Dr. Jerry H. Berke, M.D., M.P.H.
600 West Cummings Park, Suite 3400
Woburn, MA 01801-6350
781/938-4653 After hours: 800/350-4511
(After hours calls will be returned within 20 minutes)

Fire/Spill Emergency -- 911

Local Occupational Physician

None

Security & Police – 911

CH2M HILL Director Security Operations

Name: Thomas Horton/DEN
Phone: Office 720/286-0022 cell 720/273-3100
24-hour emergency beeper: 720-286-4911

Utilities Emergency

Water: 920-322-3470
Gas: 800-862-6263
Electric: 800-862-6263

Health and Safety Manager (HSM)

Name: Steven Wehrspann
Phone: 412/364-4477

Designated Safety Coordinator (DSC)

Name: Brent Brown/MKE and Ryan Loveridge/BOS
Phone: 414-847-0393 and 617-523-2002x239

Regional Human Resources Department

Name: Cindy Buader/WDC
Phone: 703/471-6405 ext. 4243

Project Manager

Name: John Burgess/BOS
Phone:

Corporate Human Resources Department

Name: Pete Hannon/COR
Phone: 303/771-0900

Federal Express Dangerous Goods Shipping

Phone: 800/238-5355

CH2M HILL Emergency Number for Shipping Dangerous Goods

Phone: 800/255-3924

Insurance

Worker's Compensation

Contact Regional HR to have an Incident Report Form (IRF) completed. After hours contact:
Albert Jerman 303/741-5927 or
Julie Zimmerman 303/664-3304

Auto Claims

Rental: Linda Anderson/COR 720-286-2401
CH2MHILL Owned: Zurich Insurance Company
1-800-987-3373

Contact the Project Manager. Generally, the Project Manager will contact relevant government agencies.

Facility Alarms: NA

Evacuation Assembly Area(s): On shore at docking area or near field vehicle.

Facility/Site Evacuation Route(s): If harbor evacuation is necessary, employees should leave by the nearest exit. Employees should sufficiently distance themselves from the site emergency and create a mustering point for all project personnel.

Hospital

To be completed by the Site Safety Coordinator (SSC).

Driving Directions