



**Construction Quality Assurance Plan
Texarkana Wood Preserving Company
Bowie County, Texas**

**Remedial Action Contract 2
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Prepared for:

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LIST OF ATTACHMENTS

ATTACHMENT A Quality Assurance Report Daily Log of Construction

ACRONYMS AND ABBREVIATIONS

CM	Construction Manager
CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Plan
CQC	Construction Quality Control
EA	EA Engineering, Science and Technology, Inc.
EPA	U.S. Environmental Protection Agency
ft	feet
PCP	Pentachlorophenol
QA	Quality Assurance
RA	Remedial Action
SWPPP	Storm Water Pollution Prevention Plan
TCEQ	Texas Commission on Environmental Quality

1. GENERAL

1.1. INTRODUCTION

EA Engineering, Science, and Technology, Inc., (EA) has prepared this Construction Quality Assurance Plan (CQAP) for the U. S. Environmental Protection Agency (EPA) to describe the Quality Assurance (QA) tests necessary to ensure the final product meets the design specifications at the Texarkana Wood Preserving Company Superfund Site (EPA Identification No. TXD008056152) located in Bowie County, Texas.

The Site is located at 1001 Lubbock Street in Bowie County, Texas near Texarkana, Texas; the site coordinates are 33°24'29" north latitude and 94°3'12" west longitude (Figure 1). The Site spans approximately 26 acres within the 100-year floodplain. It is transected by Lubbock Street, which splits the Site into eastern and western portions. The Site is bounded to the west by the Union Pacific (formerly Texas and Pacific) Railroad right-of-way. Days Creek, an interstate tributary of the Sulphur River, is located approximately 500 feet (ft) east of the Site and flows to the south-southwest; the Arkansas state line is approximately 2,500 ft east of Days Creek. Vacant land is located north, east, and south of the Site and the area surrounding the Site is primarily undeveloped or commercial.

According to past investigations, the Site had been used for lumber-related activities since the early 1900s. However, in the late 1940s or early 1950s, wood preserving operations were initiated to treat wood against bacterial and insect damage. Initially, wood preserving operations utilizing pentachlorophenol (PCP) and creosote occurred on the southwestern portion of the Site. Facilities included a process building, a pressurized retort, process waste, treatment ponds, and drying areas for preserved wood. Two ponds (i.e., Ponds 4 and 5) were later added on the southeast side of Lubbock Street to serve as wastewater evaporation ponds (see Figure 2).

In the latter part of 1971 or early part of 1972, creosoting operations were moved to improved facilities on the northwest portion of the Site. These facilities included improved wastewater treatment facilities, which were surrounded by concrete dikes designed to contain potential spillage and runoff. Following treatment, wastewater from the creosote and PCP operations was released into a series of three evaporation ponds (i.e., Ponds 1 through 3) on the northeast part of the Site. The treated wood was allowed to dry in open areas to the south of the treatment operations and Ponds 1 through 3. The Site ceased operations and closed in August 1984.

This report is a plan for construction quality assurance for the remediation of the Site in accordance with the treatment remedy put forth in the EPA Record of Decision. This CQAP provides the Government with a professional responsible for the management and certification of all construction quality assurance activities on the site, in order to verify compliance with design specifications and federal regulations.

The Construction Quality Assurance (CQA) Engineer shall be independent from the remedial construction contractor and the contractor's quality control program. The CQA Engineer shall be responsible for CQA activities associated with construction of the consolidation area, stabilized

source areas, and related features and shall verify compliance with the specification sections listed below. The CQA Engineer shall review the following specification sections in preparation for CQA activities:

- 01 10 00 Summary of Work
- 01 20 00 Price and Payment Procedures
- 01 25 00 Substitution Procedures
- 01 33 00 Submittal Procedures
- 01 35 29.13 Health, Safety & Emergency
- 01 40 00 Quality Requirements
- 01 50 00 Temporary Facilities and Controls
- 01 57 23 Temporary Storm Water Pollution Control
- 01 70 00 Execution and Closeout Requirements
- 02 55 00 Solidification-Stabilization of Contaminated Material
- 02 61 13 Excavation and Handling of Contaminated Material
- 31 10 00 Site Clearing
- 31 23 16 Excavation of Non-Contaminated Material
- 31 23 23 Fill
- 31 25 13 Erosion Controls
- 32 92 19 Seeding
- 33 24 00 Monitoring Well Installation
- 33 29 00 Monitoring Well Abandonment

1.2. DEFINITIONS

The definitions listed in the following paragraphs are relevant to the design, construction and CQA of the remedial action (RA).

