



Final Construction Quality Assurance Plan

Prepared for:
Emhart Industries, Inc.

**Source Area Operable Unit
Rockets, Fireworks, and Flares Superfund Site
EPA ID: CAN000905945**

June 2014

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Project No. 0179962



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TABLE OF CONTENTS

LIST OF ACRONYMS	iii
1.0 CONSTRUCTION QUALITY ASSURANCE PLAN	1
1.1 SAOU REMEDIAL ACTION SUMMARY	1
1.2 CQA PLAN PURPOSE AND ELEMENTS	2
2.0 POSITION RESPONSIBILITIES	4
2.1 CONSTRUCTION QUALITY ASSURANCE MANAGEMENT TEAM	4
2.1.1 <i>Project Coordinator</i>	4
2.1.2 <i>Project Manager</i>	5
2.1.3 <i>Construction Quality Assurance Manager</i>	5
2.1.4 <i>Construction Task Leader</i>	6
2.1.5 <i>Health and Safety Coordinator</i>	7
2.2 FIELD CONSTRUCTION SUPPORT TEAM	8
2.2.1 <i>Construction Manager</i>	8
2.2.2 <i>Field Construction Support Team</i>	9
2.3 SUBCONTRACTORS	9
2.4 OUTSIDE ORGANIZATIONS	10
3.0 LEVEL OF EXPERIENCE	11
3.1 CONSTRUCTION QUALITY ASSURANCE TEAM	11
3.2 FIELD CONSTRUCTION SUPPORT TEAM	11
4.0 CONSTRUCTION QUALITY CONTROL PROCEDURES	13
4.1 PHASES OF CONTROL	14
4.1.1 <i>Pre-Construction Preparation</i>	14
4.1.2 <i>Construction Phase</i>	15
4.1.3 <i>Post-Construction Phase</i>	16
4.2 INSPECTIONS AND TESTING	16
4.2.1 <i>Extraction Well and Piezometer Construction and Inspection</i>	17
4.2.2 <i>Conveyance Pipeline Construction and Inspection</i>	18

4.2.3	<i>Treatment Plant Expansion and Extraction Well House Enclosure Construction and Inspection</i>	18
5.0	NON-CONFORMANCES AND CHANGES	20
5.1	NON-CONFORMANCES AND DEFICIENCIES	20
5.2	CHANGES AND CHANGE ORDERS	21
6.0	SAMPLING REQUIREMENTS	23
6.1	SAMPLE COLLECTION	23
6.2	LABORATORY PROCEDURES	24
7.0	DOCUMENTATION	25
7.1	MEETINGS AND TELECONFERENCES	25
7.2	PROGRESS SUMMARIES	26
7.3	REPORTING AND FIELD DOCUMENTATION	26
7.4	DOCUMENT CONTROL AND STORAGE	27
7.5	REMEDIAL ACTION REPORT	27
8.0	REFERENCES	29
	APPENDIX A - ORGANIZATION CHART	

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation
ACI	American Concrete Institute
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
AWWA	American Water Works Association
CDPH	California Department of Public Health
CM	Construction Manager
CoC	Chain of custody
CQA	Construction Quality Assurance
EDD	Electronic data deliverables
FAA	Federal Aviation Administration
gpm	Gallons per minute
H&S	Health and Safety
LIMS	Laboratory Information Management System
OSWER	Office of Solid Waste and Emergency Response
P.E.	Professional Engineer
P.G.	Professional Geologist
PM	Project Manager
QA/QC	Quality assurance/Quality control
RD	Remedial Design
RWQCB	Regional Water Quality Control Board
SAOU	Source Area Operable Unit
TCE	Trichloroethene
USEPA	U.S. Environmental Protection Agency
VOC	Volatile organic compound

1.0

CONSTRUCTION QUALITY ASSURANCE PLAN

On behalf of Emhart Industries, Inc. (Emhart), ERM-West, Inc. (ERM), prepared this Final Construction Quality Assurance Plan (CQA Plan) for the remedy selected by the U.S. Environmental Protection Agency (USEPA) for the Source Area Operable Unit (SAOU) at the Rockets, Fireworks, and Flares Superfund Site (site; Figure 1), formerly known as the B.F. Goodrich Superfund Site. This CQA Plan is being submitted in accordance with the *Statement of Work for Remedial Design and Remedial Action for the Source Area Operable Unit, B.F. Goodrich Superfund Site* (Statement of Work), which is Appendix F to the Consent Decree entered by the U.S. District Court for the Central District of California in *City of Colton v. American Promotional Events, Inc. et al.*, Case No. ED CV 09-01864 PSG (SSx) on 2 July 2013 (Work Consent Decree). This document was also prepared in accordance with the Remedial Design Work Plan (RD Work Plan; ERM 2013b). This CQA Plan was prepared to support Emhart's implementation of its obligations under the Work Consent Decree (the "Work").

This document has been written in accordance with the *Guidance of Quality Assurance for Environmental Technology Design, Construction and Operation*, EPA QA/G-11, published by the USEPA (USEPA, 2005) with the intended purpose of describing organization, procedures and documentation processes to ensure construction of the remedial action meets or exceeds design criteria, specifications and relevant Performance Standards.

