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US Army Corp of Engineers
Kansas City District

Raritan Bay Slag Superfund Site

Old Bridge/ Sayreville, New Jersey

Final Contractor Quality Control Plan (CQCP) (Revision No. 1)

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FINAL CONTRACTOR QUALITY CONTROL PLAN
(REVISION NO. 1)

RARITAN BAY SLAG SUPERFUND SITE

OLD BRIDGE/SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

USACE CONTRACT NO. W912DQ-08-D-0018
TASK ORDER NO. 018

February 18, 2011

Prepared for:
U.S. Army Corps of Engineers
Kansas City District

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FINAL CONTRACTOR QUALITY CONTROL PLAN
(REVISION NO. 1)

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/ SAYREVILLE
MIDDLESEX COUNTY, NEW JERSEY

USACE CONTRACT NO. W912DQ-08-D-0018
TASK ORDER NO. 018

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Acronym List

ARAR	applicable or relevant and appropriate requirements
ASC	analytical services coordinator
CAD	computer aided drafting
CDM	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CHMM	certified hazardous materials manager
CIH	certified industrial hygienist
CIS	community involvement specialist
CLP	contractor laboratory program
CMQ	certified manager of quality
CQCP	contractor quality control plan
CSP	certified safety professional
D	duplicate
DESA	Division of Environmental Science and Assessment
DQCR	daily quality control report
DQO	data quality objectives
EPA	United States Environmental Protection Agency
ER	engineering regulation
FAR	Federal Acquisition Regulations
FASTAC	Field Analytical Services Teaming Advisory Committee
FCR	field change request
FS	feasibility study
FTL	field technical leader
GIS	geographic information system
GRA	general response action
HHRA	human health risk assessment
MS/MSD	matrix spikes/matrix spike duplicates
M&TE	measurement and test equipment
NJDEP	New Jersey Department of Environmental Protection
P. E.	Professional Engineer
P.G.	professional geologist
PRG	preliminary remediation goals
QA	quality assurance
QAC	quality assurance coordinator
QAPP	quality assurance project plan
QC	quality control
QCC	quality control check
QCT	quality control team
QIP	quality implementation plan
QP	quality procedure
RAO	remedial action objectives
RAS	routine analytical services
RI	remedial investigation
RSCC	regional sample control coordinator
SMO	sample management office
SOP	standard operating procedure

SOW	statement of work
TBC	to be considered
TRC	technical review committee
the site	Raritan Bay Slag Superfund Site
UFP	uniform federal policy
USACE	United States Army Corps of Engineers
WVN	work variance notice

Section 1
Introduction

Under the United States Army Corps of Engineers (USACE), Kansas City District, Contract No. W912DQ-08-D-0018, Task Order No. 018, CDM Federal Programs Corporation (CDM) has been tasked to provide technical services necessary to complete a Remedial Investigation (RI) and Feasibility Study (FS) for the Raritan Bay Slag Superfund Site (the site) located in Old Bridge and Sayreville, Middlesex County, New Jersey.

This Contractor Quality Control Plan (CQCP) has been developed to describe the management structure and quality assurance/quality control (QA/QC) procedures that will be implemented by CDM to ensure that each step of the field investigation is completed in accordance with project objectives and applicable requirements and standards.

This CQCP has been developed in accordance with USACE Engineering Regulation (ER) 1110-1-12, *Engineering and Design Quality Management* (USACE 2006); ER 110-1-263, *Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities* (USACE 1998); and *CDM's QA Manual*, Revision 11 (CDM 2007) as modified by CDM's *Quality Implementation Plan* (QIP) for the USACE Kansas City District Contract No. W912DQ-08-D-0018 (CDM 2009).

Section 2
Project Description

2.1 Project Scope

The USACE has requested CDM to provide technical services necessary to complete the RI/FS at the site. Technical services are ongoing and include a review of existing planning documents and evaluation of data collected at the site, a data gap evaluation, and determining a path forward in implementing the RI/FS. The tasks described in the scope of work, dated November 2009, included preparation of a data gap evaluation. The USACE has also directed CDM to conduct early actions, including initial field activities to investigate the presence and distribution of buried slag in the vicinity of the seawall and to provide site support. In addition, RI/FS activities are ongoing at the site.

2.1.1 Early Actions

The slag distribution investigation was performed early in the RI/FS process to support potential early remedial actions at the site and to support subsequent RI/FS activities. Site support activities include beach clean-up, timber removal, and site security and maintenance.

CDM has completed the following submittals:

- Draft and Final Quality Assurance Project Plans (QAPP) (CDM 2010b) (slag distribution field investigation, data evaluation and site support activities)
- Draft and Final Accident Prevention Plan (APP) (CDM 2010a)
- Draft and Final Beach Debris and Timber Removal Letter Report (CDM 2010d)
- Draft and Final Test Excavation Data Summary Report (CDM 2010h)
- Draft and Final Beach Sampling Technical Memorandum (CDM 2010i)

2.1.2 Remedial Investigation and Feasibility Study

The RI includes the development and implementation of a field sampling program, which has been completed. The FS will include an initial screening study process and the detailed evaluations of the remedial alternatives. The FS will consider bench-scale treatability studies to evaluate slag reuse or recycling technologies.

CDM will deliver the following submittals, some of which have already been completed.

- Draft and Final Data Gap Analysis Technical Memoranda (CDM 2010c)
- Draft and Final Work Plans (CDM 2010f)
- Draft and Final QAPPs (CDM 2010g)

- Draft and Final APPs (CDM 2010e)
- Data Usability Summary
- Pathways Analysis Report
- Draft and Final Human Health Risk Assessment Reports
- Draft and Final Ecological Risk Assessment Reports
- Draft and Final RI Reports
- Draft Remedial Alternatives Screening/Evaluation Technical Memorandum
- Draft and Final Treatability Study Work Plans
- Draft and Final Treatability Study Reports
- Draft and Final Feasibility Study Reports

2.2 Site Location

The Raritan Bay Slag site is located in the eastern part of Old Bridge Township within the Laurence Harbor section in Middlesex County, New Jersey. A small portion of the northern end of the site, the western jetty at the Cheesequake Creek Inlet, is located in the Borough of Sayreville. The site is situated in a residential area on Raritan Bay in New Jersey and is bordered to the east, west and south by residential properties. State Highway 35 is located south beyond the residential properties and Raritan Bay is to the north.

2.3 Site Description and History

The site is approximately 1.3 miles in length and consists of the waterfront area between Margaret's Creek and the area just beyond the western jetty at the Cheesequake Creek Inlet. The site also includes the wetland areas connected to Margaret's Creek. The portion of the site located in Old Bridge contains the Old Bridge Waterfront Park. The park is made up of walking paths, a playground area, several public beaches, and three jetties, not including the two jetties at the Cheesequake Creek Inlet. The park waterfront is protected by a seawall.

The slag was placed at the site approximately 40 years ago. The seawall is partially constructed with pieces of slag while the western jetty at the Cheesequake Creek Inlet, and the adjoining waterfront area west of the jetty, also contain slag. The seawall, jetties, and beach area east of the Cheesequake Creek Inlet and the western jetty at the Cheesequake Creek Inlet are popular fishing areas. The beaches east of the Cheesequake Creek Inlet and west of the seawall appear to be the most popular for swimming.

In September 1972, the New Jersey Department of Environmental Protection (NJDEP) was advised by a local environmental commission member that lead-bearing waste material was being deposited along the Laurence Harbor beachfront. The material was reported to be nonrecoverable, low-yield metallic waste from a blast furnace and

blast furnace rubble. The slag was deposited at the beachfront in the late 1960s and early 1970s, mostly in the form of blast furnace pot bottoms, in an area that had sustained significant beach erosion and damage due to a series of storms in the 1960s. Demolition debris in the form of concrete and a variety of bricks, including fire bricks, were also placed along the beachfront. A portion of the seawall also contains large riprap believed to have been placed over the slag when the grassed and paved portion of the park was developed.

The western jetty at Cheesequake Creek Inlet has been in existence since the USACE constructed it in the late nineteenth century. The slag was reportedly placed on the jetty during the same general time period as the construction of the seawall. The entire jetty is covered with slag that is similar in appearance to the slag on the seawall. The waste material and slag were used to supplement the jetty and were used as fill and stabilizing material for the seawall.

The site has been the subject of numerous environmental investigations and remediation work dating back to 2006. Widespread contamination has been observed in soil, sediment, and surface water during multiple site investigations performed by or behalf of both NJDEP in 2006 and 2007 and the Environmental Protection Agency (EPA) from 2006 through 2009.

2.4 Project Objectives

The main contaminants associated with the slag and associated waste materials are metals and include antimony, arsenic, chromium, copper, and lead. The objectives for the early actions include:

- Characterize the horizontal and, if possible, the vertical extent of the slag on the south side of the seawall
- Characterize subsurface conditions (e.g., type of soil, type of fill material, depth to groundwater) and extent of contamination
- Provide site support activities, as necessary, including beach debris removal, timber removal, and site security and maintenance.

The objectives for the RI/FS include:

- Define the nature and extent of soil, surface water, and sediment contamination at the site.
- Characterize surface water flow patterns and sediment transport dynamics using current meters and geochronology samples.
- Characterize groundwater-surface water interactions, vertical and horizontal groundwater flow, and provide a groundwater quality baseline.
- Identify and quantify potential human health and ecological risks posed by exposure to contaminated soil, surface water, sediment, groundwater, and biota.

- Conduct treatability studies of the source material (slag) and contaminated soils and sediments in order to develop remedial alternatives.

- Develop and screen remedial alternatives.

- Conduct detailed analysis of appropriate remedial alternatives for contaminated media and associated contaminated areas.

Section 3
Organization and Responsibilities

CDM's quality management philosophy includes a vision to be a leader in providing complete environmental and infrastructure services to the federal government and to be noted for consistent excellent performance. This vision is embodied in CDM's goal to provide exceptional client service. To achieve consistent excellent performance, CDM emphasizes a culture that is oriented toward continuous improvement. CDM's expectations and standards for quality work on projects under the USACE Kansas City Contract are defined in the CDM QA Manual (CDM 2007), as amended by the USACE QIP (CDM 2009). These documents provide the tools and procedures necessary to foster teamwork and ensure quality work products are consistently produced. Every employee is responsible for meeting such expectations and standards, and suggesting ways to improve CDM's QA tools and procedures.

Periodically, CDM's QA program is reviewed by an outside consultant to identify components of the program that are effective in improving the quality of work products, and components or areas that require improvement. Suggestions for program improvement are made to CDM's QA Director and Chief Executive Officer, who are responsible for implementation of the program.

Project organization for the site has been designed to provide clear lines of functional and program responsibility, and authority supported by a management control structure. The control structure involves the USACE Project Manager and the CDM Project Manager. A description of CDM's Project Team and Quality Control Team is presented below. Organizational charts of personnel assigned to these teams are presented in Figures 3-1 and 3-2.

3.1 Project Team

The CDM Project Team is responsible for the preparation, execution, supervision, and coordination of all RI/FS activities in accordance with EPA's Guidance for Remedial Investigations and Feasibility Studies under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), Interim Final, October 1988 (EPA 1988). These activities include subcontractor procurement and management, test excavations, sample collection, investigation derived waste management, data management, validation, and preparation of drawings and reports. Technical and support staff, including engineers, scientists, cost estimators, computer-aided drafting (CAD) operators, and clerical personnel, will be used to support the efforts of the Project Team. Personnel assigned to the Project Team, along with a description of their responsibilities, are presented below.

3.1.1 Project Manager

The CDM Project Manager, Mr. Frank Tsang, P.E., is responsible for coordinating the work effort with the USACE PM, Ms. Kristine Stein, and is directly responsible for the technical content, schedule adherence, subcontract management, and financial management of the task order. He is the primary contact with the USACE.

3.1.2 RI Task Leader

The CDM RI Task Leader, Mr. Edward Leonard, CHMM, directs preparation of project plans, procurements, and documents leading up to and including the RI report and oversees the implementation of the field investigation.

3.1.3 Field Operations Task Manager

The CDM Field Operations Task Manager, Ms. Seth Kellogg, PG, directs preparation of procurement documents, communicates with the selected subcontractors, reviews subcontractor invoices prior to payment, and ensures the field team has the equipment needed at the appropriate time in the field. She is the primary liaison between the subcontract management personnel and the field team and oversees the implementation of the field investigation.

3.1.4 Field Team Leader

The Field Team Leader (FTL), Mr. Jeffrey Rakowski, is directly responsible for the coordination and execution of all field activities outlined in the QAPP. It is his responsibility to ensure that all field tasks are conducted in strict compliance with the QAPP. Field personnel report directly to Mr. Rakowski on all matters relating to the field investigation. He works with the Field Operations Task Manager and provides direct oversight of the field subcontractors.

3.1.5 Field Team Staff

The field team staff executes all field activities as outlined in the QAPP, at the direction of the FTL. The field team consisted of environmental scientists, geologists, and/or environmental engineers. The geographic information system (GIS) specialist will create and maintain the geological database and develop figures to support the RI.

3.1.6 Technical Expert/Technical Reviewer

The senior technical experts/reviewers, Mr. Christopher Koerner, P.E and Ms. Susan Schofield, PG will guide the project technical approach and provide technical support to the project team.

3.1.7 Toxicologist/Risk Assessor

The toxicologist, Dr. Nai-chia Luke, PhD, will direct the preparation of the risk assessments in accordance with EPA's Guidance for Conducting RIs and FSs under CERCLA (EPA 1988). The human health risk assessment will also be prepared in accordance with EPA's Risk Assessment Guidance for Superfund Human Health Evaluation Manual (Part A) Interim Final, December 1989 and the ecological risk assessment in accordance with EPA's Ecological Risk Assessment Guidance for Superfund Sites June 1997. All other relevant and applicable guidance documents will also be followed.

3.1.8 FS Task Leader

The CDM FS Task Leader, Mr. Thomas Mathew, P. E. works closely with the RI Task Leader to ensure that the field investigation generates the proper type and quantity of data for use in the initial screening of remedial technologies/alternatives, detailed

evaluation of remedial alternatives, and associated cost analysis. He is responsible for ensuring that all FS activities are conducted in accordance with EPA's Guidance for Conducting RIs and FSs under CERCLA, this CQCP, and all applicable protocol.

3.1.9 Project Engineer

The project engineer, Mr. Chris Gurr, will assist the RI team to ensure the required engineering data are collected, assist with preparation of the project plans, and will assist in the preparation of the RI and FS Reports.

3.1.10 Analytical Services Coordinator

Mr. Scott Kirchner, CHMM, the CDM Analytical Services Coordinator (ASC), is responsible for obtaining laboratory space for samples. Analytical services will be obtained according to EPA's Field and Analytical Services Teaming Advisory Committee (FASTAC) policy which sets a tiered system for procuring laboratories.

Tier 1 - EPA's Division of Environmental Science and Assessment (DESA)

Tier 2 - Contract Laboratory Program (CLP)

Tier 3 - Region specific analytical services contracts

Tier 4 - CDM subcontract laboratory

Tier 1 is the preferred option for special analytical services. The FASTAC policy requires contractors to pursue the use of the CLP or DESA prior to engaging in a laboratory subcontract and ensures that alternatives to standard CLP analysis were sought with the EPA Regional Sample Control Coordinator (RSCC), prior to any sample collection activities and analyses via a subcontracted laboratory.