- (1) Construction Quality Assurance: CQA includes observations, audits, and evaluations of materials and workmanship to determine and document the quality of the constructed facility. CQA is performed by a party independent from the remediation contractor.
- (2) Construction Manager (CM): The CM is responsible for the construction activities during the RA. Qualifications for this role include a minimum of 4 years of experience supervising field work and construction activities, including field investigation activities and the installation, operation, and maintenance of remedial systems.
- (3) Construction Quality Assurance Engineer: The CQA Engineer shall be a professional engineer and shall have a minimum of 3 years of experience in design and construction of earthwork and waste remediation projects. The CQA Engineer shall be responsible for carrying out the tasks outlined in the CQAP. The CQA Engineer shall be responsible for hiring CQA personnel to assist in CQA testing, reporting, verification, and documentation. For the purposes of this document, the term CQA Engineer shall refer to

the CQA Engineer and/or authorized CQA Observation Personnel. Construction Quality Control (CQC) material testing and documentation will be carried out by the CQA Engineer's third party laboratory. The CQA Engineer shall oversee and verify that CQC activities were completed in accordance with the Specifications. The CQA Engineer shall take independent tests to verify CQC results as described in this CQAP.

- (4) Construction Quality Assurance Observer Personnel: The CQA inspection personnel shall be under the supervision of the CQA Engineer and shall assist in CQA testing and observation. These personnel shall have experience as a CQA observer and National Institute of Certifications in Engineering Technologies certified or shall be individuals with an engineering (or related field) degree from an accredited university, for the areas in which they will be performing CQA inspections.
- (5) Construction Quality Assurance Testing Laboratory: The CQA testing laboratory shall perform CQA conformance tests required by the specifications and CQAP. The CQA testing laboratory shall be hired by the Government or the CQA Engineer. The laboratory shall have provided CQA testing of soils used for the construction of consolidation areas for at least five completed projects.

1.3. CQA ORGANIZATION PRE-CONSTRUCTION SUBMITTAL REQUIREMENTS

The CQA organization shall submit a CQA qualifications report listing the names of CQA personnel which will be onsite and the duties of each. The CQA qualifications report shall show the lines of authority for the onsite CQA personnel. A resume for the CQA Engineer and each CQA observer shall also be included in the report. The report shall be submitted for approval a minimum of 28 days prior to the start of CQA duties. If new CQA personnel are brought onsite after the start of construction, a resume for each shall be submitted to EPA for approval a minimum of 7 days prior to the new personnel performing CQA duties.

1.4. RESPONSIBILITY AND AUTHORITY

The general responsibilities of the CQA Engineer are listed below. Subsequent sections of this document provide specific CQA requirements during the construction of various components of the consolidation area.

- (1) Review applicable plans and specifications.
- (2) Review the CQAP.
- (3) Review approved changes to the drawings and specifications.
- (4) Review and recommend approval or disapproval of site-specific documentation, including contractor submittals, manufacturer's information, installer's information, and referenced standards.

- (5) Verify construction is performed in accordance with the drawings and specifications. Observers shall be assigned to every major construction activity being performed. A minimum of one CQA Engineer or CQA Engineer delegate shall be onsite at all times during the RA.
- (6) Attend required meetings.
- (7) Educate onsite CQA observers about specific CQA requirements and procedures.
- (8) Assign CQA observers to observe all activities requiring monitoring.
- (9) Confirm that calibrations of CQC and CQA testing equipment are performed and recorded.
- (10) Confirm that CQC and CQA tests are performed and recorded as required and that the results meet specified requirements.
- (11) Review contractor personnel qualifications to verify conformance with the specifications.
- (12) Review warranty submittals to verify that they comply with the specified warranty requirements.
- (13) Verify that the contractor is following the CQC requirements of the Specifications.
- (14) Review required submittals and recommend rejection or approval.
- (15) Report any unapproved deviations from the CQAP.
- (16) Note any activities that could result in damage to installed consolidation area components.
- (17) Prepare and maintain required reports, files, and logs.
- (18) Oversee the collection, marking, packaging, and shipping of CQA conformance samples.
- (19) Review as-built surveys and drawings.