1.1

SAOU REMEDIAL ACTION SUMMARY

The USEPA's selected remedy is a groundwater pump-and-treat system intended to intercept (i.e., hydraulically control) and remove contaminated groundwater in the Target Area. The construction activities related to the remedial action are anticipated to include construction of extraction well(s), piezometers, conveyance pipelines, and groundwater treatment equipment.

Since finalization of the RD Work Plan, the remedy design has been further defined through implementation of a remedial design investigation, development of a groundwater flow model, and discussions with representatives of the USEPA, City of Rialto (Rialto), City of Colton (Colton), County of San Bernardino (County), California Department of

Public Health (CDPH) and Emhart. Based on these activities, the remedy includes the following main components:

- Groundwater Extraction – Based on groundwater flow modeling simulations and USEPA approval (letter dated 28 June 2013), the initial remedy design will include extraction from one new extraction well (EW-1) and one existing extraction well (Rialto-3) (Scenario 2Br within the Final Groundwater Flow Modeling Report [ERM, 2013c]). Wells EW-1 and Rialto-3 are expected to provide sufficient hydraulic control of groundwater in the combined SAOU and County target areas. Should hydraulic capture analysis indicate insufficient capture of the SAOU Target Area, a second extraction well, EW-2, may be installed at an optimal location to address the circumstance and/or extraction at Miro-2 and/or Miro-3 will be initiated. The County reports that containment of the County plume is currently achieved through the operation of Rialto-3 alone and, therefore, Miro-2 and Miro-3 are currently inactive.
- Treatment – The County currently operates a treatment system to address releases emanating from and near the area proposed to be used for the future Unit 5 of the Mid-Valley Sanitary Landfill (County Remedy Area). The County Remedy Treatment Plant removes trichloroethene (TCE), other volatile organic compounds (VOCs), and perchlorate from extracted groundwater from up to three extraction wells (Rialto-3, Miro-2, and Miro-3) and has a maximum operational treatment capacity of 1,900 gallons per minute (gpm). The Work includes expanding the treatment capacity of the County Remedy Treatment Plant by approximately 2,000 gpm.
- Conveyance System– The remedy will include installation of the conveyance pipelines and pumps, if necessary, to: (1) convey extracted water from EW-1 well to the treatment plant; (2) convey treated water from the treatment plant to the Rialto drinking water supply distribution system; and (3) wheel water from the Rialto distribution system to the Colton distribution system.

1.2

CQA PLAN PURPOSE AND ELEMENTS

The objectives of the CQA Plan are to ensure, with reasonable and practical means, that the completed remedial action will meet or exceed all design criteria, plans and specifications, and relevant Performance Standards. This CQA Plan defines the various management and

inspection staff personnel directly responsible for the CQA activities, including position descriptions, responsibilities, and experience requirements. In addition, this CQA Plan addresses specific quality assurance and quality control (QA/QC) testing requirements for each of the various components of the system construction. During construction, contractors, vendors, and others involved in the implementation of the remedial action, will be required to provide supplemental supporting documents. These supplemental requirements will be outlined in the technical specifications provided in the Final Design.

2.0 *POSITION RESPONSIBILITIES*

The Project Coordinator will be responsible for the quality of construction in the finished product and for compliance with the construction documents, drawings, and specifications. The complete construction, design, and CQA team organization is presented on Appendix A.

The CQA team members will be under the direct supervision of the CQA Manager. Therefore, specific positions, and their associated descriptions and responsibilities, will be set forth by the CQA Manager.

2.1 *CONSTRUCTION QUALITY ASSURANCE MANAGEMENT TEAM*

The CQA management team will solely participate in the QA function and will not be involved in any other aspect of the construction effort. This team will, however, possess all of the credentials, capabilities, and experience of an independent design/construction oversight team. The duties and responsibilities of each position are described below. One individual or entity may perform multiple CQA responsibilities.

2.1.1 *Project Coordinator*

The Project Coordinator provides overall project delivery oversight and serves as a resource for the Project Manager (PM) and project team for risk, quality, and financial management of the project. The Project Coordinator is the main point of contact for the USEPA. The Project Coordinator's quality management responsibilities include the following:

- Reviewing and approving plans for project delivery concerns including cost proposals and budgets;
- Verifying that appropriate budgets have been allocated for the quality efforts required;
- Monitoring the implementation of the quality program throughout the life of a project; and
- Periodically reviewing and auditing the financial status and performance of the project.

2.1.2 *Project Manager*

The PM is responsible for overall creation, implementation, and management of program policies and procedures, such as the CQA Plan, and will supervise the preparation of deliverable documents. The PM's duties pertaining to quality management include:

- Reviewing budget, schedule, and performance reports;
- Reviewing corrective actions and lessons learned to assess the effectiveness of resolutions;
- Allocating resources for quality management;
- Establishing the objectives, expectations, and scope of work to be performed;
- Serving as liaison for communications with the client and subcontractors;
- Coordinating and communicating with Supervising Contractor and CQA Manager to keep them informed of the work progress;
- Verifying compliance with health and safety procedures; and
- Reviewing all deliverables for conformance with client requirements, scope of work, and the Quality Management Plan (ERM, 2013a). The PM is ultimately responsible for timely, well-planned reviews and for incorporating review comments.