The ASC will provide project staff with required sampling documentation forms, coordinate any required performance evaluation samples, oversee contract compliance screening, track the data packages through the validation process, and provide the sampling results to the CDM Project Manager. The ASC will maintain communications with the Sample Management Office (SMO) and EPA's RSCC.

The ASC will also communicate with project personnel regarding quality problems identified during these activities and will send out documentation of all quality problems to the Quality Assurance Coordinator (QAC). The ASC will provide assistance in procuring subcontractor laboratory services for non-routine analytical services (RAS).

3.1.11 Database Manager

Data management activities will be performed by Ms. Melinda Olsen who will use CDM's EQuIS database program and standard industry spreadsheet software programs to manage all data related to the sampling program. She is responsible for maintaining the integrity of the data, coordinating the entry of data from the laboratory into a usable format (e.g., tables, graphics, spreadsheets), and ensuring that

the data are verified against the hard copies of laboratory results prior to the production of data reports.

3.1.12 Corporate Health and Safety Manager

The Corporate Health and Safety Manager, Mr. Shawn Oliveira, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), is responsible for implementing and maintaining CDM's health and safety program, reviewing and approving the APP that governs the field activities outlined in the QAPP, and will be the contact point for health and safety issues and concerns.

3.1.13 Site Health and Safety Officer

The site Health and Safety Officer, Mr. Jeffrey Rakowski, is responsible for ensuring that the protocols specified in the APP are carried out during field activities. He will also ensure that copies of the APP and the CDM Corporate Health and Safety Program Manual (CDM 2006) are maintained at the site at all times. He is responsible for the upgrading or downgrading of the personal protection level in accordance with the APP, based on existing site conditions. The site Health and Safety Officer must also give an overview of the APP to all field personnel and obtain their signatures. He is also responsible for site-specific health and safety training, and daily tailgate safety meetings. If any questions or issues arise during field activities that he cannot address, he will contact the Corporate Health and Safety Manager.

3.1.14 Community Involvement Specialist

The Community Involvement Specialist (CIS), Ms. Maritza Diaz, will provide assistance in the preparation of the community involvement plan; preparation of public notices and fact sheets; and provide support at public meetings.

3.2 Quality Control Team

The Quality Control Team (QCT) is responsible for implementing the CQCP to ensure high quality is maintained throughout all stages of the project. The QCT will independently review deliverables and will recommend the approval or disapproval of the end products (as detailed in Section 4). The QCT is also responsible for conducting the required independent QC audits. Personnel assigned to the QCT, along with a description of their responsibilities, are presented below.

3.2.1 Quality Assurance Director

CDM's Federal QA Director, Mrs. Jo Nell Mullins, develops and implements the CDM QA program and assesses the implementation of the quality requirements for all projects. Mrs. Mullins schedules and oversees QA audits and corrective actions for deficiencies. All local QACs report to the QA Director.

3.2.2 Quality Assurance Coordinator

Ms. Jeniffer Oxford has QA responsibilities for the USACE Kansas City District Contract. She will be assisted by QACs Sharon Budney and Anthony Isolda. Ms. Oxford works with project staff to select appropriate quality measures; interfaces with client QA and technical and procurement staff as appropriate; and tracks

implementation of the quality requirements for the project. She also ensures that QA audits assigned by the QA Director are performed and follows up on any corrective actions required. Ms. Oxford also provides QA review and participates in field planning meetings. Responsibilities of the QACs are further described in Section 2.2 of CDM's QA Manual (CDM 2007).

3.2.2.1 Office Auditors

QA staff members are trained in auditing procedures and authorized by the QA Director to conduct office audits. Office audits are conducted by authorized QA staff independent of the project to check that the overall quality program is functioning. A list of approved office auditors is maintained on the CDM intranet. The responsibilities and procedures for planning, conducting, reporting, and closing out audits are specified in Quality Procedure (QP) 6.2 of CDM's QA Manual (CDM 2007).

3.2.2.2 Quality Assurance Reviewers

The Project Manager will select an authorized QA staff member to perform QA review on all applicable documents (e.g., work plans, proposals, field plans, measurement reports, and procurement documents for QA requirements) in accordance with QP 3.3 of CDM's QA Manual (CDM 2007). A list of approved QA reviewers by document type is maintained on the CDM intranet.

3.2.2.3 Sampling Quality Control

Mr. Jeffrey Rakowski, the FTL, will be responsible for sampling QC, ensuring that all paperwork is completed correctly, that duplicates, blanks, and laboratory QC samples are collected, and that samples are stored, labeled, and shipped in accordance with the applicable requirements described in the QAPP. He will resolve any questions or issues with the ASC. He will also write and submit all Daily Quality Control Reports (DQCRs). Additionally, Mr. Rakowski will be responsible for ensuring that subcontractors adhere to all applicable quality procedures.

3.2.2.4 Data Quality Control

Mr. Scott Kirchner, the ASC, will provide oversight of quality control activities for the analytical services, including overseeing the review and validation of the analytical data. He will be assisted by Melinda Olsen the Database Manager, as necessary. He will also perform audits of subcontract laboratories, if required.

3.2.2.5 Database Quality Control

Data received electronically from the DESA, CLP, and CDM subcontract laboratory will be entered into the EQuIS database and checked for consistency. Hand entered data will undergo 100 percent QC checks.

3.2.3 Technical Experts/Technical Review Committee

CDM's senior technical staff will conduct independent technical reviews on documents prior to their submittal (see Section 3.1.6). Additionally, senior technical staff will be part of the Technical Review Committee (TRC) to review and comment on the concepts and/or work products of the RI and FS. TRC review is required prior to the draft RI Report and the draft FS submittal.

The technical experts on the TRC will not be involved with the project on a daily basis, but may be periodically consulted for technical guidance during the course of work.

3.2.4 Subcontractors

Subcontractors procured for the early actions included test excavation and debris removal services, waste disposal services, analytical support and fence/sign repair and installation. Subcontractors procured for the RI/FS included surveying, aquatic services (vessel, vibracore and other aquatic support), drilling services, analytical services (non-RAS, bioavailability, and geochronology radioisotope), cultural resources, physical oceanographic services (current studies), investigation derived waste disposal and treatability study services. Subcontractors will be expected to review their work products prior to submittal to CDM. Quality requirements were specified in the respective statements of work (SOWs) and checked by the Project Manager's selected QA reviewer.

Section 4
End Products

Quality control procedures will be applied to all end products, defined as planning and technical documents, required by this assignment. These end products are listed on Table 4-1 and summarized below. Documents will be prepared by appropriately qualified personnel selected by the Project Manager. For larger documents prepared by multiple authors, the Project Manager will conduct a pre-writing planning session to ensure that the objectives and format are clear. The technical and QA review process is outlined in Sections 5.1.1 and 5.1.2.

4.1 Planning Documents

CM has prepared Final QAPPs (2010b and g) and Final APPs (2010a and e) both for the early actions and the RI/FS filed activities.

4.1.1 Quality Assurance Project Plan

Two QAPPs were completed in accordance with the uniform federal policy (UFP)-QAPP Manual (EPA 2005). One QAPP (CDM 2010b) addresses the early actions and data evaluation. The second QAPP (CDM 2010g) covers the full range of RI/FS activities. The QAPP is the governing document for the performance of the field investigation activities. The QAPP outlines specific field investigation, sampling, and QA/QC procedures for sample collection activities. The QAPP procedures describe the planning, collection, handling, transport, analysis, and evaluation of representative environmental samples and data results in a manner that is intended to meet the requirements of USACE.

The QAPP includes:

- Sampling requirements and QA/QC requirements for analysis of samples obtained during field activities
- Key staff, responsibilities, and communication pathways
- Problem summary and project objectives, rationale, and sampling procedures
- Analytical methods, sample matrices, locations, depths, and QA/QC samples
- Data quality objectives (DQOs) and data levels required to meet these DQOs
- QA/QC requirements for analytical measurements
- Requirements for electronic data deliverables
- Data validation tools and requirements and assessment procedures

4.1.2 Accident Prevention Plan

Two APPs were prepared in compliance with USACE requirements. One APP (CDM 2010a) addresses the early action field activities and the second APP (CDM 2010e) covers the full range of RI/FS field activities. The APP details health and safety

requirements such as personal protective equipment, monitoring procedures, staff responsibilities, training requirements and emergency plans.

4.1.3 Work Plan

CDM prepared the RI/FS Work Plan (CDM 2010df) outlining the overall technical approach, proposed field investigation, personnel requirements, and included a project schedule with deliverable milestones and corresponding due dates. CDM prepared a draft and final documenting changes to the RI/FS Work Plan.

4.2 Subcontract Documents

In order to procure quality technical services to implement the early actions and the RI/FS, CDM prepared statements of work (SOWs) describing technical and quality requirements, required bid items and deliverables for test excavation and debris removal services, fence/signage repair and installation, surveying, aquatic services (vessel, vibracore and other aquatic support), drilling services, analytical services (non-RAS, bioavailability, and geochronology radioisotope), cultural resources, physical oceanographic services (current studies), investigation derived waste disposal and treatability study services. These subcontract SOWs were prepared by staff with experience in the technical area and knowledgeable of the project objectives. Technical and quality reviews were performed as described in Section 5 to ensure that the SOW contains the required elements. These elements included details of the tasks to be performed, experience, permits and certifications required, technical and QA/QC requirements, schedule, safety requirements, expected submittals for the bid package and deliverables during and at the end of the performance of the work, and criteria for selection.

Typical quality requirements for subcontractors are shown on Table 4-2.

4.3 Technical Documents

The following end products have been or will be prepared in accordance with the USACE SOW. These documents will be reviewed as shown on Table 4-1.

4.3.1 Data Gap Analysis Technical Memorandum

CDM evaluated existing data and any additional information provided by the USACE to determine and identify major data gaps. CDM provided the Data Gap Analysis Technical Memorandum (2010c) summarizing the results of the data collected to date and providing recommendations for additional investigations and studies for the RI/FS. Following the preparation of the draft technical memorandum, a project meeting was held to discuss the recommendations with the USACE. The final technical memorandum addressed USACE and EPA comments.

4.3.2 Data Usability Summary

Data validation will be conducted by DESA or EPA's validation contractor. Data results generated by analytical subcontractors will be validated by CDM. Once validated data are received, the data quality and usability of the data for the intended project uses will be evaluated by the project chemist in consultation with the FTL.

Details of the evaluation, contents of the report and equations to be used are included in the QAPP. The data usability/data quality assessment evaluation will be appended to the RI Report.

4.3.3 Pathway Analysis Report

A Pathway Analysis Report (PAR) will be prepared and submitted as an interim deliverable prior to preparation of the Human Health Risk Assessment. The PAR will be prepared in accordance with *Risk Assessment Guidelines for Superfund – Part D* (EPA 2001) and will present exposure assumptions to define potential exposure pathways and potential human receptor populations.

4.3.4 Human Health Risk Assessment Report

The project toxicologist will be responsible for the preparation of the Pathways Analysis report, followed by the draft Human Health Risk Assessment (HHRA) report as described in the Work Plan and in compliance with EPA's Human Health Risk Assessment Guidance (EPA 1989). CDM will respond to comments on the draft human health risk assessment. Once comments are approved, the final HHRA report will incorporate changes prior to submittal. Both draft and final risk assessment reports will be subject to independent technical review by the senior risk assessor. A quality control check will also be performed to ensure all review comments are addressed. If the risk assessment is submitted prior to the RI report, the data assessment report section will also be subject to QA review.

4.3.5 Ecological Risk Assessment Report

The project toxicologist will be responsible for the preparation of the draft Ecological Risk Assessment report as described in the Work Plan in compliance with the EPA's Ecological Risk Assessment Guidance (EPA 1997). CDM will respond to comments on the draft ecological risk assessment; once comments are approved, the final report will incorporate changes prior to submittal. Both draft and final risk assessment reports will be subject to independent technical review by the senior risk assessor. A quality control check will also be performed to ensure all review comments are addressed. If the risk assessment is submitted prior to the RI report, the data assessment report section will also be subject to QA review.

4.3.6 RI Report

The RI Task Leader will be responsible for preparation of the RI report. The contents of the RI report will be in accordance with the EPA Guidance for Conducting RIs and FSs under CERCLA (EPA 1988). A draft and final report will be prepared and subject to the reviews shown on Table 4-1. The draft report will be submitted to the USACE and EPA for comments. The final report will include the agreed upon changes resulting from responses to comments on the draft document.

4.3.7 Remedial Alternatives Screening/Evaluation Technical Memorandum (Draft)

The FS Task Leader will be responsible for the preparation of the draft remedial alternatives technical memorandum and FS reports with the support of the project

engineer and other staff as needed. A meeting will be held prior to the screening of remedial alternatives to discuss the remedial action objectives (RAOs), and preliminary remediation goals (PRGs) for agreement on a consensus basis. The outcome from this meeting will be used to screen the remedial alternatives and evaluate remedial alternatives.

CDM will discuss the remedial alternatives with USACE prior to submittal of the Draft Technical Memorandum. This memorandum will include the first three sections of the FS report (RI results summary; RAOs and general response actions (GRAs); applicable or relevant and appropriate requirements (ARARs) and To Be Considered (TBC) criteria; identification and screening of applicable technologies against their effectiveness, implementability, and cost criteria; and evaluation of remedial alternatives against their effectiveness, implementability and cost criteria (if a large number of alternatives are developed).

A final memorandum will not be prepared; the results will be incorporated into the FS report for submittal to the USACE. Review requirements are shown on Table 4-1.

4.3.8 Treatability Study Work Plan

The FS Task Leader will be responsible for preparation of the treatability study work plan and an associate QAPP in accordance with the EPA Guidance for Conducting RIs and FSs under CERCLA (EPA 1988). Bench-scale treatability tests for the evaluation of slag reuse or recycling technologies will be considered during the detailed alternative analysis. The work plan will describe the remedial technologies and purpose of the tests; describe the equipment, material and procedures; identify analytical methods, data management and data analysis; and provide any specific health and safety and residual management procedures.

4.3.9 Treatability Study Report

The FS Task Leader will be responsible for the treatability study report. The draft and final reports will include a summary of the remedial technologies; procedures and methods used; test results; and conclusions and recommendations.

4.3.10 Draft Feasibility Study Report

CDM will develop and screen remedial alternatives in accordance with the EPA Guidance for Conducting RIs and FSs under CERCLA (EPA 1988). After the remedial action objectives have been agreed upon by CDM and USACE, and after a detailed analysis of the alternatives has been conducted by CDM, the draft FS report will be prepared by the FS Task Leader and project engineer. The draft FS report will include a summary of the field investigation, nature and extent of contamination, initial screening process and the detailed evaluations of the remedial alternatives. Comments received from USACE and EPA during the FS process will be incorporated into the draft FS report.

4.3.11 Final Feasibility Study Report

Upon receipt of USACE and EPA written comments on the draft FS report, CDM will prepare responses to comments prior to revising the report for submittal to the USACE

and EPA. The final FS report will incorporate responses approved by USACE and EPA.

4.3.12 Beach Debris and Timber Removal Letter Report

The Project Manager was responsible for preparation of the Beach Debris and Timber Removal report (CDM 2010d). The report included a summary of the activities performed, copies of the disposal documentation (analytical results, non-hazardous determination letter, and non-hazardous manifest) and supporting field documentation. Draft and final reports were prepared and subjected to the reviews shown on Table 4-1. The draft report was submitted to the USACE and EPA for comments. The final report included the agreed upon changes resulting from responses to comments on the draft document.

