RISK ASSESSMENT AND CLOSURE CERTIFICATION FOR THE FORMER BIOPLANT EQUALIZATION BASIN RADFORD ARMY AMMUNITION PLANT

FINAL

Risk Assessment and Closure Certification for the Former Bioplant Equalization Basin *Radford Army Ammunition Plant*

U.S. Army Corps of Engineers
Norfolk District
Norfolk, Virginia

22 July, 1998

Environmental Resources Management
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1.0 *INTRODUCTION*

On behalf of the United States Army and Alliant Techsystems, Inc. the United States Army Corp of Engineers (USACOE) and Environmental Resources Management (ERM) have prepared this risk assessment and closure report for the former Bioplant Equalization Basin (United States Environmental Protection Agency (USEPA) ID No. VA1210020730).

The purpose of this report is to document that the closure activities were conducted in accordance with the Closure, Contingent Closure and Contingent Post-Closure Plans for Radford Army Ammunition Plant's Equalization Basin HWMU-10 & SWMU-10, dated 12 December 1995 and amended 9 March 1998 (Closure Plan) and that clean closure has been achieved for all Hazardous Constituents of Concern (HCOCs) except for fluoranthene A risk assessment for risk-based closure has been performed for fluoranthene in accordance with the approved Closure Plan and is included in this report. This report includes the following items:

- Facility description/history;
- Former Bioplant Equalization Basin description/history;
- Summary of closure activities, including depth of excavation;
- Summary of results for background and basin subsoil sampling;
- Data usability and QA/QC summary;
- Results of statistical calculations;
- Risk assessment for fluoranthene;
- Disposal of waste generated during closure activities;
- Closure activities compliance certification;
- Risk-based closure assessment compliance certification, and;
- Attachments providing figures, tables, and other relevant information for this project.

Each of the items listed above will be discussed in the remaining sections of the report.

2.0 DESCRIPTION/SITE HISTORY

2.1 DESCRIPTION

2.1.1 Facility Description

The Bioplant Equalization Basin is situated on the Radford Army Ammunition Plant (RFAAP), which is operated by Alliant Techsystems, Inc. RFAAP is a government owned industrial complex located in southwestern Virginia. It encompasses approximately 4,104 acres and is located in Pulaski and Montgomery Counties. The facility is located approximately five miles northeast of the city of Radford, 10 miles west of Blacksburg, and 47 miles southwest of Roanoke (see Figure 1). The New River divides the RFAAP into two portions commonly known as the "Horseshoe Area" and the "Main Manufacturing Area." The "Horseshoe Area" lies mainly to the north and west in Pulaski County. The "Main Manufacturing Area" lies in Montgomery County to the south and east.

The former Bioplant Equalization Basin was located in the north central portion of the "Main Manufacturing Area" (see Figure 2).

2.1.2 Former Bioplant Equalization Basin Description

The Bioplant Equalization Basin was a soil/cement-lined, rectangular impoundment with dimensions of 255 x 160 x 10.5 feet deep. The basin met design capacity of 1,350,000 gallons with 7.5 feet of water. The basin received wastewater of widely varying characteristics, including non-acidic wastewater from propellant manufacturing (on both a batch and continuous basis); pre-treated wastewater from nitroglycerine manufacturing and alcohol rectification; and wastes from recovery of ethyl ether.

2.2 SITE HISTORY

2.2.1 Facility Background

RFAAP was operated under contract by Hercules Aerospace Corporation from 1941 to 1995. Alliant purchased the operations of Hercules RFAAP in 1995 and is the current facility contractor. This facility, which contains over 1,696 buildings and occupies close to 3.65 million square feet, is the top manufacturer of solid propellants in the United States. The major

products manufactured at this facility are solvent and solventless propellants that include single base (nitrocellulose), double base (nitrocellulose and nitroglycerin), and triple base (nitrocellulose, nitroglycerin, and nitroguanidine) propellants; cast propellants; and high energy propellants. These propellants are ultimately used in small arms, anti-tank weapons, anti-aircraft weapons, rockets, torpedoes, missile systems, igniters, and other numerous ordnance-related items.

2.2.2 *Bioplant Equalization Basin Background*

In 1979, two incinerators were constructed and the incineration of waste and off-specification explosives and propellants began. These incineration operations became regulated subsequent to the promulgation of the federal hazardous waste regulations under the Resource Conservation and Recovery Act (RCRA) in 1980.