1.5. REFERENCES

The following references were used in preparation of this document:

- (1) Quality Assurance Representatives Guide, EP 415-1-161 Volume 5, United States Army Corps of Engineers, July 1997.
- (2) Quality Assurance and Quality Control for Waste Containment Facilities, Technical Guidance, EPA/600/R-93/182, United States Environmental Protection Agency, September, 1995.

1.6. SUBMITTAL REVIEW

The CQA Engineer shall review all submittals required by the specifications to ensure that they comply with the specified requirements. The CQA Engineer shall also review as-built surveys and drawings to ensure the drawings accurately reflect the construction and that the construction is in compliance with the drawings and specifications.

1.7. MEETINGS

The following paragraphs summarize the meetings the CQA Engineer shall attend prior to and during construction.

1.7.1. Pre-Construction Meeting

A pre-construction meeting shall be held at the site prior to the beginning of construction. The meeting shall be attended by the CQA engineer, CQA inspection personnel, CM, general contractor, and other concerned parties. Specific topics for the preconstruction meeting shall include the drawings and specifications, the CQAP, areas of confusion, safety, CQC documentation, and the responsibilities of each party.

1.7.2. Weekly Progress Meetings

Weekly progress meetings shall be held between the CQA Engineer, CQA inspection personnel, CM, general contractor, appropriate subcontractors, and other concerned parties. The purpose of these meetings is to discuss current progress, planned activities for the next week, issues requiring resolution, and any revisions to the work. The CQA Engineer shall report any deficiencies noted during the previous week.

1.7.3. Contractor Coordination Meetings

The CQA Engineer and appropriate CQA inspection personnel shall attend coordination meetings with each major subcontractor prior to the start of construction activities. Specific topics for the coordination meetings shall include the plans and specifications, the CQAP, areas of confusion, safety, and the responsibilities of each party.

1.7.4. Safety Meetings

The CQA Engineer and CQA inspection personnel shall attend required safety meetings.

1.8. CQA SAMPLES

1.8.1. CQA Sample Collection

CQA samples shall be collected at locations designated by the CQA Engineer, if determined necessary. The CQA Engineer or his delegate shall be present during collection of CQA samples and ensure they are collected, cut, labeled, and packaged in accordance with the specifications

and/or CQAP. The CQA Engineer shall ensure samples are labeled with the following: sample number, date sampled, project name, soil borrow source, and intended use of soil. The location, sample number, and purpose of the samples shall be noted on the daily report.

1.8.2. CQA Sample Testing

The CQA Engineer shall ensure samples are submitted to the CQA laboratory for testing. Subsequent sections of the CQAP describe the tests to be performed.

1.8.3. Testing Frequency

Testing frequencies are identified in the specifications.

1.8.4. CQA Test Results

The CQA Engineer shall verify that test results meet the requirements stated in the specifications. The following shall be verified when reviewing CQA test results:

- (1) Properties of the borrow soils used for CQA testing are consistent with those of the materials used for full-scale construction.
- (2) The correct tests were performed and specified test procedures were used.
- (3) Test results are in accordance with the specifications. The CQA Engineer shall immediately notify the CM of problems with CQA testing procedures or test results.
- (4) The CQA Engineer is to ensure that all testing, by the CQA or CQC, is recorded on an approved datasheet and filed appropriately.

2. SOILS

2.1. GENERAL

General soils CQA requirements are discussed in this section and in the specifications in the Contract Documents. Additional requirements for specific types of soils are discussed in subsequent sections.

2.1.1. CQA Personnel

All individuals assigned CQA responsibilities for soil layers shall have provided CQC and/or CQA inspection services on earthmoving and waste remediation projects.