4.3.13 Test Excavation Data Summary Report

The RI Task Leader was responsible for preparation of the Test Excavation Data Summary report (CDM 2010h). The report included a summary of activities performed, a summary of the field observations and analytical data, and supporting field documentation. Draft and final reports were prepared and subjected to the reviews shown on Table 4-1. The draft report was submitted to the USACE and EPA for comments. The final report included the agreed upon changes resulting from responses to comments on the draft document.

4.3.14 Beach Sampling Technical Memorandum

The project Manager was responsible for preparation of the Beach Sampling Technical Memorandum (CDM 2010i). The report included a summary of activities performed, analytical results, and a summary. Draft and final reports were prepared and subjected to the reviews shown on Table 4-1. The draft report was submitted to the USACE and EPA for comments. The final report included the agreed upon changes resulting from responses to comments on the draft document.

Section 5
Critical Stages for Quality Control

Compliance with specific quality requirements must be verified at critical stages of project execution. The critical stages of quality control for tasks, services, and equipment used for the RI/FS are presented below. Prior to the start of any activity, it is the Project Manager's responsibility to ensure that project staff members are knowledgeable of the technical and quality requirements of the tasks they will perform. Otherwise, they should be indoctrinated by a qualified instructor and mentored with sufficient oversight to ensure that the tasks are performed correctly. A copy of the training documentation should be kept in the office files.

5.1 Control of Document Preparation

The document authors are responsible for the quality of work they produce. In addition, CDM staff independent of the document will perform checks to ensure that the end product is compliant with the established requirements documented in this CQCP. The procedures used for controlling the quality of the critical stages of document development include:

- Draft of each technical document as detailed in Section 4 will be prepared.
- Following the completion of a draft version, an independent technical review will be conducted. A Technical/QA Review Form will be completed and signed by the approved technical reviewer. All Technical/QA Review Forms will be kept in the project files. An example form is included in Attachment B.
- The author, Project Manager, and independent technical reviewers will resolve all comments.
- The draft document will be revised to incorporate the accepted comments resulting from the technical review process. Accepted comments are defined as those comments provided by the independent reviewers that are accepted by the author for inclusion or correction of the document. Non-accepted comments will be discussed with the technical reviewer for resolution; if necessary, the Project Manager and Program Manager, or QA Director, may be consulted to resolve the issue.
- Following the incorporation of technical review comments, a QA review, if required, will be completed by an authorized QAC, to ensure that the document meets the quality requirements of the client and the CDM QA Manual (CDM 2007). The QA reviewer will also sign the Technical/QA review form.
- The author, Project Manager, and QA reviewer will resolve all comments.
- The draft document will be revised to incorporate the accepted comments or changes as a result of the QA review process.
- Upon revision of the draft document, a final review will be performed of the document for format, grammar, and spelling, by a staff member selected by the Project Manager (QC check).

- After reproduction, the draft document will be issued to the document recipients for review.
- Following receipt of comments from USACE, comments will be addressed and changes will be incorporated into the document.
- A technical review or QA review (or both) will be conducted, as necessary, of the revised document by approved CDM reviewers to ensure technical adequacy of the document and to check that all stakeholder comments have been incorporated.
- Upon direction from USACE, CDM will distribute revised draft or final documents to USACE, regulators, and others as requested.

5.1.1 Technical Review

Technical document review is an independent review of a document containing technical information by appropriate and approved technical staff. Technical review requirements are outlined in CDM's QA Manual, Revision 11, QP 3.2 (CDM 2007). It is a critical review of work by one or more of CDM's qualified reviewers who are independent of the document. The review is performed to ensure technical accuracy, accomplishment of project objectives, and conformance to established requirements. Independent technical reviewers will be selected from CDM's Technical Reviewer's List. This list consists of senior staff with significant experience in a variety of technical areas. A technical reviewer with the appropriate expertise will be selected by the Project Manager to review each document as required.

Technical review will be performed after the document is completed and ready for submittal. Table 4-1 shows the documents requiring technical review.

5.1.2 Quality Assurance Review

QA review is an independent review of work plans, proposals, procurement documents, field plans, QA plans, technical standard operating procedures (SOPs), and measurement reports. It is performed by a QA staff member trained and authorized by the QA Director to conduct the review of different categories of documents. QA review requirements are outlined in CDM's QA Manual, Revision 11, QP 3.3 (CDM 2007). QA review is performed to ensure the document meets the specified QA/QC requirements. The QA reviewer is selected by the Project Manager.

QA review will be performed after the document has been technically reviewed by an authorized reviewer, comments have been incorporated, and the document is ready for submittal. Table 4-1 shows the documents requiring QA review.

5.2 Control of Remedial Investigation Activities

Procedures for controlling RI activities are summarized below. Quality control procedures for activities such as procurement of measurement and test equipment (M&TE), mobilization, field measurements, sample collection, handling, storage and shipping, are detailed in the QAPP.

5.2.1 Procurement of Services

Services that directly affect the quality of results and work products are controlled to ensure technical adequacy and quality. Procurement of services is processed to ensure that CDM policies and procedures and the Federal Acquisitions Regulations (FAR) are followed. These services include all the subcontractors to be used for the RI activities.

CDM's QP 2.2, Procuring Technical Services, and CDM's Procuring Quality Technical Services, Revision 1 (CDM 2000) outlines the procedures, requirements, and responsibilities for procuring technical services. A SOW is prepared for each subcontract outlining the required technical services, project objectives, schedule, submittals and documentation, quality requirements, experience, licenses and certification, health and safety requirements, terms and conditions, and applicable local, state, and federal standards. SOWs are subject to technical and QA review prior to submittal to the procurement staff. Technical responses to solicitations are evaluated to ensure technical and quality requirements are satisfied prior to a subcontract award.

5.2.2 Procurement of Items

Items affecting quality are controlled to ensure adequacy. Procurement of items is controlled in accordance with the CDM Federal procurement procedures which are compliant with the FAR, CDM's QP 2.1, Procuring Measurement and Test Equipment, and QP 2.3, Control of Nonconforming Items.

A M&TE form is completed by the requestor indicating the project-specific technical and quality requirements for the item, special requirements, acceptance testing, if required, and calibration requirements. Upon receipt of the item the FTL or his designee will inspect for obvious damages, receipt of documentation such as calibration certificates, and verify the quantities and item description against the packing slip. If acceptance testing is required, a qualified individual will determine the item's acceptability and document its acceptance or rejection according to the procurement procedures. Rejected nonconforming items will be labeled and segregated to prevent inadvertent use.

5.2.3 Meetings

5.2.3.1 Field Planning Meetings

Prior to the start of the field activities, the CDM FTL will hold a planning meeting with the project personnel to discuss the project objectives, logistics, schedule, staff responsibilities, communication, equipment, potential problems, quality requirements, QC samples and procedures, and health and safety concerns related to the site. The primary purpose of the meeting is to ensure that all field activities are performed in accordance with the QAPP and related SOPs.

Planned activities will be discussed with the field personnel during daily meetings that will be held each morning prior to the start of work. Daily meetings will also include a discussion of associated QC samples, QC procedures, and health and safety

topics pertaining to the activities to be performed that particular day. Progress coordination meetings will also be held periodically to discuss project status.

The field staff is responsible to review and become acquainted with the APP, QAPP and their appendices. The Project Manager and/or FTL will allow time for the staff to read and prepare for field activities prior to the start of work. Questions or clarifications may be addressed during the field planning meeting or at another time prior to mobilization.

5.2.4 Field Activities

During field activities, the CDM FTL will be onsite at all times to ensure activities are conducted in accordance with the approved QAPP and related SOPs contained therein. To ensure that field work will be properly performed, the following field activities will take place:

- Hold Field Planning Meetings
- Use Equipment Checklist
- Follow SOPs
- Complete Field Change Request Forms
- Collect Quality Control Samples
- Complete DQCRs
- Perform Field Audit

5.2.5 Standard Operating Procedures and Standardized Methods

SOPs and standardized methods will be used to the extent possible to maintain consistency and to assure accurate and defensible data are collected. The SOPs and standardized methods are detailed in the QAPP.

CDM SOPs will be followed, as applicable and as modified for the project per the QAPP, for the field activities conducted during the field investigation to ensure that activities are conducted in a consistent and correct manner. These procedures are discussed in and included as appendices to the QAPP. If deficiencies are noted during the field program, corrective action will be taken in accordance with the QIP and CDM's QA Manual, Revision 11, QP 8.1 (CDM 2007).

5.2.6 Deviations from Approved Standards and Practices

If deviations from the QAPP or approved SOPs are required, they will be documented using field change request (FCR) forms and discussed with the USACE Project Manager before the change is implemented. The impact, if any, of deviations on the project's quality objectives must be documented on the form. Procedures for documenting changes and receiving required approvals will also be provided in the QAPP. An example of the FCR form is included in Attachment B.

For minor changes, an FCR form will be prepared and sent to the USACE. For major changes, CDM will obtain written concurrence from USACE in the form of a work variance notification (WVN) prior to proceeding, and hold a teleconference to discuss the change. It is the responsibility of the FTL to determine if changes to the QAPP are required and to communicate these changes to the CDM Project Manager, who will initiate the appropriate communications with USACE.

Changes may be required to the APP as a result of changes to field conditions, staff or equipment change, or comments from staff or a subcontractor. The site health and safety officer is responsible for documenting these changes and obtaining the CDM Project Manager's concurrence, and corporate health and safety manager's approval.

5.2.7 Sample/ Data Custody

Possession of samples must be traceable from time of collection to data reporting; data packages are also traceable in the event they are needed for legal proceedings. Samples will be given a unique sample identification number according to the sample naming system described in the work plan. Data packages are assigned a chain of custody form by EPA which is kept with the hardcopy data to archival. Custody procedures are described in the QAPP.

5.2.8 Field Quality Control Samples

Quality control samples will be submitted with the project samples to evaluate laboratory results. These samples include field duplicates, equipment rinsate blanks, field blanks, trip blanks, and matrix spike/matrix spike duplicates (MS/MSDs) or laboratory duplicates (D). The QC samples, the frequency at which they will be collected, and the acceptance criteria are detailed in the QAPP. These samples will be analyzed in the same manner as the investigative samples.

Field duplicate samples will be collected and analyzed to assess the overall precision of the field sampling technique. Trip blanks will be used to determine whether onsite atmospheric contaminants are seeping into the sample vials, or if any cross-contamination of samples is occurring during shipment or storage of sample containers. Field blanks, also known as "rinsate blanks" or "equipment blanks," will be used to assess the effectiveness of equipment decontamination. Cooler temperature indicators or "temperature blanks" will be placed in each cooler containing samples (solid and aqueous) being sent to the subcontract laboratory for analysis, and will be used to determine cooler temperatures. MS samples are laboratory QC samples drawn from excess volumes of existing samples, and will be used to demonstrate the accuracy of laboratory analysis.

5.2.9 Daily Quality Control Reports

The FTL will prepare and submit DQCRs to the USACE PM daily during field activities. The DQCR will be sent daily to the USACE PM or otherwise, as determined by the USACE PM. The DQCR form is a USACE-provided form. An example form is included in Attachment B.

5.2.10 Assessments

All RI/FS activities will be subject to one or more periodic assessments such as self assessments, technical self assessments, assessment of data usability and calculation checking audits. Calculation checking is also described in Section 5.5.

5.2.10.1 Project and Technical Self Assessments

Project self assessment will be conducted by project personnel knowledgeable of the project requirements to identify if the technical requirements are being met and to identify commendable work practices. This assessment provides rapid feedback to facilitate timely corrective action. For example, the FTL will review field logs and notes on a regular basis. These assessments may be used to lessen independent audit requirements for the project with the QA Director's approval. Table 5-1 provides a list of the field activities to be assessed, the types of assessments, and the frequency.

A technical self assessment may be conducted by CDM staff to determine if project activities are being conducted in compliance with requirements. Self assessment check list(s) are included in Attachment A. The assessor is not independent of the project; the purpose is to improve the technical quality of the work and to identify commendable work practices, problems or deficiencies.

5.2.10.2 Assessment of Data Usability

Measurement data will be generated in the field, in subcontractor laboratories, and in EPA CLP laboratories. As defined in the QAPP, measurement data will be assessed to ascertain if the data are suitable for their intended use. The QAPP identifies the acceptance criteria to be used (worksheet #37).

CLP contracts specify acceptance limits for the laboratory measurement systems, ensuring a high probability of detecting invalid data. Data will be reported in a standard format that includes data qualifiers, which indicate the limitations of the data. The data validator will follow the appropriate EPA data validation SOP or CDM SOP as applicable for generated data. The project chemist or designee will assess analytical results versus the project DQOs and measurement performance criteria and the intended use of the data to determine if the data are usable.

As a result of assessment, data may be accepted, rejected, or qualified. Depending on the intended use of the data, and the DQOs, qualified data may be usable. Limitations on the intended data use will be documented when the data are reported. The response to rejected or unusable data may include reanalysis or resampling as determined by the project manager or client, based on the DQOs for the project.

All measurement reports will include a QA section. This section is only required for reports that present the data for the first time. The QA section will be commensurate in size and detail with the measurements reported.

The report QA section will address:

- Adherence to the document(s) governing the measurement work (e.g., work plan, QAPP).

- Deviations noted and explained
- The extent to which the established DQOs were met
- Quality of the data and its limitations
- Usability of the data
- Data precision and accuracy achieved compared with the QAPP objectives
- Specific information required by USACE/EPA QAPP
- Summary of QC activities
- Description of quality problems found and corrective actions taken

5.2.10.3 Calculation Checking

Mathematical calculations will be checked periodically in accordance with the CDM Design QC Plan (2010j). The person performing the check will be technically capable of independently performing the calculations, and should initial and date the calculation checked. Discrepancies will be discussed and resolved to technical correctness and the resolution noted. If necessary, the Project Manager will be consulted to resolve any discrepancies.

5.2.10.4 Field Audits

A field QA audit is a technical assessment of processes or activities conducted by an authorized, independent auditor to verify conformance to specified requirements. A field audit was conducted by two approved CDM field auditors during the field investigation. The auditors were independent of the project staff and conducted an onsite evaluation during field activities to ensure all activities were being performed in accordance with the QAPP. A team of field auditors have been selected based on technical proficiency and trained in audit procedures by the QA Director. The contract QAC and the QA Director selected the project field auditors. The auditors used the checklist in Attachment C during the audit, and prepared a report for the project file detailing the findings of the audit. The field audit report was distributed to CDM's management and to the USACE.

5.2.10.5 Office Audits

An office audit will be conducted on the project files to independently evaluate the use of the quality measures specified in the QAPP, Work Plan, and this CQCP. The office audit will be conducted by an approved CDM office auditor during the task order execution by an auditor independent of the project staff. The audit will be conducted at the office where the project files reside to ensure that project documents are retained and tasks are executed in accordance with the work plans and the QAPP. An audit plan will be prepared to address the scope, activities to be audited, applicable documents, persons to be notified of the audit and the audit schedule. The auditor will prepare a report for the project file detailing the findings of the audit. The audit report will be distributed to CDM's management and to the USACE if requested. Details of office audit procedures are described in CDM QP 6.2, Audits, and the Auditors Handbook.

Alternatively the QA Director may approve five self-assessments which would be conducted in lieu of an office audit. The QAC for this project, a qualified office auditor, Jeniffer Oxford, would be responsible for delegation and oversight of performance of these self-assessments which actions include: making sure that self-assessments are conducted in a timely manner, approving that scope of self-assessments are appropriate, reviewing self-assessment checklists prior to use, and reviewing completed self-assessments and determining any required corrective actions.