Beginning in 1980, the Bioplant Equalization Basin operated as the first of nine components that make up a biological wastewater treatment system at RFAAP. The biological treatment system was built in 1978/1979 and became operational in 1980. Prior to 1980, these wastewaters were discharged directly to the New River. Operating procedures were such that influent flows were cut off if the Bioplant Equalization Basin capacity was reached.

The facility did not submit its Part B permit application prior to 8 November 1985 and was, therefore, notified that a closure plan was required under RCRA and the Virginia Hazardous Waste Management Regulations (VHWMR). On 16 March, 1990, RFAAP was notified that a closure plan for the Bioplant Equalization Basin was required; however, the Virginia Department of Environmental Quality (VADEQ) notified RFAAP that it would allow the Bioplant Equalization Basin to remain in operation as a "newly regulated unit" until 15 March, 1994. A closure plan was submitted as part of the Part B Permit Application. VADEQ commented on the Part B application on February 2, 1991, and requested additional information.

On 28 June 1991, RFAAP submitted the requested information. On 2 December 1991, RFAAP re-submitted a RCRA Part B application for the biological waste water treatment plant. On 1 June 1992, RFAAP submitted a plan for sampling the equalization sludges in accordance with RFAAP's agreement with EPA. On 21 July 1992, VADEQ approved the groundwater monitoring plan for the Bioplant Equalization Basin via Section E of the Part B application. On 3 November 1992, a Final Draft Verification Investigation report was received by VADEQ which contained detailed studies of all SWMUs, including the sampled sludges

from the Bioplant Equalization Basin. On 19 October 1993, EPA's Delisting Section recommended denial of petition number 0834 for the sludges from the Bioplant Equalization Basin, and thus they remain a listed hazardous waste. RFAAP contacted VADEQ's Roanoke Regional Office by phone on 11 March 1994, and notified VADEQ that RFAAP was not prepared to cease operation of the Bioplant Equalization Basin on 15 March 1994, as stipulated in the VADEQ's 16 March 1990 letter. On 21 March 1994, VADEQ notified RFAAP that the requirements for immediate closure had arisen from Section 3005(j)(6) of RCRA, that the unit was required to close, and should have ceased operations on 15 March 1994.

The provision requires that "newly regulated surface impoundment units" meet the requirements of Section 3004(o)(l)(a) of RCRA (minimum technology requirements) or cease receipt of hazardous wastes four years from the date the unit becomes subject to the regulations. The VADEQ notified RFAAP that continued operation constituted noncompliance. RFAAP was also notified that the Bioplant Equalization Basin was subject to the Toxicity Characteristics Final Rule (Federal register Vol.55, No.61, 29 March 1990), by VADEQ on 21 March 1994. Since the Bioplant Equalization Basin received toxicity characteristic waste (D030, 2.4-Dinitrotoluene), RFAAP was notified that the unit must be retro-fitted or have the unit operation cease by 29 March 1994.

The VADEQ notified EPA of the pending date for the Toxicity Characteristics Final Rule for appropriate action. RFAAP responded to the VADEQ notification correspondence the day before the final closure deadline and informed VADEQ that RFAAP would continue equalization operation while working toward a consent order with VADEQ's Office of Enforcement. On the same day, 29 March 1994, EPA notified RFAAP to immediately cease operation of the Bioplant Equalization Basin.

Emergency measures were taken by utilizing several abandoned steel tanks to serve as temporary Bioplant Equalization Basins to store wastewater prior to the transmission of the wastewater to the holding chamber of the Bioplant Equalization Basin pump station (located at the southwest corner of the Basin). The pump station delivers the wastewater to the biological treatment plant. The pump station was sealed off from the Bioplant Equalization Basin by the installation of a steel plate and gasket at the bar screen at the inlet to the pump station.

The Bioplant Equalization Basin was "closed " after the unit's pump station was taken off line, and RFAAP could route all wastewater directly to the newly constructed (2) concrete equalization tanks each holding 3.82 million gallons. All hazardous waste sludges and liquids that were

remaining in the Bioplant Equalization Basin have been removed. Copies of the Hazardous Waste Manifests are on file with the VADEQ.