2.1.2. Equipment

Visually inspect and verify that soil processing, placement, and compaction equipment meet the requirements described in the specifications.

2.1.3. Weather Conditions

Verify that soil placement or compaction does not occur during periods of freezing temperatures, if it is raining excessively or if excessive soil moisture is present for other reasons, or if other detrimental weather conditions exist.

2.2. EXECUTION

2.2.1. General

- (1) Verify that the stockpiles containing contaminated material are bermed, lined, and covered (as necessary). Covers shall be placed over soil to minimize dust and prevent contact with storm water in accordance with the specifications.
- (2) Verify waste material is placed so that large void spaces do not exist and that uncontaminated waste is not disposed of in the consolidation area (i.e., waste from clearing and grubbing, etc). Material that contains unprocessed DNAPL cannot be placed in the consolidation area. Material containing DNAPL must be solidified and stabilized before it can be placed in the consolidation area.
- (3) Compaction of waste is usually specified by requiring several passes of a compactor over all areas of the waste instead of requiring that a specific density criterion be achieved. At least three times per 8-hour period, the CQA observer shall spot-check to make sure the contractor is making the minimum required number of passes for each lift of waste placed.
- (4) Immediately notify the CM if unexpected hazardous materials (tanks, medical waste, etc.) are discovered during waste re-grading or placement.
- (5) Notify the CM if odor or volatilization of contaminants becomes a problem.
- (6) Verify that the contractor is maintaining dust control as required.
- (7) When waste is being re-graded, look for leachate seeps that present unsuitable conditions for fill placement. Report such seeps to the CM.
- (8) Check for areas where additional fill needs to be placed due to settlement.
- (9) Check interim surveys to verify adequate space is available within the consolidation area to store all contaminated material.
- (10) Verify final lines and grades of the re-graded and in-place waste.

2.2.2. Soils Placement

During soils placement, verify the following:

- (1) Sudden braking or sharp turns are not made.
- (2) Slippage of placement and compaction equipment is not occurring on side slopes. CQA Engineer shall also verify there are no thin areas of soil which could allow underlying clay layer to be eroded and potentially release contaminated material.
- (3) Loose lifts are no greater than the specified maximum allowable thickness as listed in the contractor's approved work plan. A CQA Engineer shall physically measure the loose lift thickness of each soil layer being placed a minimum of three times per 8-hour shift at randomly selected locations.
- (4) Soil contains no material prohibited by the specifications. The CQA Engineer shall physically measure clods and other materials that appear to be too large in size.
- (5) Soil is placed to the lines and grades shown on the drawings by comparing the contract drawings with as-built surveys and raw data located on known control points and grade stakes.

2.2.3. Compaction

- (1) Verify that the specified minimum numbers of passes are being made over all areas of each lift of soil (if applicable). For each soil layer being placed, a CQA Engineer shall spot check the number of passes over a specific area at least three times per 8-hour shift.

2.2.4. Classification

- (1) Verify that soil classifications and sources meet requirements in specifications.

2.2.5. Tests

Borrow tests and in-place moisture content and density tests will be conducted.

2.2.5.1. Borrow Tests

- (1) Check CQC borrow third party test results (sieve analysis, Atterberg limits, compaction tests, classification, etc.) to verify that the borrow material is uniform and matches the required properties given in the specifications.
- (2) Advise the CM about the need to do additional borrow source assessment testing if the properties of a borrow source appear to have changed significantly.

2.2.5.2. In-Place Moisture Content and Density Tests

Verify the following during testing of the in-place soil layer:

- (1) CQC moisture content and density tests are performed by the CQA Engineer's third party testing lab at the required frequency in the specifications.
- (2) Additional CQC tests are taken where density or moisture content test results are not in compliance with the specifications or the soil is visibly suspect.
- (3) The Contractor performs corrective action as a result of failed tests in compliance with the specifications and submits documentation describing the corrective measures taken.
- (4) The Contractor uses nuclear gauges in the direct transmission mode to measure density.