5.2.10.6 Corrective Action

Corrective actions will be implemented by the FTL, or Project Manager, as applicable, in accordance with audit findings. Deficiencies found during the field audit will be dealt with immediately. In the case of major non-conformances, a follow-up audit may be performed at the recommendation of the QA auditor to ensure that corrective actions have been implemented. The Project Manager will implement corrective actions, as applicable. Details of the corrective action procedures are described in CDM's QP 8.1.

5.2.10.7 Monthly Progress Reports to Management

Monthly progress reports will be provided to the USACE PM to summarize work completed, budget expended, and updated project schedule. In addition, DQCRs were completed, as noted previously.

5.3 Control of Subcontractor Activities

Subcontractors procured include test excavation and debris removal services, fence/signage repair and installation, surveying, aquatic services (vessel, vibracore and other aquatic support), drilling services, analytical services (non-RAS, bioavailability and geochronology radioisotope), cultural resources, physical oceanographic services (current studies), and investigation derived waste disposal. The subcontractors are responsible to perform their required activities in accordance with the technical, quality, and health and safety requirements for the site. These are defined in the SOWs of the applicable subcontracts. If the CDM FTL or field team staff observes any non-conformance, CDM will document the nature of the deficiency and will inform the subcontractor that corrective action is necessary. The FTL will also document all undertaken corrective measures.

5.4 Control of Risk Assessment Activities

5.4.1 Planning Meetings

Prior to implementation of risk assessment activities, the CDM Project Manager will hold a planning meeting with the toxicologist, risk assessment senior technical reviewer and other project staff to discuss the objectives of the project, specifics of the risk assessment activities to be performed, and related technical and quality requirements and procedures. The primary purpose of the meeting is to ensure that all risk assessment activities are performed in accordance with EPA guidance. The Preliminary Ecological Risk Assessment shall be developed in accordance with the EPA Ecological Risk Assessment Guidance (EPA 1997) and the Preliminary Human

Health Risk Assessment in accordance with EPA Human Health Risk Assessment guidance (EPA 1989). USACE is invited to participate in the planning meetings.

Progress coordination meetings will also be held periodically to discuss project status.

5.4.2 Checking Procedures

During risk assessment activities, all work products will undergo thorough and continuous checking in accordance with CDM's quality procedures. Checking will be done by staff that are knowledgeable of the work being checked and independent of the specific work product. A separate form to document QC checks is not required.

5.4.2.1 Checking Calculations and Spreadsheets

Calculations and spreadsheets will be checked by an independent reviewer. Checking will be performed throughout the risk assessment process and, at the completion of each set of calculations and spreadsheets. The complete thought process and mathematical accuracy will be reviewed. The applicable formulas and risk criteria will be referenced on the spreadsheets, and reviewed during the checking process. Corrections will be clearly noted on the calculations and erroneous figures will be crossed out. Revisions will be reviewed with the individual who made the original calculations.

5.4.3 Risk Assessment Technical and QC Check Review

The draft risk assessment report will be subject to editorial review and additional QC checks (QCCs). When these are completed the final document will be subject to technical review in accordance with the QIP (CDM 2009) and CDM's QA Manual, QP 3.3 (CDM 2007) and the EPA Risk Assessment Guidance. Technical review is described in Section 5.1.1 of this CQCP. The technical reviewer will be a senior technical risk assessor. The Final Human Health Risk Assessment will incorporate comments received from USACE and be subject to the same reviews as the draft document.

5.5 Control of Feasibility Study Activities

5.5.1 Planning Meetings

Prior to implementation of FS activities, the CDM Project Manager will hold a planning meeting with the Project Team to discuss the objectives of the project, specifics of the FS activities to be performed, and related quality requirements and procedures. The primary purpose of the meeting is to ensure that all FS activities are performed in accordance with the CDM Design QC Plan (CDM 2010j). USACE is invited to participate in the planning meetings.

Progress coordination meetings will also be held periodically to discuss project status.

5.5.2 Checking Procedures

During FS activities, all work products will undergo thorough and continuous checking in accordance with CDM's Design QC Plan (CDM 2010j). Checking will be

done by staff that are knowledgeable of the work being checked and independent of the specific work product.

The reviewer's name and date will be printed on each work product. Whenever practical, work will be performed on CDM's standard computation sheet, which contains a header requiring this information. The title box of drawings also requires this information. A separate form to document QC checks is not required when the reviewer's name and date are noted on the work product itself. The reviewer's name and date are considered evidence that work products have been checked, and will be provided to the technical reviewer of the FS report.

5.5.2.1 Checking Calculations and Spreadsheets

Calculations and spreadsheets will be checked by an independent reviewer. Checking will be performed throughout the FS process, at the completion of each set of calculations and spreadsheets. The complete thought process and mathematical accuracy will be reviewed. The applicable formulas and design criteria will be referenced on the computation paper or spreadsheets, and reviewed during the checking process. Corrections will be clearly noted on the calculations and erroneous figures will be crossed out. Revisions will be reviewed with the individual who made the original calculations.

5.5.2.2 Checking Drawings, Maps, and Sketches

Drawings, maps, and sketches will be checked by an independent reviewer. Checking of all drawings, maps, and sketches will be performed prior to submittal of the draft and final FS reports. Questions or corrections will be clearly noted and discussed with the preparer of the work product.

5.5.2.3 Checking Tables, Charts, and Data Sheets

Tables, charts, and data sheets will be checked by an independent reviewer. Checking of all tables, charts, and data sheets will be performed prior to submittal of the draft and final FS reports. Each table and chart will be read thoroughly to ensure accuracy, appropriateness, and coordination with the text. Corrections will be clearly marked and discussed with the author.

5.5.2.4 Checking Cost Estimates

Cost estimates will be checked by an independent cost estimator. Cost estimate checking will be performed prior to submittal of the draft and final FS reports. Cost estimates, including figures obtained from outside sources, will be checked for mathematical accuracy, reasonableness of data, and assumptions and to ensure that all items in the project have been accounted for and included in the estimate. Cost estimates will also be checked to ensure that all related items, such as contractor's overhead/profit and a contingency allowance, have been included. Corrections/revisions will be clearly noted.

5.5.3 Technical Review Committees

TRCs are composed of several staff members who have expertise in the design concepts and the work to be reviewed. The TRC meets as a committee to review and comment on the concepts and/or work products.

TRCs will be held after preparation but prior to submittal of the draft RI report and the draft FS report. The TRC and the Project Team will resolve all comments. The draft document will be revised to incorporate the accepted comments or changes. Accepted comments are defined as those comments provided by the TRC that are accepted by the author for inclusion or correction of the document. Only valid and correct comments will be incorporated into documents. USACE is invited to participate in the TRC.

After revision of the draft document, a final review of a document for format, grammar, and spelling will be performed. After reproduction, the draft document will be issued to USACE for review.

5.5.4 FS Technical and Quality Assurance Review

Technical documents produced, including technical memoranda will be subject to technical review in accordance with the QIP (CDM 2009) and CDM's QA Manual, QP 3.3 (CDM 2007). The FS documents needing technical review are shown on Table 4-1. Technical reviews are described in Sections 5.1.1 of this CQCP. The reviewer will be selected by the FS Task Leader or Project Manager.

Section 6
Acceptability Criteria and Evaluation Methods

Acceptability criteria and methods to determine if acceptability criteria have been met are defined in the following documents:

- CDM QA Manual Revision 11 (CDM 2007)
- Raritan Bay Slag QAPPs (2010b and 2010g)
- EPA Guidance for Conducting RIs and FSs under CERCLA (EPA 1988)

Tables 4-1 and 6-1 provide the appropriate section of the quality guidance document that defines the acceptability criteria for each end product presented in Section 4, and for each critical stage presented in Section 5, respectively.

Section 7
Quality Control Documentation and Record Keeping

Documentation related to QC and execution of the project will be available in the project files for review by USACE personnel. Project deliverables will be submitted to USACE for review and approval prior to implementation.

7.1 Telephone Conversation Records

The CDM Project Manager will record project-related telephone conversations resulting in direction or decisions pertinent to the RI/FS with USACE and other project personnel using a telephone conversation record. These records will be maintained in the project file to ensure accurate record keeping of all communications related to site work.

7.2 Meeting/Teleconference Minutes

The CDM Project Manager will record all project meetings with USACE and other project personnel. These meeting minutes will be typed and distributed to all meeting participants, and will be maintained in the project file to ensure accurate record keeping.

7.3 Project Files

All documentation related to the QC process and project execution will be maintained in the project record file system. Project files for the site will be maintained in CDM's local office. The files will be maintained according to USACE requirements and CDM's QA Manual, QP 3.1 (CDM 2007).

7.3.1 Field and Office Audit Report

The project files will be subject to a field and an office audit by a qualified CDM QA auditor to ensure the files are in compliance with QP 3.1. The responsibilities and procedures for planning, conducting, reporting, and closing out of office audits are specified in QP 6.2 of CDM's QA Manual (CDM 2007). Office audit reports will be maintained in the project file

7.3.2 Daily Quality Control Reports

The DQCRs were submitted daily by the FTL to USACE. A copy of all DQCRs is maintained in the project file to ensure accurate record keeping.

7.3.3 Field Logbooks

During the field investigation, a record of field activities was kept in bound, water-proof field logbooks. Field logbooks were maintained in accordance with the procedures outlined in the QAPP.

7.3.4 Documentation of QC Checks in Project Files

In accordance with CDM's technical review procedures, checks of earlier work products will not be retained in the project files. Evidence of reviews and checks will be documented on the Technical/QA Review Form which will be maintained in the project file.

7.3.5 Documentation of Technical Review Committees in Project Files

The documentation of TRCs and all document reviews will be retained in the project files.

7.4 Quality Control for Reports and Deliverables

7.4.1 Quality Control for Written Deliverables

Independent technical and QA reviews will be performed on deliverables as required by the CDM *QA Manual*, QPs 3.2 and 3.3 (CDM 2007) and shown on Table 4-1. Editorial reviews will additionally be performed on all documents prior to submittal. The CDM Project Manager will provide a final check of all deliverables. After final copying and assembly, a QCC will be performed by someone other than the author and reviewers to ensure the final document is of good quality and complete.

7.4.2 Quality Control for Electronic Deliverables

Laboratory data will be provided to USACE electronically. All electronic data will be checked against the hardcopy results before they are provided to USACE.

7.5 Recordkeeping

Field logbooks were kept in the field in accordance with CDM SOP 4.1. Other field sheets, specific to activities, were completed as specified in the QAPP.

CDM will prepare minutes of all project meetings and will provide them to all attendees. Communications with subcontractors and USACE will be documented.

File maintenance, storage, and control of all deliverables and other project records will occur in the CDM local office. A standardized project filing system will be used to quickly access documents on an as-needed basis and simplify file inventorying during project closeout. Project files are maintained in accordance with CDM's *Project File Creation, Maintenance, and Retention Guidance*. All records are accessible, and copies will be provided to USACE upon request.

Section 8
References

CDM. 2010a. Final Accident Prevention Plan for Early Actions, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. April (revised August)

____. 2010b. Final Quality Assurance Project Plan for Early Actions, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. April (revised September).

____. 2010c. Final (Revised) Data Gap Analysis Technical Memoranda for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. June.

____. 2010d. Final Beach Debris and Timber Removal Letter Report for the Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. August.

____. 2010e. Final Accident Prevention Plan for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. September.

____. 2010f. Final Work Plan for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. September.

____. 2010g. Final Quality Assurance for Project Plan for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. October

____. 2010h. Final Test Excavation Data Summary Report for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. November.

____. 2010i. Final Beach Sampling Technical Memorandum for the RI/FS, Raritan Bay Slag Site, Old Bridge/Sayreville, New Jersey. December.

____. 2010j. CDM Federal Programs Corporation Design Quality Control Plan, Revision 3, September.

____. 2009. CDM Federal Programs Corporation Contract Quality Implementation Plan (QIP) for USACE Contract Number W912DQ-08-D-0018. May.

____. 2007. CDM Federal Programs Corporation Quality Assurance Manual, Revision 11, March.

____. 2006. Camp Dresser & McKee Inc. Corporate Health and Safety Program Manual. October.

____. 2000. Procuring Quality Technical Services, Revision 1. August.

EPA. 2005. Uniform Federal Policy for Quality Assurance Project Plans – UFP QAPP Manual. EPA/505-B-04-900A. March.

____. 1997. Ecological Risk Assessment Guidance for Superfund Sites. 540-12-97-006. June.

____. 1989. Risk Assessment Guidance for Superfund Human Health Evaluation Manual (Part A) Interim Final. EPA540/1-89/002. December.

____. 1988. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA. EPA540/G-89/004. October.

USACE. 2006. Engineering Regulation 1110-1-12, Engineering and Design Quality Management. July.

____. 1998. Engineering Regulation 1110-1-263, Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste Remedial Activities.

Table 4-1
Acceptability Criteria for End Products
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

End Product	Source of Acceptability Criteria	Required reviews/ Comments
Planning Documents:		
Contractor Quality Control Plan	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review USACE ER-1110-1-12	Technical and QA
Quality Assurance Project Plan - Early Actions	EPA UFP-QAPP Manual and QAPP Guidance Manual EPA QA/R-5 CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	QC (3) , Technical and QA
Quality Assurance Project Plan - RI/FS	EPA UFP-QAPP Manual and QAPP Guidance Manual EPA QA/R-5 CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	QC, Technical and QA
Accident Prevention Plan - Early Actions	USACE Safety and Health Requirements Manual, EM 385-1-1 OSHA CFR 1910 and 1926 regulations CDM Health and Safety Manual	QC, and Health and Safety Manager
Accident Prevention Plan - RI/FS	USACE Safety and Health Requirements Manual, EM 385-1-1 OSHA CFR 1910 and 1926 regulations CDM Health and Safety Manual	QC, and Health and Safety Manager
Work Plan	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	Technical, QA and QCC
Subcontract Documents:		
Statements of Work for Test Excavations & Debris Removal Services, Fence/Signage Repair & Installation, Surveying, Aquatic Services, Drilling Services, Analytical Services, Cultural Resources, Physical Oceanographic Services, Investigation Derived Waste Disposal and treatability study services	Federal Acquisition Regulations CDM Procuring Quality Technical Services CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	Technical, and QA

Table 4-1
Acceptability Criteria for End Products
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

End Product	Source of Acceptability Criteria	Required reviews/ Comments
Technical Documents:		
Data Gap Analysis Technical Memorandum	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review	Technical, and QA
Data Usability Summary	EPA UFP-QAPP Manual CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	QC, Technical, and QA
Pathway Analysis Report	Risk Assessment Guidance for Superfund - Part D CDM QA Manual QP 3.2, Technical Review	QC, Technical, and QCC
Human Health Risk Assessment Report	Risk Assessment Guidance for Superfund: Human Health Evaluation Manual CDM QA Manual QP 3.2, Technical Review	QC, Technical, and QCC
Ecological Risk Assessment Report	Ecological Risk Assessment Guidance for Superfund Sites CDM QA Manual QP 3.2, Technical Review	QC, Technical, and QCC
RI Report	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review CDM Quality Implementation Plan	QC, Technical/ TRC (draft report), QA, QCC
Remedial Alternatives Screening and Evaluation Technical Memoranda	National Contingency Plan Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review	QC, Technical, and QCC
Treatability Study Work Plan	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review CDM Quality Implementation Plan CDM QMP-1, CDM Design QC Plan	QC, Technical, QA, QCC
Treatability Study Report	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review CDM Quality Implementation Plan CDM QMP-1, CDM Design QC Plan	QC, Technical, QA, QCC