2.1.3 *Construction Quality Assurance Manager*

The Construction Quality Assurance Manager (CQA Manager) is assigned by the PM to provide quality management support to the project. The CQA Manager coordinates with the PM for day-to-day construction operation to identify and communicate quality issues related to planning and assessment, and assists in improving the quality management system. The CQA Manager reviews and approves project summaries and project-level quality work instructions and procedures.

The general purpose of the CQA Manager is to ensure that the contractor provides a full, complete, and properly constructed product in accordance with all plans and specifications. The CQA Manager will be responsible for implementing this CQA Plan. The primary duties of the CQA Manager are to verify that all QA/QC tests required under the construction contract are performed, and assure that all installed equipment and materials have passed the required tests. The CQA Manager will oversee the completion of material and equipment tests and

maintain reports of testing results, any failures, and any corrective actions employed to obtain acceptable test results. All test data, reporting data, and contractor submissions will be included in the construction certification report. The CQA Manager shall be permitted to suspend construction activities under conditions such as inclement weather, where they believe the integrity of the construction components will be compromised. The CQA Manager will be assigned to the site on a full-time basis, and will report directly to the PM. The duties and responsibilities of the CQA Manager include the following:

- Evaluates project quality requirements;
- Coordinates the project submittal processes for both design and construction documentation;
- Identifies, notifies, and resolves non-conformances and discrepancies;
- Performs and/or oversees all CQA testing activities;
- Coordinates CQA activities with the Construction Manager and the PM;
- Supports the PM and Project Coordinator in project team selection to support implementation of the project to meet the quality requirements;
- Trains Field Construction Support Team on quality processes and procedures and supports the development and distribution of quality lessons learned that may arise during implementation of a project;
- Reviews contractor invoices and recommends payment schedule to the PM;
- Maintains copies of all CQA and construction quality control testing results and certifications;
- Prepares and distributes weekly construction reports to the PM and Emhart; and
- Has the authority, as does each team member, to stop work until corrections are made if there is evidence that work performance will not meet contract specifications, company policy, and regulatory requirements.

2.1.4 Construction Task Leader

The Construction Task Leader is responsible for establishing the design specifications to meet or exceed the design criteria, as established in the

Final Design. The duties and responsibilities of the Construction Task Leader include:

- Developing technical evaluation to support the supplier selection process;
- Reviewing and approving shop drawings;
- Providing support to the CQA Manager in interpreting the meaning and intent of the construction plans and specifications and in the performance and supervision of the construction quality control testing program;
- Providing consultation and technical support to CQA team and Emhart;
- Identifying, as appropriate and in coordination with the CQA Manager, discrepancies or deficiencies in project work. Any deficiencies deemed by the Construction Task Leader to require immediate attention will be reported to Emhart immediately;
- Preparing the construction certification report. The report will include the results of all CQA Plan and construction quality control testing and deviations from the construction plans and specifications. In addition, the report will include "as-built" drawings, daily inspection reports, photographs, and other applicable documents;
- Preparing the final "as-built" drawings indicating the features constructed and the existing location of all features;
- Reviewing and making recommendations to the PM regarding any delays to the project schedule;
- Reviewing and evaluating change orders proposed by the subcontractor, owner, designer, or CQA team; and
- Providing other technical support to Emhart, as required.

2.1.5 *Health and Safety Coordinator*

The Health and Safety Coordinator (H&S Coordinator) is responsible for developing, implementing, and maintaining the H&S program for this project. The H&S Coordinator has the following responsibilities:

- Providing general oversight of activities performed at the site from H&S perspectives;
- Setting weekly safety objectives;
- Enforcing site-specific H&S Plan;

- Serving as liaison for H&S communications with the project staff and subcontractors as well as program H&S team;
- Providing guidance on any H&S issues raised by the team to ensure the safety of project personnel;
- Conducting periodic reviews and inspections of the H&S procedures being implemented at the site;
- Aiding in preparation of H&S documentation;
- Implementing continuous improvement of the H&S program;
- Initiating corrective actions for non-conformance identified on site; and
- Approving resumption of work for resolved safety issues, if work has stopped due to unsafe work practices or conditions.

2.2 *FIELD CONSTRUCTION SUPPORT TEAM*

The Field Construction Support Team will be managed by the Construction Manager (CM). The Field Construction Support Team will interact with the subcontracted personnel to establish and maintain the level of workmanship prescribed by the Final Design and Construction Specifications. The Field Construction Support Team will be available full time to support the CM in the construction phase.

2.2.1 *Construction Manager*

The CM is responsible for managing the construction tasks at a project level, on a daily basis. The CQA Manager and the CM communicate on a daily basis, identifying progress and discrepancies during construction and post-construction phases. The CM has the following responsibilities:

- Evaluating current site conditions and construction methods used on the project;
- Evaluating the subcontractor's project schedule and reporting any field delays or field modifications to the CQA Manager;
- Identifying the appropriateness of the construction activities selected for the project;
- Supervising and directing the field construction staff on the project;
- Communicating with the CQA Manager about the daily activities and project schedule;

- Preparing daily field reports documenting contractor activities; and
- Reviewing and guiding preparation of project technical work plans and project completion reports.