2.2.6. Protection

- (1) Ensure the contractor removes puddles and excess moisture from the soil surface prior to placement of additional soil.
- (2) Look for areas of erosion after each rainfall.
- (3) Inspect for damage due to freezing and/or desiccation.
- (4) Ensure the contractor repairs damaged areas and reestablishes grades.

2.2.7. Repairs

If a soil layer does not conform to the specifications, the CQA Engineer shall assist the CM in defining the extent of the area requiring repair. This shall be done through the use of additional testing and/or visual inspection.

2.2.8. Testing of Repaired Areas

After repairs have been made, ensure CQA and CQC retests are performed to check the repaired areas. In general, CQA tests shall be performed at the same frequency as the rest of the project. Additional CQA testing shall be performed in suspect areas.

2.2.9. Temporary Erosion Control

The CQA Engineer shall verify the following:

- (1) Soil erosion control fences (i.e., silt fences), berms, and other structures are installed at the locations indicated on the Engineer-approved Storm Water Pollution Prevention Plan (SWPPP).

- (2) The bottoms of silt fences are installed in accordance with specifications and manufacturers recommendations.
- (3) Hay bales are tied firmly with wire or plastic ties, secured by wood stakes, and are partially buried.

2.2.10. Maintenance

The CQA Engineer shall inspect vegetation and erosion control material monthly and after storm events (during construction) to verify the following:

- (1) Silt fences and erosion control blankets are adequately maintained.
- (2) Eroded areas are repaired.
- (3) Reseeding is performed as required.
- (4) Excessive amounts of silt are removed from behind silt fences and hay bales.
- (5) Areas are protected from traffic through the use of appropriate barricades and signs.

2.3. GEOTEXTILE

- (1) Verify sewn, heat bonded, and overlapped seams are constructed in the specified locations.
- (2) Verify sewn seams are constructed using the correct overlap, thread type, and stitch type.
- (3) Inspect for skipped stitches in stitch bonded seams.
- (4) Inspect for discontinuities in heat bonded seams.
- (5) Ensure the geotextile is not being burned through during the fabrication of heat bonded seams.
- (6) Check the specifications to determine the maximum allowable exposure time for the deployed geotextile. If the allowable exposure time has been exceeded, determine whether the geotextile has been damaged. If needed, request the performance of additional CQA tests to verify that the physical properties of the textile have not diminished due to exposure.
- (7) Inspect the geotextile for evidence of clogging from eroded or windblown soil.

3. PERMANENT EROSION CONTROL

3.1. GENERAL

CQA requirements for riprap and other runoff control features are discussed in this section as well as the drawings in the Contract Documents.

3.1.1. Delivery, Storage, and Handling

The CQA Engineer shall be present during delivery and unloading and shall verify the following:

- (1) Individual pieces of stone protection are free from cracks, seams, and other defects that will cause rapid deterioration during service.
- (2) Riprap consists of stones which are approximately rectangular in cross section and free from thin-slabbed pieces, dirt clods, mud, and other deleterious materials.
- (3) No rock is furnished from any source which has not been sampled, tested, and approved for use.

3.2. MATERIAL PROPERTIES

3.2.1. Quality Control Testing

The CQA Engineer shall review certified test results from the quarry.

3.2.2. Quality Assurance Testing

The CQA Engineer shall visually inspect and measure riprap delivered to the site. No formal CQA conformance testing for riprap shall be performed unless deemed necessary by the CM. The CQA Engineer shall advise the CM on the need for CQA testing. If CQA testing is performed, the CQA Engineer shall verify representative samples are used for this testing.

3.3. EXECUTION

By visual inspection, the CQA Engineer shall verify that placement of stone protections are in compliance with the following paragraphs.

3.3.1. Riprap Placement

Verify the following during riprap placement:

- (1) Stone protection is placed in a manner to produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids.
- (2) Damage to nonwoven geotextile does not occur.
- (3) The entire mass of stone in their final position is roughly graded to conform to the gradation specified.
- (4) Dumping stone at the top of slopes and rolling or pushing into place does not occur.

3.4. CHANNELS

- (1) Visually inspect for dips and reverse grades along channel bottoms.
- (2) For channels at the toe of cover, verify the outlet pipes for the cover drainage layer are not obstructed or damaged during construction of the toe channel.