Table 4-1
Acceptability Criteria for End Products
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

End Product	Source of Acceptability Criteria	Required reviews/ Comments
Draft FS Report	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review CDM Quality Implementation Plan CDM QMP-1, CDM Design QC Plan	QC, Technical/ TRC, QCC
Final FS Report	Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA CDM QA Manual QP 3.2, Technical Review CDM Quality Implementation Plan CDM QMP-1, CDM Design QC Plan	QC, Technical, and QCC
Beach Debris and Timber Removal Letter Report	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review	Technical, and QA
Test Excavation Data Summary Report	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review	Technical, and QA
Beach Sampling Technical Memorandum	CDM QA Manual QP 3.2, Technical Review CDM QA Manual QP 3.3, QA Review	Technical, and QA

Table 4-2
Procuring Technical Services-Typical QA/QC Requirements
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Technical Service	Typical Quality Requirements
Excavation Services	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Debris Removal Services	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Waste Disposal Services	Permit on-site audits/inspections Maintain documentation required in SOW Conduct internal QC review on work products prior to submittal to CDM Notify CDM of quality problems and corrective actions taken
Fence/Sign Repair and Installation	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Surveying	Permit on-site audits/inspections Maintain documentation required in SOW Conduct internal QC review on work products prior to submittal to CDM Notify CDM of quality problems and corrective actions taken
Aquatic Services	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Drilling Services/Monitoring Well Installation	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Analytical Services	Permit on-site audits/inspections Maintain documentation required in SOW Implement laboratory QA Plan Analyze performance evaluation samples Identify a QA Coordinator Conduct internal QC review on work products prior to submittal to CDM Notify CDM of quality problems and corrective actions taken

Table 4-2
Procuring Technical Services-Typical QA/QC Requirements
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Technical Service	Typical Quality Requirements
Cultural Resources	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
Physical Oceanographic Services	Permit on-site audits/inspections Maintain documentation required in SOW Notify CDM of quality problem and corrective action
IDW Services	Permit on-site audits/inspections Maintain documentation required in SOW Conduct internal QC review on work products prior to submittal to CDM Notify CDM of quality problems and corrective actions taken
Treatability Study Services	Permit on-site audits/inspections Maintain documentation required in SOW Conduct internal QC review on work products prior to submittal to CDM Notify CDM of quality problems and corrective actions taken Implement laboratory QA Plan Identify a QA Coordinator

Table 5-1
Objective, Standards and Acceptance Criteria for Field Activities
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Field Activity	Quality Objectives	Standards	Acceptability/Performance Criteria	Acceptable Quality Control Documentation	Responsible Person	Quality Control Activity/Frequency
Mobilization	To ensure that all project planning activities have been conduced prior to the start of field activities	UFP, QAPP (October 2010) Worksheet Numbers 17 and 21	Project Planning performed in accordance with specified standards including: – Right of entries obtained – Permits and licenses – Notices to proceed from USACE have been obtained – Analytical lab has been approved – Equipment and materials procured in accordance with Quality Procedures – Project documents approved – Field Planning Meeting held	– Mobilization checklist – Lab assignment sheet – Field planning meeting agenda and signatures	– Field Team Leader	Completed
Collection of Groundwater samples from Monitoring Wells	To obtain groundwater samples representative of the aquifer in the MW screened interval.	UFP, QAPP (October 2010) Worksheet numbers 17, 18, 20, 21, 22, 26, 27 and 28	Samples collected in accordance with specific standards including: – Proper decontamination of equipment – Proper purging and stabilization of water quality parameters – Turbidity criteria met – VOC samples collected with low-flow pump or bailers – Proper collection, preservation, identification, and handling – QA and QC samples collected at proper frequency – Proper sample packaging and shipping	– Groundwater Sampling Checklist – Field logbook – Calibration logs – Water Quality logs – Analysis Request/ Chain of Custody – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Technical Self Assessment at beginning of activity by Field Team Leader
Soil sampling	To obtain soil samples representative of discrete depth intervals	UFP, QAPP (October 2010) Worksheet numbers 17, 18, 20, 21, 22, 26, 27 and 28	Samples collected in accordance with specific standards including: – Proper decontamination of equipment – Proper depth intervals collected – Proper collection, preservation, identification, and handling – QA and QC samples collected at proper frequency - Proper sample packaging and shipping	– Field logbook – Calibration logs – Lithologic logs – Analysis Request/ Chain of Custody – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed

Table 5-1
Objective, Standards and Acceptance Criteria for Field Activities
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Field Activity	Quality Objectives	Standards	Acceptability/Performance Criteria	Acceptable Quality Control Documentation	Responsible Person	Quality Control Activity/Frequency
Sediment sampling	To obtain sediment samples representative of discrete depth intervals	UFP, QAPP (October 2010) Worksheet numbers 17, 18, 20, 21, 22, 26, 27 and 28	Samples collected in accordance with specific standards including: – Proper decontamination of equipment – Proper depth intervals collected – Proper collection, preservation, identification, and handling – QA and QC samples collected at proper frequency - Proper sample packaging and shipping	– Field logbook – Calibration logs – Lithologic logs – Analysis Request/ Chain of Custody – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed
Surface water sampling	To obtain surface water samples representative of the surface water/ sediment interface	UFP, QAPP (October 2010) Worksheet numbers 17, 18, 20, 21, 22, 26, 27 and 28	Samples collected in accordance with specific standards including: – Proper decontamination of equipment – Proper purging and stabilization of water quality parameters – Turbidity criteria met – VOC samples collected with low-flow peristaltic pump – Proper collection, preservation, identification, and handling – QA and QC samples collected at proper frequency - Proper sample packaging and shipping	– Field logbook – Calibration logs – Water Quality logs – Analysis Request/ Chain of Custody – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed
TRW sampling	To collect soil samples to assess human health risk	UFP, QAPP (October 2010) Worksheet numbers 17, 18, 20, 21, 22, 26, 27 and 28	Samples collected in accordance with specific standards including: – Proper decontamination of equipment – Proper depth intervals collected – Proper compositing of samples per TRW guidance – Proper collection, preservation, identification, and handling – QA and QC samples collected at proper frequency - Proper sample packaging and shipping	– Field logbook – Calibration logs – Analysis Request/ Chain of Custody – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed

Table 5-1
Objective, Standards and Acceptance Criteria for Field Activities
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Field Activity	Quality Objectives	Standards	Acceptability/Performance Criteria	Acceptable Quality Control Documentation	Responsible Person	Quality Control Activity/Frequency
Slag Survey	To determine the depth and areal extent of slag on the seawall, western jetty and in Margaret's Creek	UFP, QAPP (October 2010) Worksheet Numbers 17 and 21	– Proper functioning of GPS equipment – Proper location of slay survey transects	– Field logbook – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed
Water level Monitoring	To collect synoptic and continuous water levels to assess groundwater flow and tidal influences on groundwater elevation at the site	UFP, QAPP (October 2010) Worksheet Numbers 17 and 21	– Proper decontamination of equipment – Proper functioning of water level transducers and synoptic water level indicator	– Field logbook – Calibration logs – Daily QC Report	– Field Geologist/Sampler – Field Team Leader	Completed
Demobilization	To ensure that all equipment and investigation related materials have been properly removed from the site.	UFP, QAPP (October 2010) Worksheet Numbers 17 and 21	– Analytical laboratory cases have been closed – Equipment and materials returned in accordance with Quality Procedures	– Field logbook – Equipment return form – Daily QC Report	– Field Team Leader	Equipment inventory and check in forms completed by field team leader

Table 6-1
Acceptability Criteria for Critical Stages
Raritan Bay Slag Superfund Site
Old Bridge/Sayreville, NJ

Critical Stage	Source of Acceptability Criteria	Comments
Field Investigation Activities		
Planning Meetings	CDM QA Manual	Field planning meetings pre-field work events
Peer reviews/ QC checks	Project QAPP	Daily checks of field log books
Field Audit	CDM QA Manual QP 6.2, Audits and Auditors Handbook	Both self assessment and an audit by an independent auditor will be performed
Report Writing		
Technical Reviews	CDM QA Manual QP 3.2, Technical Review	See table 4-1 for document list. Technical Review Committee review/meeting (as applicable) pre-submittal of RI Report and FS Report
Quality Assurance Reviews	CDM QA Manual QP 3.3, QA Review	See Table 4-1 for document list. Conducted after technical review
Control of Feasibility Study Activities		
Planning Meetings	CDM QA Manual	
Checking Procedures	CDM QA Manual, Section 12.2.3 CDM Design QC Plan	
Technical Review Committee	CDM QA Manual QP 3.2, Technical Review	
Quality Assurance Review	CDM QA Manual QP 3.3, QA Review	
Office Audit	CDM QA Manual QP 6.2, Audits and Auditors Handbook	

FIGURE 3-1
PROJECT TEAM
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY

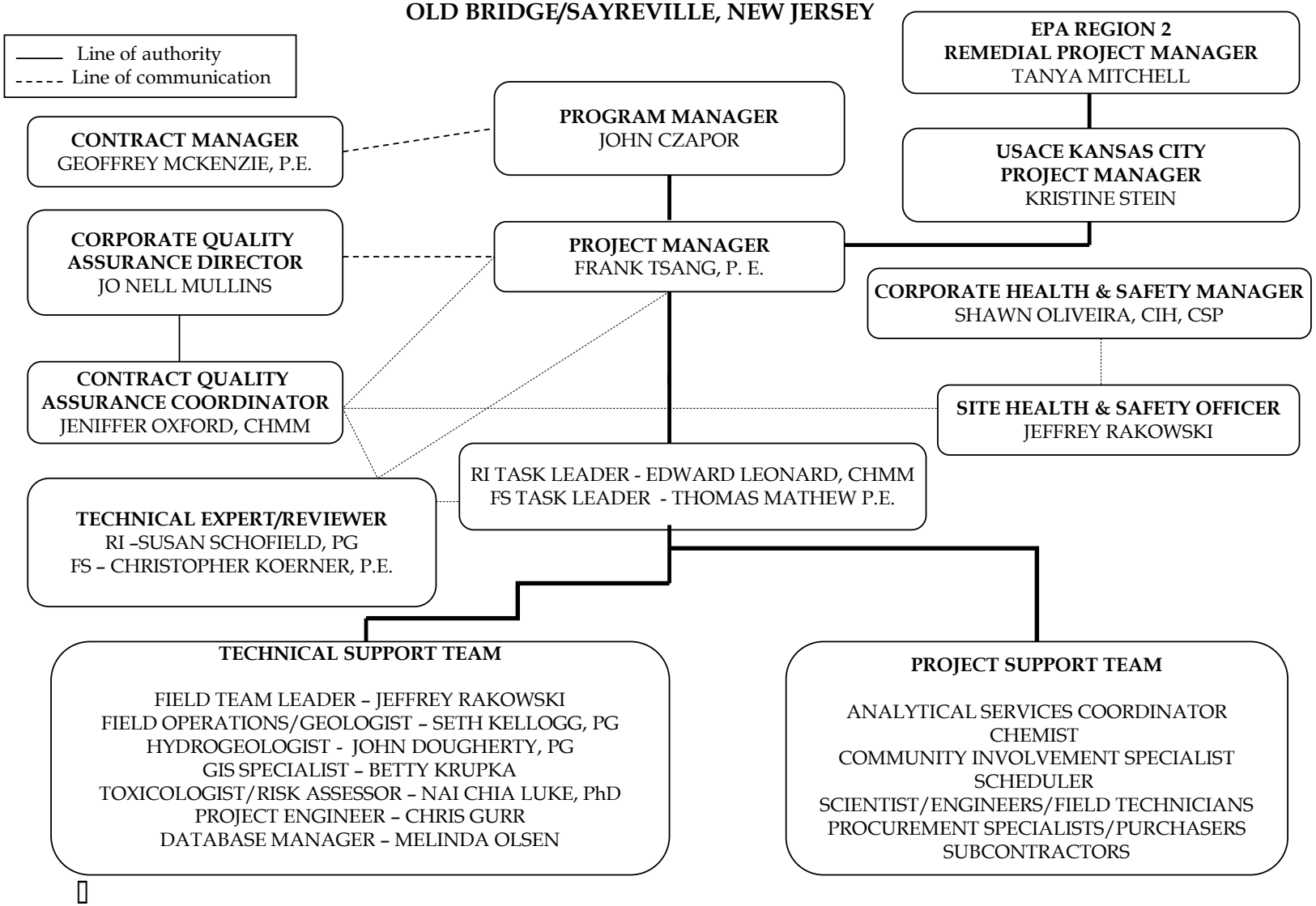
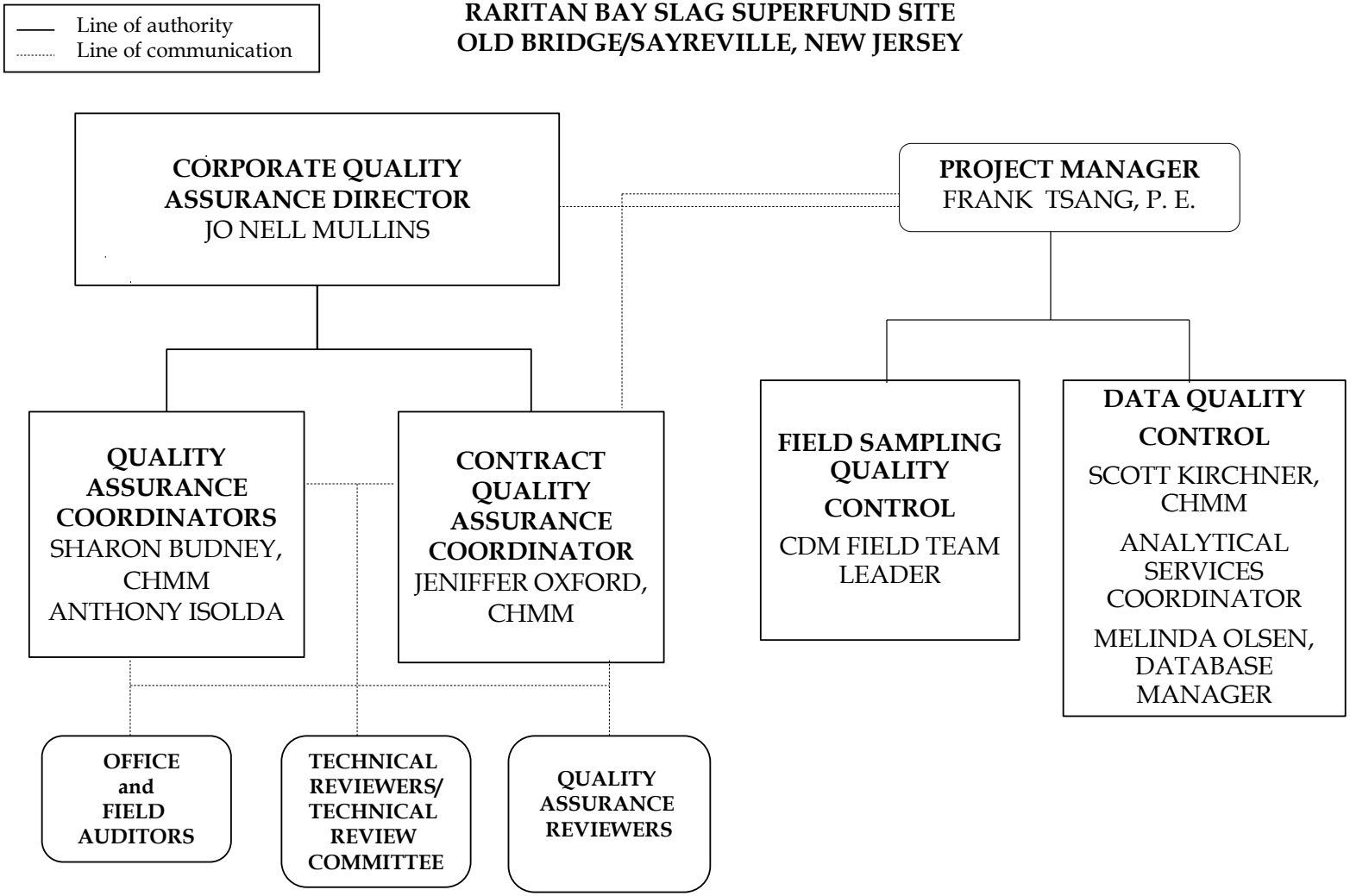