3.0 *SUMMARY OF CLOSURE ACTIVITIES*

Closure of the Bioplant Equalization Basin included earthwork, demolition, removal and decontamination/disposal of piping, pumps, soil/cement liner and concrete, subsoil testing to verify soil requiring removal, removal and disposal of contaminated soil and backfill and grading. The closure activities were completed prior to the conduct of the risk assessment for risk-based closure (described in Section 5.0 of this closure report). The closure activities were conducted in accordance with the Closure Plan and are certified in Section 6.0 of this report. The disposal of waste generated during closure activities are discussed later in this section.

3.1 *CLOSURE PERFORMANCE STANDARDS AND APPROACH*

The closure performance standards and the general closure approach is detailed in Section 3.0 of the Closure Plan. The Closure Plan and the Closure Plan Amendment are included as an attachment to this report (see Attachment 1). The following is a brief summary of the closure performance standards and the general closure approach.

The closure plan was prepared and followed to meet the requirements of VHWMR Sections 9.6.L, 10.6 and 10.10.I. The basin was closed in a manner that:

- Minimized the need for further maintenance, and;
- Controls, minimizes or eliminates, to the extent necessary to prevent threats to human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or the atmosphere.

The general closure approach included the removal of water and sludges from the Bioplant Equalization Basin prior to closure. Pumps and ancillary piping were also removed for off-site disposal or decontaminated in accordance with Section 3.7 of the approved Closure Plan. The perimeter flood control wall was removed and disposed. Soil sampling and testing was conducted to determine that no additional soils were required to be removed. The excavation was then back-filled with clean soils, graded to promote positive drainage, and re-vegetated. Equipment was decontaminated in an approved manner. The contaminated materials, excluding the water and sludges previously

removed, did not test positive as a characteristic hazardous waste and was therefore disposed of in accordance with the VSWMR (see Attachment 2, Permitted Landfill Receipt).

3.2 *CLOSURE SPECIFICATIONS*

The specifications for the closure activities are included in the Specifications for Bio Plant Equalization Basin Closure Section of the Bioplant Equalization Basin Closure Construction Solicitation and Specifications (USACOE Specifications) prepared by USACOE dated 8 September 1997. This document and the as-built diagrams are included as an attachment to this report (see Attachment 3).

Division 01 of the referenced USACOE Specifications include the general requirements of the closure activities. The specifications for demolition, demolition debris disposal, grading, chain link fence, and turf are included in Division 02 of the USACOE Specifications (see Attachment 3). Daily Reports recorded during the site work are included as Attachment 4.

3.3 *DISPOSAL OF WASTE GENERATED DURING CLOSURE ACTIVITIES*

3.3.1 *Waste Characterization Sampling*

Radian collected samples of the basin liner and of the concrete wall which surrounds the basin to identify if the material would need to be managed as hazardous waste when removed. For the basin liner, one composite sample was collected from seven sampling grid nodes. Radian placed approximately one-half liter of liner material in a stainless steel bowl from each of the seven sampling locations. The material was pulverized and completely mixed with a stainless steel spoon and split into the appropriate sample containers. The sample containers were packed with ice and shipped overnight with the proper chain-of-custody to the laboratory. The material appeared to be a mixture of brownish-colored soil and bentonite.

Radian collected four discrete samples of concrete from the basin wall. The field personnel used a hammer and chisel to remove concrete chip from the base of the 2-foot high wall. The chips were pulverized with the hammer on a piece of plastic sheeting and placed into the sampling containers. This procedure was repeated at each wall sampling location so that one concrete wall sample was collected from each quadrant of the perimeter wall.

A summary table illustrating the results of the four concrete wall samples and the basin liner composite sample is included in Attachment 5 (Table 3-3). No TCLP list constituents were detected above the regulatory level.

3.3.2 *Disposal of Wastes*

The procedures for removing, transporting, treating, and disposing of wastes as outlined in the Closure Plan were followed. VHWMR Section 10.10.I.1.a requires that all sludge and other contaminated components of the Basin (i.e. piping, pumps, concrete, liner materials, subsurface soils, etc.) be decontaminated or removed for surface impoundment soils to be "clean closed." To meet these requirements, RFAAP removed all contaminated materials.