4. MONITORING WELL ABANDONMENT

4.1. GENERAL

CQA requirements for monitoring well abandonment are discussed in this section.

4.2. SUBMITTALS

- (1) Verify that the contractor's registration as a Texas Water Well Contractor is current.
- (2) At the completion of well plugging and abandonment, verify that the water well plugging and abandonment forms have been properly filled out and submitted to the State for all monitoring wells plugged and abandoned.

4.3. EXECUTION

- (1) Verify that the contractor plugs the correct wells.
- (2) Observe the contractor pulling or attempting to pull the casing from the wells.
- (3) Verify that the contractor fills the well bore with heavyweight grout from the total depth of the well to either the surface or 1 foot above the proposed excavation depth for that area.
- (4) Verify that all well equipment, including piping, bollards, screens, and other appurtenances are removed from the site for disposal.
- (5) Verify that the contractor decontaminates all drilling equipment prior to demobilization.

5. MONITORING WELL INSTALLATION

5.1. GENERAL

CQA requirements for monitoring well installation are discussed in this section. Monitoring well installation CQC requirements can be found in Specification Section 33 24 00 Monitoring Well Installation.

5.2. SUBMITTALS

- (1) Verify that the contractor's registration as a Texas Water Well Contractor is current.
- (2) Verify that the contractor submits daily drilling logs within 7 days of well installation.
- (3) At the completion of well installation, verify that the contractor registers the wells with the Texas Commission on Environmental Quality (TCEQ) and that copies of the registration are provided.

5.3. EXECUTION

- (1) Verify that the well locations are staked in the correct location.
- (2) Verify that all downhole drilling equipment is decontaminated before the beginning of field activities, between individual borings, and prior to demobilization.
- (3) Verify that the contractor drills each well to the specified depth or stratum.
- (4) Verify that that well sump, screen, and casing are installed in the hole plumb and true.
- (5) Well screen interval may be adjusted in the field based on the lithology encountered by the well installer. Record the actual depth of screen installation.
- (6) Verify that the contractor sounds continuously during filter pack placement to measure its rate of rise and to determine if bridging is occurring.
- (7) Verify that the filter pack is placed in accordance with the design.
- (8) Verify that a minimum of 1 foot of fine sand is placed over the filter pack.
- (9) Verify that 1 foot of bentonite pellets are placed on top of the fine sand using a tremie pipe.
- (10) Verify that the bentonite is hydrated a minimum of 8 hours prior to grouting.
- (11) Verify that bentonite grout is placed from the top of the bentonite to the surface using a tremie pipe. Verify that the grouting is done in one continuous operation.
- (12) Verify that well development occurs no sooner than 48 hours after grouting is completed.
- (13) Verify that measurements are taken of the depth to water and total depth of the well prior to development and there are readings of pH, conductivity, temperature, and turbidity during development.
- (14) Verify that development continues until the water is clear and appears to be free of sediment.

- (15) Verify that all drill cuttings and decontamination water are placed in drums and stored onsite.

6. CONSTRUCTION QUALITY ASSURANCE DOCUMENTATION

6.1. GENERAL

The CQA Engineer shall document all construction inspection and testing activities with logs, reports, and photographs. The data sheets to be used for CQA documentation shall be as presented at the end of this section. With the approval of the CM, data sheets presented in this CQAP may be revised as necessary by the CQA Engineer. Additional data sheets needed to record test results and observations shall be submitted to the CM for approval.

6.2. CQA ENGINEER'S DAILY REPORT

The CQA Engineer's Daily Report shall be prepared by the CQA Engineer and submitted weekly to the CM. At a minimum, the Daily Report shall include the following information:

- (1) Date, project name, location, and other identifying information
- (2) Weather conditions
- (3) A narrative describing construction activities underway
- (4) CQA activities performed
- (5) Summary of CQA and CQC tests performed and test methods used.
- (7) Summary of CQA and CQC test results, including corrective actions taken for all construction materials not in compliance with project specifications
- (8) A list of items requiring the CM's attention
- (9) Documentation of borrow sources used and placement activities for all soils. Note any visual changes in borrow soils.
- (10) Corrective actions taken to repair damage
- (11) Visual observations noted on all construction activities, including any concerns noted
- (12) Summary of results for CQA lift thickness, density, and moisture content measurements
- (13) Record of significant discussions or conferences with the CM, subcontractors, CQC personnel, and others.