FIGURE 3-2
QUALITY CONTROL TEAM
RARITAN BAY SLAG SUPERFUND SITE
OLD BRIDGE/SAYREVILLE, NEW JERSEY



Attachment A

Self Assessment Checklists

CDM Federal Programs Corporation
Self-Assessment Checklist
Technical SOP 1-2, Revision 1
Sample Custody

Contract Name/Project Name/Project No.:_____

Client:_____

Location:_____

Date Conducted:_____

Time Frame:_____

Assessor:_____

Section 5.1 Chain-of-Custody Record

Was waterproof (indelible) ink used?..... Y / N / NA

Comments:_____

_____

Was sample I.D. number recorded for each sample?.....Y / N / NA

Comments:_____

_____

Was MS/MSD information noted on COC form?..... Y / N / NA

Comments:_____

_____

Was QC sample information noted on COC form?..... Y/ N / NA

Comments:_____

_____

Did samplers sign in all spaces provided on COC forms?..... Y / N / NA

Comments:_____

_____

Technical SOP 1-2, Revision 1, Sample Custody

Were relinquishing and receiving of samples properly signed on COCs?..... Y / N / NA

Comments:_____

_____

Was all required COC form information completed and readable prior to shipment?..... Y / N /NA

Comments:_____

_____

Were samples properly packaged in a cooler and assigned one COC form?..... Y / N / NA

Comments:_____

_____

Were copies of COCs kept by field personnel?..... Y / N / NA

Comments:_____

_____

Section 5.2 Sample Labels and Tags

Were adhesive labels placed on sample containers with clear tape placed over them?..... Y / N / NA

Comments:_____

_____

Were sample tags SECURELY attached to each sample bottle?..... Y / N / NA

Comments:_____

_____

Were the sample project code, station number, date, time, location, signature(s), preservative, parameters, method (if applicable), and other relevant information placed on sample labels or tags?... Y / N / NA

Comments:_____

_____

Technical SOP 1-2, Revision 1, Sample Custody

Section 5.3 Custody Seals

Were custody seals used on coolers prior to shipment?..... Y / N / NA

Comments:_____

_____

Were custody seals signed and dated by a field team member?..... Y / N / NA

Comments:_____

_____

Were custody seals used on individual containers/bottles?..... Y / N / NA

Comments:_____

_____

IMPROVEMENTS:

Any corrective action taken by the technical staff as a result of this SA?..... Y / N / NA
If yes, describe.

_____

_____

_____

_____

_____

_____

Technical SOP 1-2, Revision 1, Sample Custody

Improvement Plan necessary?..... Y / N / NA
If yes, describe.

_____

_____

_____

_____

_____

_____

If so, and rapid action is not possible, an improvement plan should be initiated and attached to this self-assessment report.

Assessor: _____ Date: _____

Program Manager: _____ Date: _____

cc: Project Manager
Local QA Coodinator
HQ QA Specialist
QA Director
Project Files

CDM Federal Programs Corporation
Self-Assessment Checklist
Technical SOP 4-1, Revision 3
Field Logbook Content and Control

Contract Name/Project Name/Project No.: _____

Client: _____

Location: _____

Date Conducted: _____

Time Frame Assessed: _____

Assessor: _____

NOTE: Has this procedure been modified for this project?.....Y / N / NA

Comments: _____

_____

NOTE: List logbooks and dates checked during assessment below:

Logbook Title/DCN	Dates (Start/End) of Entries

Section 5.1 Preparation

Was logbook bound, lined, and pages numbered prior to use? .....Y/ N / NA
Did cover have required information? .....Y / N /NA
Were pages reserved for Table of Contents? .....Y / N /NA

Comments: _____

_____

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Technical SOP 4-1, Revision 3, Field Logbook Content and Control

Section 5.2 Operation

Was each page initialed/signed and dated? ..... Y / N / NA
Were cross-outs or unused portions lined-out and initialed/dated? ..... Y / N / NA
Did each author sign and date his/her entries? ..... Y / N / NA

Was Daily Information Recorded, as follows:
Date/time? ..... Y / N / NA
Weather conditions? ..... Y / N / NA
Names of field team members and visitors? ..... Y / N / NA
Health and Safety PPE? ..... Y / N / NA
Instruments used/serial numbers? ..... Y / N / NA
Calibration data and field measurement results? ..... Y / N / NA

Were Sampling Activities Described or Recorded, as follows:
Location/description/IDs of samples collected/accepted? ..... Y / N / NA
Name of sampler(s) ..... Y / N / NA
Description or reference to procedures? ..... Y / N /NA
Serial numbers of documents (e.g., airbills)? ..... Y / N /NA

Were Other Observations Recorded, as follows:
Changes in weather that impact field activities? ..... Y / N / NA
Deviations from plans/procedures? ..... Y / N / NA
Problems, downtime, and delays? ..... Y / N / NA

Comments: _____

_____

_____

_____

Section 5.3 Post-Operation

Were completed pages photocopied at least weekly? ..... Y / N / NA
Were completed logs placed in file? ..... Y / N / NA

Comments: _____

_____

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Other Project-Specific Requirements (List below)

_____

_____

_____

IMPROVEMENTS:

Have any corrective actions been taken as a result of this self-assessment? .....Y / N / NA
If yes, describe below.

_____

_____

_____

Are improvements needed? .....Y / N / NA
If yes, describe below.

_____

_____

_____

If so, and rapid action is not possible, an improvement plan should be initiated and attached to this self-assessment report.

Assessor: _____ Date: _____

Program Manager: _____ Date: _____

cc: Project Manager
QA Coordinator
HQ QA Specialist
QA Director
Project Files

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CDM Federal Programs Corporation
Soil Boring Field Checklist

Contract Name/Project Name/Project No.: _____
Client: _____
Location: _____
Date Conducted: _____
Time Frame: _____
Assessor: _____

List field plan(s) governing soil boring collection below.

_____
_____
_____
_____

Section 5.1 Preparation

Was required equipment to drill soil borings available at the site?	Yes	No	NA
Was field staff wearing the personal protective equipment required by the SSHP?	Yes	No	NA
Was the photoionization detector (PID) calibrated prior to each day's use?	Yes	No	NA
Were calibrations recorded in the Calibration Log notebook or field logbook?	Yes	No	NA
Were calibrations acceptable?	Yes	No	NA
Did the field logbook(s) state soil boring locations (site map)?	Yes	No	NA
Was utility clearance completed with the base and all utility companies?	Yes	No	NA
Were any overhead obstructions that would impede drill rig setup and operation properly noted?	Yes	No	NA
Was depth of soil drilling verified?	Yes	No	NA
Was the area cleared of heavy underbrush and immediate overhead obstructions?	Yes	No	NA
Did the drilling subcontractor supervisor made a general site reconnaissance and specifically review the borehole location before moving any equipment onto the site?	Yes	No	NA

Section 5.2.1 Conditioning Rotosonic Equipment

Was the drill's operating system thoroughly checked? This includes the inspection, testing, and repair of all emergency shutdown switches and other safety devices.	Yes	No	NA
Were operating tools inspected, repaired if necessary, and inventoried, to ensure that an adequate supply was on hand for the project?	Yes	No	NA
Were drilling tools, rods, bits, etc. checked for proper repair and loaded in sufficient quantities to complete the project?	Yes	No	NA
Was the drilling rig, support vehicles, and auxiliary equipment brought to the project site fully fueled and ready for operation?	Yes	No	NA
Were extra tooling, required instrumentation installation supplies, and other expendables stored in a central location in a safe and secure manner?	Yes	No	NA
Were materials stored in a clean dry area in their original containers until transported to the decontamination area for cleaning, if necessary, or to the actual drill site for installation?	Yes	No	NA
Were all packaging debris, damaged or contaminated materials, and miscellaneous trash accumulated during drilling operations and movement containerized and staged properly?	Yes	No	NA

Section 5.2.2 Onsite General Setup

Was a safety meeting and site/project information meeting held?	Yes	No	NA

Was a complete set of job safety analysis procedures reviewed?	Yes	No	NA
Was the travel path to each boring location evaluated for the safe movement of the equipment?	Yes	No	NA
Was the drill rig and service vehicles moved to each borehole location in a safe manner?	Yes	No	NA
Was all auxiliary equipment or supplies that would interfere with the rig setup moved to a safe and visible location?	Yes	No	NA
Did the rig's leveling jacks have sufficiently sized ground contact pads to prevent misalignment of the drill tools?	Yes	No	NA
Were containers positioned as necessary for efficient and safe placement of cuttings?	Yes	No	NA
Were all pumps, hoses, and position working tools installed as necessary?	Yes	No	NA
Was equipment placed on clean plastic sheeting near the drilling area?	Yes	No	NA
Were sampling equipment and supplies covered with clean plastic sheeting (when not in use)?	Yes	No	NA
Section 5.3 Drilling Procedures Were the boreholes drilled in accordance with the SAP?	Yes	No	NA
Was proper bit for the anticipated formation attached to the sampling barrel?	Yes	No	NA
Were samples collected in accordance with the SAP and EPA Method 5035?	Yes	No	NA
Did the drillers prevent grease, oil, and other fluids from the drill rig from coming in contact with the ground around the area of well installation?	Yes	No	NA
Did the CDM field geologist complete a lithologic log for each borehole in accordance with CDM SOP 3-5, *Lithologic Logging*?	Yes	No	NA
Did the CDM field geologist record the location of each vertical fault, water bearing zone, dissolution cavity, and all other pertinent information recorded in the field logbook?	Yes	No	NA
Did the CDM field geologist maintain a field logbook recording all applicable information related to the drilling of the boreholes?	Yes	No	NA
Were soil samples collected from zones most likely to be contaminated as determined by PID measurements?	Yes	No	NA
Were boreholes plugged with grout in accordance with the SAP?	Yes	No	NA
Was bedrock logged using a downhole video camera?	Yes	No	NA
Section 5.4 Packer Testing Procedures (If completed) Was packer assembly initially tested aboveground inside an 8-inch diameter PVC pipe to ensure the packer did not leak?	Yes	No	NA
Prior to submerging the packer equipment, was the static water level in the borehole measured?	Yes	No	NA
Was the packer assembly decontaminated by the steam cleaning method prior to installation in each borehole?	Yes	No	NA
Was the packer equipment tested to withstand a specific differential pressure of 100 psi for 5 minutes without leaking within a dry consolidated section of the borehole?	Yes	No	NA
Were pressure transducers attached to the packer assembly above and within the packer interval?	Yes	No	NA
After the packer was inflated and the interval sealed, were the transducer readings (which reflect the head differential between the isolated intervals) noted?	Yes	No	NA
Was the packered interval initially pumped at a low constant rate?	Yes	No	NA
Were water levels continually monitored during pumping?	Yes	No	NA

Was pumping continued until three to five zone volumes were removed?	Yes	No	NA
Were continuous water level responses recorded with data loggers above and within the isolated interval, for the duration of the pumping?	Yes	No	NA
During purging of the final zone volume, was the water monitored for temperature, pH, and specific conductivity?	Yes	No	NA
Prior to sampling, were at least three zone volumes removed and readings stabilized within 10 percent?	Yes	No	NA
Was one sample collected from each interval for offsite VOC analysis?	Yes	No	NA
Was the packer assembly removed and decontaminated between each interval?	Yes	No	NA
Section 5.5 Borehole Geophysics (If Completed)			
Was radiological source logging (neutron and gamma-gamma) performed after nonradiological source logging?	Yes	No	NA
Was the geophysical probe lowered to a depth of 2 feet below ground surface (bgs) for the start of the test?	Yes	No	NA
Was the geophysical probe lowered at a slow, constant rate down through the borehole to a depth equal to 1 foot above the total depth of the borehole?	Yes	No	NA
Were data collection procedures repeated as the probe is raised back to the top of the borehole?	Yes	No	NA
Section 5.6 IDW Handling			
Was a staging area identified by FLW during mobilization activities for equipment decontamination and storage of IDW?	Yes	No	NA
Were soil cuttings containerized in accordance with the SAP?	Yes	No	NA
Was all IDW segregated by matrix and type (i.e., soil cuttings, fluids, and solid waste, personal protective equipment) in order to facilitate analysis and disposal?	Yes	No	NA
Were all non-source area drill cuttings placed into roll-off bins at the drilling site?	Yes	No	NA
Were all source area drill cuttings placed in drums, labeled, and sampled in accordance with the SAP?	Yes	No	NA
Were all decontamination fluids stored at the staging area in tanks prior to sampling and disposal?	Yes	No	NA
Was purge water (packer fluids) stored in the staging area in tanks prior to sampling and disposal?	Yes	No	NA
Was used personal protective equipment, used disposable sampling equipment, and general solid waste not generated at the source area disposed of as municipal solid waste?	Yes	No	NA
Was water from the source area treated using a portable granular activated carbon (GAC) unit prior to sampling and disposal?	Yes	No	NA
Was all IDW disposed of by a waste disposal subcontractor?	Yes	No	NA
Section 5.7 Equipment Decontamination			
Was a decontamination pad constructed by the drilling subcontractor for use during decontamination operations constructed in accordance with specifications in the SAP?	Yes	No	NA
Was a portable decontamination station used near each sample location for decontaminating small sampling equipment?	Yes	No	NA
Were high pressure hot water and a laboratory grade detergent such as Liquinox used for decontaminating all equipment including drill rigs and attendant vehicles prior to use?	Yes	No	NA
Were the rear deck, control panel area, rear undercarriage and drilling tools cleaned as necessary using high pressure water and a laboratory grade detergent after subsequent moves of drilling equipment between well locations?	Yes	No	NA

Was all nondisposable equipment that came in contact with a sample (including sampling tools) decontaminated using copious amounts of water containing a phosphate-free detergent (e.g., Alconox)?	Yes	No	NA
Were items that came into contact with samples rinsed thoroughly with tap water and each item checked for any residual chert?	Yes	No	NA
Were items that came into contact with samples rinsed a second time with ASTM Type II deionized water?	Yes	No	NA
Were items that came into contact with samples placed on a clean plastic sheet and allowed to air dry completely before reusing?	Yes	No	NA
Were items that did not come in contact with samples, such as drill stem, core barrels, and tremie pipes subject to gross contamination procedures that consist of steam cleaning with a power sprayer using potable water, heat, and detergent, followed by a potable water rinse?	Yes	No	NA
Section 5.8 Recordkeeping			
Was lithologic logging performed in accordance with CDM SOP 3-5, *Lithologic Logging*?	Yes	No	NA
Was all information related to drilling and the sampling event, including depth, fluid injection, drilling parameters, sampling intervals, recovery, strength index readings, classification of soil, and any comments on sampler or casing advancement listed in the field report?	Yes	No	NA
Improvements:			
Were any rapid actions taken by the technical staff as a result of this field checklist?	Yes	No	NA

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Is an Improvement Plan necessary to address outstanding issues?	Yes	No	NA

If yes, describe.