All wastewater and sludge removed from the basin were disposed of at E. I. DuPont de Nemours & Company Inc. Chambers Works, which is an approved RCRA hazardous waste treatment, storage, and disposal facility (TSD). All hazardous waste generator requirements of VHWMR Parts V and VI were followed. Samples collected from the concrete flood control protection perimeter wall (Section 6.1) passed TCLP analyses. The concrete debris was disposed of at County South Debris Landfill, Roanoke County, which is a permitted Construction and Demolition Debris (CDD) landfill in accordance with VSWMR.

All ancillary equipment not decontaminated was disposed of as hazardous waste. The piping, drains, concrete, and pumps were removed and decontaminated and disposed of according to the VHWMR and VSWMR. Any rainwater which accumulated in the basin after the sludges were removed was pumped into the headworks of the Biological treatment plant. Samples collected from the soil/concrete liner (Section 6.1) passed TCLP analyses. The soil/concrete liner was disposed of at County South Debris Landfill, Roanoke County.

4.0 SUMMARY OF RESULTS FOR BACKGROUND AND BASIN SUBSOIL SAMPLING

4.1 DEVELOPMENT OF BACKGROUND LEVELS

The hazardous constituents of concern (HCOCs) for this unit were identified in Table 3-1 of Section 3.5 of the Bioplant Equalization Basin closure, contingent closure and contingent post-closure plans (see Attachment 1). Radian developed background soil concentrations. The following is a summary from the *Final Site Investigation/Evaluation Bioplant Equalization Basin Closure Site Investigation/Evaluation Radford Army Ammunition Plant, Radford, Virginia* prepared by Radian dated February 1997.

Eight samples were collected from areas thought to be free from contamination from past or present industrial activities (see Figure 4). Prior to collection, the sample locations were approved by VADEQ. The samples were collected from soils that were geologically similar to the basin subsoil. A critical value (CV) for each constituent was calculated as an upper tolerance limit for the 99th percentile (i.e., a coverage of 99%) with 95% confidence, as specified in the closure plan. This CV became the reasonable background value for each constituent. These background levels were approved by VADEQ on 10 March 1998 and became appropriate for comparison to basin subsoil data. The background levels are included as Attachment 5 (Table 3-1). VADEQ approved the background data in writing on 22 October 1997. A copy of this letter is included as Attachment 6.

4.2 BASIN SUBSOIL SAMPLING

On 16 September, 1996, Radian initiated the basin sampling by measuring 50 foot increments around the basin wall, starting from the southeast corner of the basin. The locations of the subsoil samples are illustrated in Figure 5. A sampling point was selected in each grid node and marked with a wooden stake. At the time the sampling points were selected, water covered the center of the basin including all of grid node No. 9. The sampling point for No. 9 was marked by placing a large piece of concrete in the water in the area of the proposed sampling location. The sampling locations and elevations were surveyed following completion of the sampling.

Radian collected samples of basin subsoil from all seven sampling locations. A hole was made in the 12-inch thick basin liner with an air hammer. Radian field personnel used a stainless steel hand auger to collect soil from the top 6 inches of the soil directly underneath the liner (subsoil). The clayey sand material was split into the sampling containers following the protocol in the Chemical Data Acquisition Plan (CDAP) (Radian, 1996). Seven discrete samples were collected. The samples were identified with the following field ID's: RAAP-#10-01, 05, 06, 09, 10, 14, 15. Radian backfilled each of the boreholes in the liner with bentonite following the completion of the sampling.

The samples were packed with ice and shipped overnight with the proper chain-of-custody to the appropriate laboratory. Additional soil was collected for the QA/QC samples. Equipment rinsate blank, a field blank, and trip blanks also were collected. The results of the basin subsoil samples are included as Attachment 5 (Table 3-2). Due to high practical quantitation limits achieved during the first round of sampling, locations RAAP-#1 and RAAP-#10 were resampled. The results of the resampling were submitted to the VADEQ. VADEQ approved the use of the resampled locations for use in background comparison. This letter approving the equalization basin revised sampling dated 10 March 1998 is included as Attachment 7.

4.3 *DATA USABILITY AND QA/QC SUMMARY*

Data evaluation and usability was assessed by Radian and the results were included in the *Final Site Investigation/Evaluation Bioplant Equalization Basin Closure Site Investigation/Evaluation Radford Army Ammunition Plant, Radford, Virginia* prepared by Radian dated February 1997. The following section summarizes the findings of the assessment.