2.2.2 *Field Construction Support Team*

The Field Construction Support Team will report directly to the CM and will be present during all major construction activities. A Professional Geologist (P.G.), registered in the State of California, will be part of the Field Construction Support Team to provide oversight of well construction activities. The duties and responsibilities of this team will include the following:

- Visually inspecting materials imported to the site for conformance with contract specifications and for variations from tests completed prior to the materials being delivered to the site;
- Obtaining samples for testing;
- Observing field sampling and testing performed by the contractor and reviewing test results;
- Observing field sampling and testing performed by independent third-party contractors and reviewing test results;
- Observing and recording observations regarding the storage and handling of equipment and materials;
- Independently verifying quantity calculations;
- Preparing daily reports documenting all contractor activities;
- Assisting with the generation of soil volume placement estimates; and
- Assisting with the preparation of "as-built" drawings.

2.3 *SUBCONTRACTORS*

The Project Coordinator assumes overall responsibility for the quality of construction, implementing the necessary policies and programs to assure the specifications are met. Wherein the Project Coordinator, PM, and their staff identify subcontractors with specialities in a field, it is the responsibility of the subcontractors to manage and meet the objectives and quality assurances of their scope of work, in accordance with applicable

laws and regulations. Subcontractors will work in accordance with their own internal quality control procedures, but are required to meet the specifications outlined in the Final Design, at a minimum:

- A safety record of demonstrated safe work practices and procedures over the past 3 years;
- Qualifications and experience in successful completion of similar projects within the past 5 years; and
- Valid State of California contractor's license(s) in the applicable crafts and trades.

Subcontractors include vendors and suppliers providing services and materials that comply with the requirements of the contract plans and specifications. This includes, but is not limited to, general contractors, third-party inspectors, drillers, specialty vendors, land surveyors, and distributors of rental equipment.

2.4

OUTSIDE ORGANIZATIONS

Outside organizations establish local construction standards within their jurisdiction, under Federal and State guidelines. Outside organizations, such as Colton, Rialto, the County, CDPH, and the Federal Aviation Administration (FAA) were consulted for design criteria and will continue to be involved to permit and inspect components of the construction activities.

3.0 *LEVEL OF EXPERIENCE*

3.1 *CONSTRUCTION QUALITY ASSURANCE TEAM*

Project Coordinator: The Project Coordinator will have experience overseeing the planning and execution of construction activities. The Project Coordinator will have experience in project and program management, and demonstrated experience managing budgets and delivering quality construction projects.

Project Manager: The PM will have a thorough knowledge and familiarity with the project and demonstrated experience in engineering design and construction of groundwater treatment systems. In addition, the PM will have experience in managing the costs, schedule and tasks associated with construction. The PM will have experience in civil engineering design and construction.

CQA Manager: The CQA Manager will have experience in civil construction projects including conveyance pipeline installation, soils and materials testing, equipment testing, communication controls testing, and remediation equipment installation. The CQA Manager will have a thorough familiarity with the project and testing requirements, as related to local jurisdictions and specialty areas and have directly-applicable experience in the testing of materials used in structural design and trenching backfill.

Construction Task Leader: The Construction Task Leader will have experience in civil construction projects including conveyance pipeline installation, soils and materials testing, equipment testing, communication controls testing, and remediation equipment construction. The Construction Task Leader will have a thorough familiarity with the project and testing requirements, as related to local jurisdictions and specialty areas and have directly-applicable experience in the testing of materials used in structural design and trenching backfill.

3.2 *FIELD CONSTRUCTION SUPPORT TEAM*

Construction Manager: The CM will be trained in the areas of landfill/civil/earthwork construction and engineering. The CM will have demonstrated experience in the construction field with respect to well construction, pipeline conveyance installation and groundwater extraction and treatment system equipment installation and will have a familiarity with the project.

Field Construction Quality Control Inspectors: Field Construction Quality Control Inspectors will have experience and/or training in testing and inspection of earthwork, granular materials, asphalt, concrete, well construction, pressurized pipe, remedial equipment, structural components, and other site improvements. The inspectors that perform soil, pressurized pipe, and backfill testing will have a minimum of 1 year experience performing the required tests, including familiarity with the use and application of necessary equipment.

Analytical Laboratories: The Analytical Laboratories will be independent laboratories subject to the approval of the CQA Manager and Emhart. The laboratories will have experience in testing soils, soil-reagent mixes, and other construction materials, and will be familiar with American Society of Testing and Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO), and other applicable test standards.

Land Surveyor: The Land Surveyor will have experience as a crew chief in performing topographic surveys, and must be a professional land surveyor registered in the State of California.

Construction quality control procedures follow the standards established in the Final Design to address many of the aspects of system construction such as site selection and development, reviewing resources and suppliers, materials management, inspection, testing, control and tracking, certifications, and approvals.