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If so, and rapid action is not possible, an improvement plan should be initiated and attached to this self-assessment report.

Assessor: _____ Date: _____
Project Manager: _____ Date: _____
cc: Project Manager QA Director
HQ QA Specialist Project Files

R2-0004588

CDM Federal Programs Corporation
Design and Installation of Monitoring Wells in Aquifers Field Checklist

Contract Name/Project Name/Project No.: _____
Client: _____
Location: _____
Date Conducted: _____
Time Frame: _____
Assessor: _____

List field plan(s) governing installation of monitoring wells below.

_____
_____
_____
_____

Section 5.1 Preparation

Was required equipment to drill boreholes available at the site?	Yes	No	NA
Did the field logbook(s) state well locations (site map)?	Yes	No	NA
Was utility clearance completed with the base and all utility companies?	Yes	No	NA
Were any overhead obstructions that may impede drill rig setup and operation properly noted?	Yes	No	NA
Was the area cleared of heavy underbrush and immediate overhead obstructions?	Yes	No	NA
Did the drill foreman made a general site reconnaissance and specifically review the borehole location before moving any equipment onto the site?	Yes	No	NA

Section 5.2.1 Conditioning Equipment

Was the drill's operating system thoroughly checked? This includes the inspection, testing, and repair of all emergency shutdown switches and other safety devices.	Yes	No	NA
Were operating tools been inspected, repaired if necessary, and inventoried, to ensure that an adequate supply was on hand for the project?	Yes	No	NA
Were drilling tools, casing, rods, bits, etc. checked for proper repair and loaded in sufficient quantities to complete the project?	Yes	No	NA
Were the drilling rig, support vehicles, and auxiliary equipment brought to the project site fully fueled and ready for operation?	Yes	No	NA
Were extra tooling, required instrumentation installation supplies, and other expendables stored in a central location in a safe and secure manner?	Yes	No	NA
Were materials stored in a clean dry area in their original containers until transported to the decontamination area for cleaning if necessary or to the actual drill site for installation?	Yes	No	NA
Were all packaging debris, damaged or contaminated materials, and miscellaneous trash accumulated during drilling operations and movement been containerized and disposed of properly?	Yes	No	NA

Section 5.2.2 Onsite General Setup

Was a safety meeting and site/project information meeting held?	Yes	No	NA
Was a complete set of job safety analysis procedures reviewed?	Yes	No	NA
Was the drill crew wearing required personal protective safety gear?	Yes	No	NA
Did the drill crew know the location of underground and overhead utility locations?	Yes	No	NA
Was the travel path to each boring location evaluated for the safe movement of the equipment?	Yes	No	NA

Were the drill rig and service vehicles moved to each borehole location in a safe manner?	Yes	No	NA
Were all auxiliary equipment or supplies that would interfere with the rig setup moved to a safe and visible location?	Yes	No	NA
Were the rigs leveling jacks sufficiently sized ground contact pads to prevent misalignment of the drill tools?	Yes	No	NA
Were containers positioned as necessary for efficient and safe placement of cuttings?	Yes	No	NA
Were all pumps, hoses, and position working tools installed as necessary?	Yes	No	NA
Was equipment placed on clean plastic sheeting near the drilling area?	Yes	No	NA
Were sampling equipment and supplies covered with clean plastic sheeting (when not in use)?	Yes	No	NA
Section 5.3 Drilling Procedure			
Was a proper bit for the anticipated formation attached to the rods?	Yes	No	NA
Was the plumb of the casing in relation to the drill rig checked?	Yes	No	NA
Was protective casing installed in accordance with State of Missouri Regulations for Monitoring Well Construction?	Yes	No	NA
Were the wells drilled to depths specified in the SAP?	Yes	No	NA
Were the wells drilled to the appropriate diameter for well completion allowing the proper annular space as specified in the State of Missouri Regulations for Monitoring Well Construction?	Yes	No	NA
Was the depth to completion approved by the Field Team Leader prior to monitoring well construction?	Yes	No	NA
Did the drillers prevent grease, oil, and other fluids from the drill rig from coming in contact with the ground around the area of well installation?	Yes	No	NA
Did the CDM field geologist complete a lithologic log for each borehole?	Yes	No	NA
Did the CDM field geologist maintain a field logbook recording all applicable information related to the drilling of the boreholes?	Yes	No	NA
Was the bedrock logged using a downhole video camera?	Yes	No	NA
Did the CDM field geologist record the location of each vertical fault, water bearing zone, dissolution cavity, and all other pertinent information recorded in the field logbook?	Yes	No	NA
Section 5.4 Packer Testing Procedures (If Completed)			
Was packer assembly initially tested aboveground inside an 8-inch diameter PVC pipe to ensure the packer does not leak?	Yes	No	NA
Prior to submerging the packer equipment, was the static water level in the borehole measured?	Yes	No	NA
Was the packer assembly decontaminated by the steam cleaning method prior to installation in each borehole?	Yes	No	NA
Was the packer equipment tested to withstand a specific differential pressure of 100 psi for 5 minutes without leaking within either a dry section of the well casing, or alternatively, a dry consolidated section of the well?	Yes	No	NA
Were pressure transducers attached to the packer assembly above and within the packer interval?	Yes	No	NA
After the packer was inflated and the interval sealed, were the transducer readings (which reflect the head differential between the isolated intervals) noted?	Yes	No	NA
Was the packered interval initially pumped at a low constant rate?	Yes	No	NA
Were water levels continually monitored during pumping?	Yes	No	NA

Was pumping continued until three to five zone volumes were removed?	Yes	No	NA
Were continuous water level responses recorded with data loggers above and within the isolated interval, for the duration of the pumping?	Yes	No	NA
During purging of the final zone volume, was the water monitored for temperature, pH, and specific conductivity?	Yes	No	NA
Prior to sampling, were at least three zone volumes removed and readings stabilized within 10 percent?	Yes	No	NA
Was one sample collected from each interval for offsite VOC analysis?	Yes	No	NA
Was the packer assembly removed and decontaminated between each interval?	Yes	No	NA
For the deep monitoring well, did drilling and packer testing continue below the water table until no contaminants were detected in two consecutive lengths (20 feet)?	Yes	No	NA
For the shallow monitoring wells, was packer testing conducted across water-bearing features above the water table only?	Yes	No	NA
Section 5.5 Borehole Geophysics (If Completed)			
Was protective casing installed to competent bedrock before geophysical logging is performed?	Yes	No	NA
Was radiological source logging (neutron and gamma-gamma) performed after nonradiological source logging?	Yes	No	NA
Was the geophysical probe lowered to a depth of 2 feet bgs for the start of the test?	Yes	No	NA
Was the geophysical probe lowered at a slow, constant rate down through the borehole to a depth equal to 1 foot above the total depth of the borehole?	Yes	No	NA
Were data collection procedures repeated as the probe is raised back to the top of the borehole?	Yes	No	NA
Section 5.6 Well Installation			
Was each well constructed of 4-inch ID Schedule 80 PVC with flush-threaded joints?	Yes	No	NA
Were the water table wells constructed using 30-foot screens set with approximately 5 feet of screen above the groundwater surface and 25 feet of screen below the groundwater surface to account for seasonal fluctuations?	Yes	No	NA
Was the deep monitoring well completed with 20 feet of screen?	Yes	No	NA
Was the well screen manufactured with a slot size of 0.010 inch?	Yes	No	NA
Was casing decontaminated by the driller using a hot water high-pressure wash and allowed to air dry prior to use?	Yes	No	NA
Was protective casing installed and grouted in place within 10 feet of the water table to prevent the borehole from becoming a conduit for direct contaminant migration to groundwater?	Yes	No	NA
Was the deep well constructed within the next 20-foot interval from where two packer tests resulted in non-detect target VOC concentrations?	Yes	No	NA
Was the bottom of each well sealed with a flush-threaded end cap?	Yes	No	NA
Were all wells installed with centralizers to ensure plumbness and alignment?	Yes	No	NA
Was the annulus around the well screens filled with clean, washed silica sand sized and grained appropriately for the lithological conditions around the well screen?	Yes	No	NA
Does the filter pack extend from the bottom of the screen to at least 2 feet and not more than 5 feet above the top of the screen?	Yes	No	NA
Was a 5-foot bentonite seal placed directly above the filter pack, composed of commercially manufactured bentonite pellets?	Yes	No	NA

Were the bentonite pellets placed in the borehole and hydrated in 1-foot lifts?	Yes	No	NA
Was the bentonite seal allowed to hydrate according to recommendations provided by the manufacturer before the rest of the well's annulus is sealed?	Yes	No	NA
Does the annular seal consist of a high solids bentonite slurry with at least 20 to 30 percent solids by weight or cement grout consisting of a mixture of portland cement ASTM C150, bentonite, and water, consisting of approximately 7.5 gallons of water, 4 pounds of bentonite, and one 94-pound bag of cement?	Yes	No	NA
Were the quantities of grout recorded on the well log?	Yes	No	NA
Were monitoring wells completed above-grade with a locking steel shroud and vented well cap?	Yes	No	NA
Was a concrete apron (2.5 feet by 2.5 feet by 4 inches thick) constructed with the concrete surface sloped away from the well, flush with the ground surface at the outside edges?	Yes	No	NA
Were three 3-inch diameter by 6 feet long steel posts installed evenly spaced around the concrete pad?	Yes	No	NA
Was a well construction diagram completed for each well?	Yes	No	NA
Were all well materials and quantities used described in the applicable field logbook?	Yes	No	NA
Were all new wells surveyed for top of casing elevation and horizontal location?	Yes	No	NA
Section 5.7 IDW Handling			
Was a staging area identified by FLW during mobilization activities for equipment decontamination and storage of IDW?	Yes	No	NA
Were soil cuttings containerized in accordance with the SAP?	Yes	No	NA
Was all IDW segregated by matrix and type (i.e., soil cuttings, fluids, and solid waste, personal protective equipment) to facilitate analysis and disposal?	Yes	No	NA
Were all non-source area drill cuttings placed into roll-off bins at the drilling site?	Yes	No	NA
Were all decontamination fluids stored at the staging area in tanks prior to sampling and disposal?	Yes	No	NA
Was all purged water stored at the staging area in tanks prior to sampling and disposal?	Yes	No	NA
Was purge water from packer testing stored at the staging area in tanks prior to sampling and disposal?	Yes	No	NA
Was used personal protective equipment, used disposable sampling equipment, and general solid waste not generated at the source area disposed of as municipal solid waste?	Yes	No	NA
Was all IDW disposed of by a waste disposal subcontractor?	Yes	No	NA
Section 5.8 Equipment Decontamination			
Was a portable decontamination station used near each sample location for decontaminating small sampling equipment?	Yes	No	NA
Were high pressure hot water and a laboratory grade detergent such as Liquinox used for decontaminating all equipment including drill rigs and attendant vehicles prior to use?	Yes	No	NA
Were the rear deck, control panel area, rear undercarriage and drilling tools cleaned as necessary using high pressure water and a laboratory grade detergent after subsequent moves of drilling equipment between well locations?	Yes	No	NA
Was all nondisposable equipment that may come in contact with a sample (including sampling tools, packers, and geophysical equipment) decontaminated using copious amounts of water containing a phosphate-free detergent (e.g., Alconox)?	Yes	No	NA
Were items that come into contact with samples rinsed thoroughly with tap water and each item checked for any residual chert?	Yes	No	NA

Were items that come into contact with samples rinsed a second time with ASTM Type II deionized water?	Yes	No	NA
Were items that come into contact with samples placed on a clean plastic sheet and allowed to air dry completely before reusing?	Yes	No	NA
Were items that do not come in contact with samples, such as drill stem, core barrels, and tremie pipes subject to gross contamination procedures that consist of steam cleaning with a power sprayer using potable water, heat and detergent, followed by a potable water rinse?	Yes	No	NA
Section 5.9 Recordkeeping			
Was lithologic logging performed in accordance with CDM SOP 3-5, Lithologic Logging?	Yes	No	NA
Was all information related to drilling and the sampling event, including depth, fluid injection, drilling parameters, sampling intervals, recovery, strength index readings, classification of soil, and any comments on sampler or casing advancement listed in the field report?	Yes	No	NA
Improvements:			
Were any rapid actions taken by the technical staff as a result of this field checklist?	Yes	No	NA
Is an Improvement Plan necessary to address outstanding issues? If yes, describe.	Yes	No	NA

If so, and rapid action is not possible, an improvement plan should be initiated and attached to this self-assessment report.

Assessor: _____ Date: _____

Project Manager: _____ Date: _____

cc: Project Manager
HQ QA Specialist
QA Director
Project Files

CDM Federal Programs Corporation
Well Development and Purging Field Checklist

Contract Name/Project Name/Project No.: _____

Client: _____

Location: _____

Date Conducted: _____

Time Frame: _____

Assessor: _____

List field plan(s) governing well development below.

_____

_____

_____

_____

Section 5.1 Preparation

Was required equipment to conduct well development available at the site?	Yes	No	NA
Were drillers/field staff wearing the personal protective equipment (PPE) required by the SSHP?	Yes	No	NA
Was the photoionization detector (PID) calibrated prior to each day's use?	Yes	No	NA
Were calibrations recorded in the Calibration Log notebook or field logbook?	Yes	No	NA
Were calibrations acceptable?	Yes	No	NA

Section 5.2 Procedures

Was the wellhead in good operational condition?	Yes	No	NA
Were PID measurements collected in the airspace at the wellhead?	Yes	No	NA
Was the depth to static water level and depth to bottom of casing determined?	Yes	No	NA
Did surging and purging of water continue for a minimum of 2 hours?	Yes	No	NA
Did well development continue until the well produced water that was clear, free of suspended solids, and had stabilized parameters (less than 0.2 pH units or a 10 percent change for the other parameters between three consecutive readings)?	Yes	No	NA
Was a minimum of 3 times the volume of water that was lost during well construction purged from the well?	Yes	No	NA
Was any water or other liquid introduced into the well during development other than formation water from that well?	Yes	No	NA
Was pertinent data recorded in the field logbook and on the Well Development Log?	Yes	No	NA
Were water and sediment removed during this process properly containerized?	Yes	No	NA
Were containers properly labeled and staged by the drilling subcontractor for testing and disposal?	Yes	No	NA

Improvements:

Were any rapid actions taken by the technical staff as a result of this field checklist?	Yes	No	NA

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Is an Improvement Plan necessary to address outstanding issues? Yes No NA

If yes, describe. _____

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If so, and rapid action is not possible, an improvement plan should be initiated and attached to this field checklist.

Assessor: _____ Date: _____

Project Manager: _____ Date: _____

cc: Project Manager QA Director
HQ QA Specialist Project Files

R2-0004595

CDM Federal Programs Corporation
Groundwater Sampling Field Checklist

Contract Name/Project Name/Project No.:_____

Client:_____

Location:_____

Date Conducted: _____

Time Frame: _____

Assessor: _____

List field plan(s) governing groundwater sampling below.