6.3. FIELD MOISTURE AND DENSITY TEST RESULT DATA SHEET

The CQA shall ensure that the contractor records moisture content and density tests, and they shall be recorded on an approved datasheet.

6.4. TEST REPORT

An approved data sheet shall be used to record all other testing.

6.5. SURVEY RECORDS

Record drawings resulting from the topographic surveys shall be reviewed by the CQA Engineer. Record drawings shall be included as part of the Final CQA Report issued by the CQA Engineer.

6.6. PHOTOGRAPHIC DOCUMENTATION

Photographic documentation shall serve as a record of work progress, problems, and repairs and shall be taken of every phase of construction being performed. It is recommended the CQA use a digital camera with at least 3 megapixels resolution quality for these photographs and that photographs be taken daily of the construction process. Additional photographs shall be taken to document potential contractual or regulatory problems. The basic file shall contain color prints in electronic format saved in order of date. These photographs shall be available for review by the CM, the CQA Engineer, and other interested parties authorized to view them. Selected photographs shall be reproduced as part of the final report. The remaining photographs shall be transmitted to the CM for archive as part of the permanent records.

6.7. FINAL REPORT

At the completion of work, the CQA Engineer shall be responsible for writing a final report on CQA activities performed at the site. The draft final report shall be completed and submitted to the CM no more than 60 days after completion of construction and shall include, at a minimum, the following information:

- (1) Brief description of the project including type of facility, name of site, location, altitude, name of owner, design engineer, general contractor, and all major subcontractors
- (2) Detailed description of the cover and lining systems, including surface area, cross sections, and a summary of all materials used
- (3) Chronological summary of construction activities
- (4) Photographic documentation, including photographs of the site at different phases of construction, photographs of construction details, and photographs of all CQA operations
- (5) General record of activities, such as dates of performance of CQA operations, and number and names of CQA observers

- (6) Sampling and testing locations
- (7) Copies of all CQA data sheets and records completed during construction of the consolidation area
- (8) All CQA field and laboratory test results as well as a summary of these results
- (9) Discussion of special problems encountered and their solutions
- (10) Discussion of significant changes from design and material specifications
- (11) As-built survey records
- (12) A summary statement sealed and signed by the CQA Engineer documenting that CQA was conducted in accordance with the CQAP and, based on visual observations and data generated in accordance with the CQAP, the consolidation area, stabilized areas, and related features shown on the construction drawings were constructed in accordance with project construction drawings and specifications except as properly authorized and documented in the CQA Final Report.

7. CONTAMINATED MATERIALS

CM shall monitor Contractor's work to verify compliance with the Contractor's approved Contaminated Materials Handling Plan. Any deficiencies shall be immediately reported to the CQA Engineer.

Attachment A

Quality Assurance Report Daily Log of Construction

QUALITY ASSURANCE REPORT (QAR) DAILY LOG OF CONSTRUCTION	THE OCR WILL BE ATTACHED TO OR FILED WITH THE QAR.
	REPORT NUMBER
	DATE
PROJECT CONTR	ACT NUMBER
CONTRACTOR (Or hired labor)	WEATHER
CQC control phases attended and instruction given:	
Results of QA activities and tests, deficiencies observed, actions taken and corrective action of Contractor: (Include comment pertaining to Contractors CQC activities.)	
Verbal instruction given to Contractor: (Include names, reactions and remarks.)	
Has anything developed on the work which might lead to a change order or finding of fact? ___No ___Yes	

Information on progress of work, causes for delays and extent of delays, weather, plant, material, etc.:			
Information, instructions, or actions taken not covered on QCR report or disagreements:			
Safety: (Include any infractions of approved safety plan or safety manual Specify corrective action taken.)			
Remarks: (Include visitors to project and miscellaneous remarks pertinent to work.)			
QA Representative's Signature	Date Supervisor's	Initials	Date