This section describes the three construction components of the remedy. Compliance with the Final Design will be verified by implementing a three-phase control process during each component of construction. Each control phase (pre-construction, construction, and post-construction) includes a minimum requirement for inspection to maintain the level of quality throughout the construction process. During each control phase, particularly the pre-construction phase, inspection and verification of compliance with the Final Design will identify or prevent deficiencies from progressing into the next phase. While there are general procedures with which each control phase shall comply, some inspection and testing requirements are unique to each component of construction. The general procedures for each control phase and the minimum requirements of inspection and testing for each of the following components of construction are described below:

- Extraction well and piezometer construction - A drilling contractor will be selected to execute the scope of work to meet the specifications outlined in the contract documents to construct nested piezometers (PZ-1S/D, PZ-2S/D, and PZ-3S/D) and extraction well EW-1.
- Conveyance pipeline construction - A general contractor will be selected to install conveyance pipelines to: (1) convey untreated extracted groundwater from extraction well EW-1 to the Combined Remedy Treatment Plant; (2) convey treated water from the Combined Remedy Treatment Plant to the Rialto drinking water supply distribution system; and (3) convey water between the Rialto and Colton distribution systems.
- Treatment plant expansion and extraction well enclosure construction - A general contractor will be selected to execute the scope of work to meet the specifications outlined in the contract documents to procure, install, and test the treatment system and well enclosure.

4.1

PHASES OF CONTROL

This section describes the three phases of control for execution of each component of construction: (1) pre-construction preparation; (2) construction phase; and (3) post-construction phase. Implementation of the phases of control process provides the opportunity to verify compliance with the approved plans, specifications, and procedures. This section specifies the minimum requirements and the extent CQA verification must be conducted. Each control phase is important for obtaining a quality product. The CQA Manager is responsible for ensuring that discrepancies identified during each phase of control are documented and resolved.

4.1.1

Pre-Construction Preparation

The first phase of control is the pre-construction preparation which leads up to the site mobilization for executing construction activities. Completion of the preparatory phase establishes relationships and communication lines between the necessary parties and verifies the scope of work, workmanship standards and design guidelines have been clearly laid out in the Final Design. Verification of compliance with the Final Design during this phase can identify deficiencies and prevent problems in future phases of construction.

During pre-construction preparation, the contractor(s) will review the selected site, contract documents, and scope of work. A pre-field meeting will be conducted between the PM or CQA Manager and the contractor(s) prior to scheduled field activities to discuss discrepancies or alternative construction recommendations proposed by the contractor or CQA Manager.

Generally, the following line items will be addressed during pre-construction preparation of each component of construction to maintain the standards set forth in the Final Design:

- The CQA Manager will review construction quality assurance task requirements with the Construction Task Leader.
- The contractor will prepare and submit a site-specific H&S Plan with Job Hazard Analyses specific to the daily tasks performed for review and approval by the H&S Coordinator.
- The PM will coordinate with the contractor to obtain necessary public right-of-way agreements and permits with the appropriate outside organizations.

- The contractor will submit to the Construction Task Leader for review and approval, the name of the materials' supplier with specifications of all construction supply materials, inclusive of, but not limited to equipment and materials listed in the Final Design.
- The contractor will confirm availability of the required materials and equipment.
- The contractor will examine the materials and equipment to confirm compliance with approved procedures.
- The contractor and Construction Task Leader will confirm permits and regulatory requirements are met.
- The Construction Task Leader will develop a submittal register and inspection and testing log.

4.1.2 *Construction Phase*

Following pre-construction, the construction phase will begin. During the construction phase, the CQA Manager and CM establish the acceptable levels of quality and assure that these levels are being met through observations, documentation, testing and inspections. During the construction phase, specific deficiencies will be identified and addressed in an efficient manner to mitigate delays in schedules or added costs to the project. Daily inspections and daily progress reports capture the progress and deficiencies during the construction phase. Follow-up inspections will be conducted consistently to ensure that deficiencies are corrected prior to the continuation of work that may be affected by the deficiencies. The information captured in the daily progress reports will be communicated between the subcontractor, CQA Support Team and CQA Management Team to ensure unsatisfactory results can be rectified to meet the design criteria and standards of the Final Design.

During the construction phase, the CQA Field Construction Support Team will provide field support to the CQA Manager, overseeing contractor activities. Generally, the following line items will be addressed during the construction phase of each component of construction to maintain the standards set forth in the Final Design:

- The CQA Manager and CM will establish the quality of workmanship and housekeeping required to meet the requirements of the contract documents, as prescribed by CDPH, County, and Rialto.
- The CQA Manager will provide guidance to the CM to manage and resolve conflicts that may arise during construction activities.

- The contractor will keep a log of daily activities and provide the log to the CM at the end of each day.
- The CQA Manager will be on notice to observe execution of field testing activities.
- The contractor will provide testing results to the CM.
- The CM will ensure the contractor is compliant with the respective outside organizations' construction, inspection, and testing requirements for all tasks within each construction component.
- The CM will ensure investigative-derived waste is disposed, or treated at a facility approved by the USEPA's Project Coordinator, and in accordance with federal, state, and local requirements.

Specific inspection and testing requirements for the construction phase are discussed in Section 4.2.

4.1.3 *Post-Construction Phase*

Nearing the completion of a construction component, the CQA Manager will conduct an internal inspection to evaluate the quality of workmanship. This will initiate the post-construction phase, implemented at the culmination of a construction activity. The inspection will include line items of the deliverables expected, noting conformance or non-conformance to the standards and requirements outlined in the Final Design. Line items of non-conformance will become a punch list. This punch list will be revisited at the beginning and end of the work day, leading up to the final days of construction, until all line items have satisfactorily met the standards outlined in the Final Design. The contractor will provide the CM with documentation to comply with disposal methods outlined in the Final Design. The contractor will schedule and complete all inspections required by the permits, to ultimately obtain final inspection and approval of all tasks of each component of construction.