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Section 5.1 Low-Flow Sample Collection

Was required equipment to sample groundwater available at the site?	Yes	No	NA
Were samplers wearing the personal protective equipment (PPE) required by the Site Safety and Health Plan (SSHP)?	Yes	No	NA
Were VOCs measured at the rim of the unopened well with a photoionization detector (PID) and recorded in the field logbook?	Yes	No	NA
Was the photoionization detector (PID) calibrated prior to each day's use?	Yes	No	NA
Were calibrations recorded in the Calibration Log notebook or field logbook?	Yes	No	NA
Were calibrations acceptable?	Yes	No	NA
Did each sampling apparatus have a T-valve for turbidity samples to be taken separately from water entering the flow-through cell?	Yes	No	NA
Did each field team have a current version of the SAP/SSHP onsite?	Yes	No	NA
Did each field team have a copy of the Low-Flow Sampling SOP?	Yes	No	NA
Were field measurements (water quality parameters) recorded on a Monitoring Well Sampling Log Form and in the logbook?	Yes	No	NA
Was initial water level measured (to +/- 0.1 foot) after the pump was installed in the well, but before pumping started?	Yes	No	NA
Was the pump installed a minimum of 2 feet from the bottom of the well?	Yes	No	NA
Was the depth to which the pump was lowered recorded in the field logbook?	Yes	No	NA
Was pump turned on as slowly as possible (200-500 mL/min)?	Yes	No	NA
Was the water level in the well being monitored at least every 5 minutes during pumping?	Yes	No	NA
Was a steady pumping rate reached so that total drawdown in the well is < 0.3 feet?	Yes	No	NA
If drawdown exceeded 0.3 feet, was it corrected?	Yes	No	NA
Were at least three well volumes purged and parameters stabilized before collecting samples?	Yes	No	NA

If water level was still falling, was pump at lowest setting possible, which still maintained a steady stream of water?	Yes	No	NA
Was the well purged dry? If so, was it allowed to recharge, then sampled after taking one field reading?	Yes	No	NA
Were field readings being recorded every 5 minutes during purging?	Yes	No	NA
Were stabilization criteria met for three consecutive readings prior to sample collection (unless well was purged dry?) (0.1 for pH and DO, 10 mV for ORP, 3% for conductivity, 10% for temp and turbidity)	Yes	No	NA
Was the flow rate <250 mL/min during sample collection?	Yes	No	NA
Was the water line disconnected from the flow-through cell prior to sample collection?	Yes	No	NA
Were the appropriate amounts of preservatives or (bases or acids) added to each sample container prior to sampling?	Yes	No	NA
Were sample containers filled in the proper order (VOCs, PAHs, other offsite samples)?	Yes	No	NA
Were VOC vials filled without air bubbles?	Yes	No	NA
Were sample containers cleaned on the outside with a clean Kimwipe or paper towel?	Yes	No	NA
Was final water level measured and recorded immediately after the last sample container was filled?	Yes	No	NA
Were the appropriate field quality control samples (field duplicates, rinsate blanks) collected?	Yes	No	NA
Was clean tubing used for sampling, and then left in the well? If not left in well, was the tubing permanently discarded?	Yes	No	NA
Section 5.2 Sample Labeling and Custody			
Were sample labels properly filled out and affixed to the sample jars in the field at the time of sampling? Taped on with clear tape? Placed inside individual Ziplock bags?	Yes	No	NA
Were samples placed on ice immediately after collection?	Yes	No	NA
Was a COC Form properly filled out according to SOP 1-2, listing all samples in the cooler?	Yes	No	NA
Were samples kept in the sample team's possession before being released to the sample coordinator for packaging and shipment?	Yes	No	NA
Were field logbooks properly completed in accordance with SOP 4-1?	Yes	No	NA
Were samples packaged and shipped in accordance with SOP 2-5?	Yes	No	NA
Section 5.3 Pump Decontamination			
Were all pumps and bailers decontaminated between uses at each new well according to the following procedure?	Yes	No	NA
1. Dissemble all pieces of the pump or bailer to be decontaminated 2. Alconox or Liquinox soapy wash 3. Potable water rinse 4. Deionized water rinse 5. Isopropanol or methylene chloride rinse 6. Final deionized water rinse			
Was the pump visibly clean following decontamination?	Yes	No	NA
Were decontaminated pumps contained inside a clean trash bag or aluminum foil until next use?	Yes	No	NA

Improvements:

Were any rapid actions taken by the technical staff as a result of this field checklist? Yes No NA

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Is an Improvement Plan necessary to address any outstanding issues? Yes No NA

If yes, describe.

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If so, and rapid action is not possible, an improvement plan should be initiated and attached to this field checklist.

Assessor: _____ Date: _____

Project Manager: _____ Date: _____

cc: Project Manager QA Director
HQ QA Specialist Project Files

Attachment B

Forms

Raritan Bay Slag Site
Old Bridge Township, New Jersey

Daily Quality Control Report

DATE:	**Prepared by:**

Contractors and Personnel Onsite:	

Weather	Bright Sun	**Clear**	Overcast	Rain	Snow
Temperature	**To 32 º F**	32 to 50 º F	50 to 70 º F	70 to 85 º F	85+ º F
Wind	Still	Moderate	High		
Humidity	Dry	Moderate	Humid		

Daily Health and Safety Meeting Completed:

Description of Field Activities

Issues/Problems Encountered/Deficiencies/Deviations from QAPP's (and resolutions)

Projected Work- Near Term

Projected Schedule

RARITAN BAY SLAG SITE
REMEDIAL INVESTIGATION/FEASABILITY STUDY
FIELD CHANGE REQUEST (FCR) FORM
OLD BRIDGE/ SAYREVILLE, NEW JERSEY

REQUEST NO: _____ DATE: _____

FCR TITLE: _____

DESCRIPTION: _____

_____

_____

_____

REASON FOR DEVIATION: (Include impact on project objectives) _____

_____

_____

_____

RECOMMENDED/MODIFICATION: _____

_____

_____

_____

INCLUDE IMPACT ON PROJECT OBJECTIVES: _____

_____

Signatures: _____ _____
Field Team Leader (FTL) Date

_____ _____
CDM Task Order Manager (TOM) Date

Distribution: EPA Remedial Project Manager
USACE PM
CDM TOM
Regional Quality Assurance Coordinator
Field Team
Project File

☐ **CDM Federal Programs**
☐ **CDM Federal Services Inc.**

TECHNICAL/QA REVIEW FORM

QC Check ☐ **Technical Review** ☐ **QA Review** ☒

Check reviews required above

Document Type: I _____ Author: _____

Title: _____

DCN: _____ Revision Number: _____ Date: _____

Contract/Project: _____

100% QC Check on Tables, Figures, Calculations, and Text Compared to Actual Data Used Conducted by:

Signature: _____ Date: _____

Instructions to Technical/QA Reviewers:

Charge No: _____ Project Manager: _____

Estimated Review Hours*: Technical: _____ QA: _____

Date Sent: _____ Due Date for Comments: _____

Return Comments to: _____

Background and Instructions:

.

Technical Reviewer:

Name: _____

Location: _____

QA Reviewer:

Name: J

Location: _____

Technical Reviewer
Signature: _____ Date: _____

***Note*: Spot-check accuracy of equations, calculations, reference citations, tables, and figures**

QA Reviewer
Signature: _____ Date: _____

***Note*: Check consistency between tables, figures, and text**

Return for Follow-up Technical review? ☐ **Yes** ☐ **No**

Return for Follow-up QA review? ☐ **Yes** ☐ **No**

Concurrence with Comment Resolution – Required When Follow-up Review is Required

Reviewer's Signature: _____ Date: _____

Reviewer's Signature: _____ Date: _____

Review Comments Incorporated/Resolved – Required for all Reviews

Project Manager's
Signature: _____ Date: _____

*If Reviewer requires more time, discuss with Project Manager.

Attachment C

Field Audit Checklist

CDM Federal Programs Corporation

SAMPLING FIELD AUDIT CHECKLIST

Project No./Title: _____

Auditor/Date: _____

Project Manager: _____ Firm Audited: _____

Field Team Leader: _____ CDM Federal QA Coordinator: _____

Audit Location: _____

_____

Documents Relevant To This Audit (List titles, dates, sections) _____

_____

_____

_____

_____

_____

_____

Review these documents in detail and record applicable Field Plan sections and SOPs for each activity to be checked.

Field Activities To Be Checked/Applicable Field Plan Section or SOP: _____

_____

_____

_____

_____

_____

_____

Personnel Contacted During Audit and Affiliation: _____

_____

_____

_____

_____

_____

_____

Note: Record Applicable Field Plan Sections and SOPs for Each Subject Checked

General Sampling Procedures Y/N/NA

1) a. Does field crew have operating procedures for field work on site? _____

Field Plan(s): (specify Revision No. or Date _____) _____

Tech SOPs (specify _____) _____

Equipment Procedures (specify _____) _____

b. Is required health and safety documentation on site? (specify: _____) _____

2) Were sampling locations selected as planned? _____

If No, explain _____

_____

3) Were samples collected starting with the least likely contaminated and proceeding to the most likely contaminated? _____

Remarks _____

_____

4) Was sampling equipment protected from possible contamination prior to sample collection? _____

If No, explain _____

_____

5) If equipment was cleaned in the field, were described procedures used? _____

If No, explain _____

_____

_____

_____

6) What field instruments were used during this investigation? _____

_____

_____

Y/N/NA

7) Were field instruments calibrated as described? _____

If No, explain _____

_____

_____

8) Were calibration procedures documented in the field notes? _____

Remarks _____

_____

_____

9) Were nonconforming instruments (those which were not functioning properly) segregated and not used? _____

10) Were nonconforming instruments or items documented as required? _____

11) Were the samples chemically preserved in the field? _____

If No, explain _____

_____

12) Were the samples iced? _____

13) Were samples for selected parameters field filtered? _____

If Yes, list parameters and describe procedures. _____

_____

_____

_____

14) What are the field change control requirements for this project? Circle One.

Client-Specified Form Project QAPP "Field Change Request Form" Record of Communication

Were requirements followed? _____

Monitoring Well Sampling Y/N/NA

1) Was depth of well determined? _____

2) Was depth to water determined? _____

3) Were the above depths to water converted to water level elevations common to all wells? _____
Describe how the depths were determined _____
_____
_____

4) How was the volume of water originally present in each well determined? _____
_____

5) Was the volume determined as described in the field operating procedure? _____

6) How was completeness of purging determined?
Volume Measure _____
Time/Flow Rate _____
Cond./pH/Temp _____

7) Was well purged to completeness point? _____
Remarks _____
_____

8) Was dedicated (in-place) pump used? _____
If no, describe the method of purging (bailer - include type and construction material, pump - include type) _____
_____

Y/N/NA

9) How were the samples collected?

Bailer _____ Pump _____ Combination _____

Construction material of bailer: _____

Design of bailer:

Open Top _____ Closed Top _____ Other _____

10) If a pump was used, describe how it was cleaned before and/or between wells. _____

_____

_____

11) Was the sample properly transferred from bailer to sample bottle (i.e., was the purgeable sample agitated, etc.)? _____

12) Was the rope or line prevented from touching the ground? _____

13) Was any wetted rope or line discarded after use at each well? _____

14) How many wells were sampled? _____

15) Who collected samples:

_____

16) Were there any changes to sampling procedures? _____

17) Note any deficiencies observed during the collection of well samples:

_____

_____

_____

_____

Surface Water Sampling Y/N/NA

1) What procedures and equipment were used to collect surface water samples? _____

_____

_____

2) Did the samplers wade in the stream during sample collection? _____

If Yes:

Did the sampler face upstream while collecting samples? _____

Did the sampler ensure that sediments were not collected along with water sample? _____

3) Note any deficiencies observed during the collection of the surface water samples _____

_____

_____

_____

_____

_____

4) Total number of samples collected: _____

5) Sample collector: _____

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_____

Waste, Sludge, Soil/Sediment Sampling Y/N/NA

1) What procedures including equipment were used to collect soil/sediment samples? _____

_____

_____

_____

2) Were the soil/sediment samples well mixed prior to placing the sample in the sample container? _____

3) Note any deficiencies observed during the collection of the soil/sediment samples _____

_____

_____

_____

4) Total number of samples collected: _____

5) Sample collector: _____

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Other Sampling Y/N/NA

1) What other types of samples were collected during this investigation?

_____

_____

_____

2) What procedures were used for the collection of these samples?

_____

_____

_____

_____

3) Total number of samples collected: _____

4) Sample collector: _____

5) Note any deficiencies observed during the collection of these samples: _____

_____

_____

_____

_____

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_____

QUALITY ASSURANCE/QUALITY CONTROL Y/N/NA

(While all of these QC procedures are not necessarily used, please check on the specific techniques which were described in the field protocols.)

1) Did the sampling personnel use any field trip blanks? _____

1a) Was a water blank poured for the reagent grade water? _____

2) Did the sampling personnel create any preservative blanks? _____

If Yes, to either of the above questions, list the type and handling of the blanks _____

_____

_____

3) Were any equipment blanks collected? _____

If Yes, list: _____

_____

_____

_____

4) Were any duplicate samples collected? _____

If Yes, list the types (parameter coverage, etc.) and describe their handling: _____

_____

_____

_____

5) Were any spiked samples used? _____

If Yes, list the types (parameter coverage, etc.) and describe their handling: _____

_____

_____

_____

CHAIN OF CUSTODY AND SAMPLE HANDLING Y/N/NA

1) Were split samples offered to the site owner or facility representative? _____

2) Was a receipt for samples given to the site owner or facility representative prior to leaving the site? _____

3) Were all sample tags and chain-of-custody forms signed by sample collector(s)? _____

4) Were chain-of-custody records completed for all samples? _____

5) Were sampling tag numbers and laboratory traffic report form numbers cross-referenced to chain-of-custody forms? _____

6) Were chain-of-custody form numbers recorded in the field log book? _____

7) Were all samples properly sealed at the time of collection? _____

8) Were samples kept in a secure place after collection? _____

9) Were samples stored to maintain 4EC, if required? _____

10) Were the samples shipped to a CLP laboratory? _____
If Yes: Were the traffic report forms filled out properly? _____
Were the samples properly packed for shipment? _____
If No: Explain: _____
_____

FIELD DOCUMENTATION Y/N/NA

1) Describe required field documentation:_____

_____

_____

2) Was all required information recorded? _____

Brief summary of information included: _____

_____

_____

_____

_____

If No, explain _____

_____

_____

_____

_____

3) Was sampling required to be documented with photographs? _____

If Yes, were documentation requirements met?_____

_____

4) Were field logbooks required? _____

a) Was the Field logbook cover properly completed? _____

b) Was a Table of Contents used or were pages reserved for it? _____

c) Were logbook corrections handled as required? _____

d) Were unused logbook pages properly lined out? _____

e) Were logbook review requirements met? _____

GENERAL COMMENTS:

FIELD DEBRIEFING

Proficiencies/Attaboys/Staff Notified: _____

_____

_____

Observations/Concerns/Staff Notified: _____

_____

_____

_____

Deficiencies Noted/ Staff Notified: _____

_____

_____

_____

_____

_____

_____

Action Taken on Deficiencies: _____

_____

_____

_____

Field Team Leader notified Y/N When?

Project Manager notified Y/N When?