4.2 *INSPECTIONS AND TESTING*

Inspections will be conducted by the CQA Manager or designee to verify the quality of construction and maintain compliance with the Final Design. Inspections will be conducted during each phase of control. Generally, inspections will verify that equipment and materials are free from defect; deficiencies are being corrected; the contractor is meeting or

exceeding testing requirements; and construction activities have been completed in compliance with the Final Design and any associated permit requirements. CQA staff must correct or resolve any identified discrepancies with the Final Design.

This section describes the inspection and testing requirements separately for:

- Extraction well and piezometer construction and inspection;
- Conveyance pipeline construction and inspection; and
- Treatment plant expansion and extraction well enclosure construction and inspection.

4.2.1 *Extraction Well and Piezometer Construction and Inspection*

At a minimum, the following testing and inspection line items will be addressed during the construction of the extraction well and piezometer installation component of construction activities to maintain the standards set forth in the Final Design:

- Inspection of well casing and screen for defects prior to installation;
- Inspection of conductor casing welds during installation;
- Verification of concrete volume used during cementing of the conductor casing;
- Verification of filter pack and bentonite seal (material, volume, and depth);
- Verification of grouting to the surface;
- Verification of lithology for purposes of selecting well construction;
- Documentation of lithology and well construction details in boring log and well construction diagram;
- Periodic and final permit-required inspections by outside organizations; and
- Inspection of well development activities.

4.2.2

Conveyance Pipeline Construction and Inspection

At a minimum, the following testing and inspection line items will be addressed during the construction of the conveyance pipeline construction component to maintain the standards set forth in the Final Design:

- Verification that soils testing complies with the tolerances set forth in the Final Design;
- Verification that compaction and moisture conditions are achieved by ASTM D 698, ASTM D1556 or ASTM D2922, D3017, ASTM D1557, ASTM D4253 and D4254, ASTM D75;
- Verification of trench and backfill;
- Verification testing of backflow prevention valves;
- Verification of pressure piping by American Society of Mechanical Engineers (ASME) B31;
- Observe execution of hydrostatic and pneumatic leak testing;
- Verify protection of potable water distribution system prior to testing;
- Verification of disinfection of water mains by American Water Works Association (AWWA) C601 and de-chlorination of test water (AWWA C651) prior to disposal, where applicable;
- Verification of residual chlorine;
- Coordination of trench inspections and backfill inspections with the respective outside organizations;
- Verification of successful completion of pipeline leak tests;
- Periodic right-of-way and/or permit-required inspections by outside organizations; and
- Special inspection by third-party certified chlorination and testing contractor to perform chlorination of water mains, where applicable.

4.2.3

Treatment Plant Expansion and Extraction Well House Enclosure Construction and Inspection

During the construction phase, the CQA Field Construction Support Team will provide field support to the CQA Manager by overseeing contractor activities. The following line items will be addressed during the

construction phase of the treatment system expansion and well enclosure to maintain the standards set forth in the Final Design:

- Verification of concrete foundations meeting testing requirements of cylinder tests (ASTM C 31, ASTM C 39, and ASTM C 172), slump tests (ASTM C 143), and structural concrete (American Concrete Institute [ACI] 318);
- Verification that structural foundations comply with construction standards, such as water tightness, concrete forming, water stops, steel reinforcement, as noted in the Final Design;
- Verification of the mechanical flow and compatibility of the Work with the existing system;
- Verification of heating ventilation and cooling system controls testing;
- Verification that the granular activated carbon meets the requirements of the specifications;
- Verification that the resin meets the requirements of the specifications;
- Verification of inspection of epoxy anchors, as noted in the Final Design;
- Verification of controls testing of new equipment, as noted in the Final Design to include seismic sensors and interlocks, equipment alarm pressure, temperature, level sensor switches, and automated shutdowns;
- Verification of relay and controls testing of integration of extraction pump and treatment system controls;
- Verification of removal of all temporary testing valves and appurtenances upon final approval of the Work;
- Special Inspection and Testing: Third-party concrete aggregate testing to comply with ASTM C33; and
- Periodic and final permit-required inspections by outside organizations.

5.0 *NON-CONFORMANCES AND CHANGES*

5.1 *NON-CONFORMANCES AND DEFICIENCIES*

The overall goal of this CQA Plan is to ensure construction activities are executed to conform to the requirements of the Final Design. The processes described in the CQA Plan make it possible to meet those objectives by confirming compliance or identifying non-conformances or deficiencies with the Final Design. During the various control phases, inspections, review of test results, and field observations, it is possible that workmanship or materials may be deficient, not meeting the standards prescribed in the Final Design. The following procedures will be followed, under the direction of the CQA Manager, in the event of a non-conformance or deficiency. The CQM will follow the procedures below when such an event occurs:

- If a non-conformance/deficiency exists and is identified as a threat to safety and health or design integrity, a stop work order will be issued and work will cease until corrective action is taken. The decision to resume work will be made concurrently by the PM, the H&S Coordinator, and the CQA Manager.
- The extent and nature of the non-conformance/deficiency will be identified by observations, testing, inspection, and other means. The results will be verbally brought to the attention of the contractor involved in the particular element of work. If it is agreed that a deficiency exists, the situation will be corrected, where possible, by the end of the workday.
- Non-conformance/deficiencies will be documented with an action item that identifies the responsible parties and the estimated date for corrective action.
- The PM and CQA Manager will be notified immediately to find resolution to deficiencies that cannot be resolved in one working day.
- A work deficiency meeting may be held, as needed, between the CQA Manager, the PM, CQA Field Team members, and subcontractors to address the problem.

All non-conforming conditions will be tracked on a Non-conformance/Deficiency Log. Deficiencies will be summarized in tabular format showing the date of discovery; the date the deficiency occurred; a brief description of the deficiency; the necessary corrective action; the party responsible for the corrective action; the date of the corrective action; and

the date of acceptance of the corrected work. The log will be updated daily and provided to CQA Manager on a weekly basis.

5.2 *CHANGES AND CHANGE ORDERS*

Circumstances may arise during the construction of the components of the remedy that necessitate changes to the design and/or construction approach or scope of work. These changes may include such events as unanticipated site conditions; use of alternative construction methods; substitution of materials; and additional work requested by client within the broad framework/scope of original project requirements. It is the PM's responsibility to ensure the prompt and accurate documentation of these changes to minimize impacts of these changes on the project cost and schedule.

Contractors are responsible to provide as much advanced, verbal notification of any changes (or potential for changes) immediately upon identification of the changed condition. Any project participant may identify a potential change by reporting it to either the PM or the CQA Manager. Following an assessment of the appropriateness of the change, notification will be made to the PM and Construction Task Leader.

Following verbal notifications, changes will be documented on a weekly Field Change Notice Log set up in tabular format, similar to that of the Non-conformance/Deficiency Log. The individual who identifies the change will complete the log, including the date of change; the Final Design specification in question; the recommended change with notes indicating how it will meet the standards of the Final Design; the approximate cost for the change; the party responsible for executing the change; and the date of the change, the signature and name of the party responsible for accepting the change, and the date of acceptance. The weekly log will be reviewed by the PM and then approved by the CQA Manager. Construction activities related to the changed condition will not commence until approval has been obtained. Efforts will be made to resolve minor changes in the field to minimize schedule impacts.

A Field Change Notice Log will be maintained on site by the CQA Manager, and provided to the Construction Task Leader weekly. The CQA Manager will determine the appropriateness of each change. All fee-bearing changes will be brought to the attention of the PM and Construction Task Leader with appropriate documentation to justify the cost. All fee-bearing changes will be brought to the attention of the PM and Emhart.

6.0 *SAMPLING REQUIREMENTS*

Sampling activities during construction will be limited to waste characterization and initial system performance testing. Additional groundwater monitoring requirements will be considered separately as part of the Compliance Monitoring Plan. Soil and groundwater samples to be collected during construction activities include:

- Drilling soil cuttings from well installation;
- Groundwater from well development activities;
- Decontamination rinse water;
- Soil samples for waste characterization of excess soil from trenches; and
- Influent, intermediate, and effluent water samples, during initial system performance testing.

Sample containers will be provided by the analytical laboratory. The analytical laboratory will also supply coolers and trip blanks, as appropriate.

6.1 *SAMPLE COLLECTION*

Representative samples will be collected from each waste stream. Where there are multiple containers from the same source, a composite sample will be collected. Upon collection, the sample will be labeled with a unique identification name, date, and time. The sample information, number, and type of containers; preservation method; requested analytical methods; and laboratory turnaround time will be recorded on a laboratory-supplied chain of custody (CoC) form. The same information will additionally be entered into a field sample log retained by the CM. If required, disposable sampling equipment will be used to eliminate the potential for cross-contamination.

The sample custody procedures provide continuous identification and documentation of the sampling event from time of sample to shipment, to receipt of sample by the analytical laboratory.

The CQA Manager or his designee will verify the accuracy of all sample information recorded on the CoC prior to transfer of custody to the laboratory courier. Samples will be placed in a cooler with ice and

maintained in the sampler's presence or in a secure location for the remainder of the daily sampling activities or until custody is transferred to another party. A copy of the CoC will be kept on file, as designated by the CQA Manager.

6.2 *LABORATORY PROCEDURES*

Upon receipt, the analytical laboratory will accept custody of the samples and sign the CoC. Samples received by the laboratory will be carefully checked for label identification and complete, accurate CoC records. The sample temperature will be measured upon arrival using a temperature blank that will be shipped along with the samples. Each sample will then be assigned a unique laboratory identification number through a computerized Laboratory Information Management System (LIMS) that stores identifications and essential information. The LIMS system will track the sample from storage through the laboratory system until the analytical process is completed and the sample is properly disposed.

Personnel and the laboratories performing the tests will be qualified and the equipment and procedures to be used will comply with applicable standards. Analytical results will be provided to the USEPA and Regional Water Quality Control Board (RWQCB) as electronic data deliverables (EDDs) as part of the Remedial Action Report.

7.0 DOCUMENTATION

As stated in the USEPA guidelines, for the purpose of this guidance document, the term *document control* is defined as the act of ensuring that program/project-specific documents are reviewed for adequacy, approved for release by authorized personnel, and distributed to and used at the location where the prescribed activity is performed. Documents that should be controlled are, at a minimum, those that specify requirements, prescribe processes, or establish the design of environmental processes. Examples include procedure standards, material standards, technical reports, test reports, and any documents pertaining to permit requirements (e.g., permits, codes), as-built drawings, modifications to specifications.

The PM or designee will compile and distribute meeting minutes to document pre-construction changes that take effect related to discrepancies, methods of construction or schedule.

The Contractor will document field changes and confirmed/approved modifications to specifications. The Construction Task Leader will verify modification and prepare as-built drawings.

7.1 MEETINGS AND TELECONFERENCES

As each component of construction of the Work progresses from design to construction, the key parties involved will need to be identified to establish communication. Project meetings initiated during the pre-construction phase will help ensure all parties involved in the project understand and agree to the goal; objectives; schedule; submittal, documentation, and QC processes; and inspection and testing requirements and procedures.

During the construction phase, daily safety tailgate meetings will be conducted and documented at the beginning of each work day with all staff expected to be on site. The daily safety tailgate meetings will discuss emergency procedures; the objectives of the day; procedures to be followed; and identify the personnel to execute the activities for the day. This is often a good time to incorporate “lessons learned” with regards to safety, communication, and construction activities.

The frequency and need for progress meetings and teleconferences are at the discretion of the Construction Task Leader and CQA Manager. Agendas and meeting minutes will be provided for key meetings, recording the topics discussed and any action items that need to be addressed with a person and deadline identified.

7.2 *PROGRESS SUMMARIES*

Documentation of QC meetings will be summarized in monthly progress reports. Pursuant to Section X of the Work Consent Decree and Section 1.5.1 of the Statement of Work monthly progress summaries will be submitted to USEPA during construction. These monthly reports will include:

- Description of deliverables submitted and actions taken during the previous month on each active task;
- Summary of all results of sampling and tests and all other data received or generated in the previous month;
- Description of problems arising since the previous report and steps planned or underway to mitigate the problems;
- Description of actions scheduled for the next 2 months;
- Description of any anticipated changes in schedule;
- Description of the nature of, duration of, and response to any noncompliance with Performance Standards or other requirements; and
- Description of any community relations' activities completed during the previous month or planned for the next 2 months.

7.3 *REPORTING AND FIELD DOCUMENTATION*

Reporting and documentation of field activities will be provided, as prescribed in the RD Work Plan. Analytical and well construction data generated during the work will be submitted as follows:

- Analytical data, whether validated or not: 42 calendar days after sample shipment to the laboratory or 14 days after receipt of analytical results from the laboratory, whichever occurs first.

- Validated analytical data: 90 calendar days after sample shipment to the laboratory; and
- Well construction information: 90 days after completion of a well.

In addition, any critical decisions made in meetings or conversations with USEPA will be documented in a written submittal within 5 days of the discussion.

7.4 ***DOCUMENT CONTROL AND STORAGE***

During construction, the CQA Manager will be responsible for all CQA documents and organization of the documents for easy access. The CQA Manager will be responsible for maintaining duplicate records for all documentation at another location. The CQA Manager will be responsible for incorporating any revisions to the CQA Plan and distributing revised copies to the construction contractors and all other relevant parties.

7.5 ***REMEDIAL ACTION REPORT***

Emhart will submit a Remedial Action Report requesting USEPA Certification that the Remedy is Operational and Functional. This document will be prepared in accordance with *Close Out Procedures for National Priorities List Sites* (Office of Solid Waste and Emergency Response [OSWER], 2011) and will demonstrate that the remedial action satisfies the requirements of the Work Consent Decree and is operating and functioning as intended. The report will be assembled and submitted within 30 days following the Pre-Certification Inspection, and will include the following information:

- Narrative description of the construction;
- Chronology of events;
- Results of operational and compliance monitoring completed to date;
- Determination whether remedial action objectives and other relevant requirements are being met, and the basis for determination;
- Summary of the findings of the Pre-Certification Inspection(s);
- Documentation to substantiate Emhart's certification of full satisfaction with Section XIV of the Work Consent Decree;

- Documentation that the CQA Plan was implemented and that the construction completion is consistent with the 2010 Record of Decision and remedial design plans and specifications; and
- Electronic copy of the as-built drawings signed and stamped by a Professional Engineer (P.E.).

The Remedial Action Report will also contain the following statement, signed by a responsible corporate official of Emhart or the Project Coordinator:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who managed the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

8.0

REFERENCES

- ERM-West, Inc. (ERM). 2013a. *Quality Management Plan. Source Area Operable Unit, B.F. Goodrich Superfund Site*. January.
- ERM. 2013b. *Final Remedial Design Work Plan, Source Area Operable Unit, B.F. Goodrich Superfund Site*. 3 May.
- ERM. 2013c. *Final Groundwater Flow Modeling Report*. 26 July.
- Office of Solid Waste and Emergency Response (OSWER). 2011. *Close Out Procedures for National Priorities List Sites*. May.
- U.S. Environmental Protection Agency. 2005. *Guidance of Quality Assurance for Environmental Technology Design, Construction and Operation, EPA QA/G-11*. January.

Appendix A
Organization Chart

Organization Chart

Rockets, Fireworks, and Flares Superfund Site, Source Area Operable Unit Remedy