The background and basin subsoil sample data were evaluated according to the data quality objectives (DQOs) presented in the CDAP. These DQOs are statements of the acceptable level of measurement uncertainty in chemical data. The measurement objectives were established in terms of accuracy, precision, representativeness, sensitivity, comparability, and completeness. Overall, the data generated for the background soil samples and the basin subsoil samples were approved by the VADEQ for use for their intended purpose.

4.4 *RESULTS OF STATISTICAL CALCULATIONS*

Radian conducted a statistical treatment of the background data in order to calculate a critical value (CV) for comparison against the basin subsoil data. The following section summarizes their statistical calculations as detailed in the *Final Site Investigation/Evaluation Bioplant Equalization Basin Closure Site Investigation/Evaluation Radford Army Ammunition Plant, Radford, Virginia* prepared by Radian dated February 1997.

Based on the Closure Plan and discussions with the VADEQ, Radian calculated CVs only for the seven metals detected in the background samples. These CVs are included in Attachment 5 (Tables 3-1 and 3-2). Critical values were calculated for those HCOCs that were detected in both the background and basin samples (e.g., metals) or detected in the basin samples but not in the background (e.g., fluoranthene). The CVs were calculated as an upper tolerance limit (UTL) for the 99th percentile (i.e., a coverage of 99%) with 95% confidence, as specified in the Closure Plan.

Prior to calculating the UTLs, the data were evaluated to determine if the concentrations follow a normal distribution for each analyte according to the Shapiro-Wilk w test (Shapiro and Wilk, 1965). Each of the HCOCs were determined to have a normal distribution according to the W test, so only normal UTLs were calculated using the following equation:

$$UTL = x + (K)(s)$$

where x is the estimated sample mean; K is the tolerance factor; and s is the estimated standard deviation. The tolerance factor, K, is from Hahn Meeker, 1991. A summary table illustrating the appropriate statistics used in the UTL calculations is included in Attachment 5 (Table 3-4).

Each basin sample was compared to the critical values. All results for the inorganic HCOCs were below the CVs. Fluoranthene was detected in one basin sample (Grid #9 at .330 mg/Kg); however, fluoranthene was not detected in any of the background samples. A CV for fluoranthene was calculated using the equation above. Using one-half the sample result (per telephone conversation with VADEQ) yields a CV for fluoranthene of .006 mg/Kg. Therefore, the concentration of fluoranthene for one sample exceeds the CV.

5.0 RISK ASSESSMENT FOR RISK-BASED CLOSURE

5.1 GENERAL

Based on the data collected as part of the basin subsoil sampling program, clean closure could be established for all of the HCOCs, except for fluoranthene. Based on the detection of 0.333 mg/Kg fluoranthene in one of the soil samples collected below the Bioplant Equalization Basin, USACOE elected to perform a risk assessment (RA) for risk-based closure. The risk assessment detailed herein was conducted in accordance with the VADEQ document titled "Guidance for Development of Health Based Cleanup Goals Using Decision Tree/REAMS Program" (hereinafter "Virginia Risk Guidance"), and Section 3.8.5 of the Closure Plan. Successful risk-based closure would demonstrate that the concentration of fluoranthene does not pose an unacceptable level of risk to human health and the environment.

5.2 SITE EVALUATION

At the time this RA was completed, closure activities of the Bioplant Equalization Basin had been completed. The area encompassed by the former Bioplant Equalization Basin was approximately ten feet deep. This depth accounted for removal of the concrete /soil liner The entire area was approximately 265 feet by 170 feet which accounts for some side slope and flood wall removal.

5.3 EXPOSURE ASSESSMENT

5.3.1 *Media and Exposure Pathways*

Fluoranthene was detected in one sub-basin sample collected beneath the Bioplant Equalization Basin at a concentration that statistically exceeded the background level. Exposure to fuoranthene potentially involves multiple receptors and various media pathways.

5.3.2 *Site Conceptual Exposure Model (SCEM)*

The SCEM is based on existing and future site conditions and depicts the potential exposure routes and media for the site (Figure 6). The SCEM presents the primary applicable migration pathways and identifies the

exposure routes and potentially affected populations which warrant either further consideration and/or quantitative risk characterization. Table 2 provides a summary of the exposure pathways to human populations. While there are multiple potential exposure pathways to humans, only the future on-site resident was quantitatively evaluated for this assessment. The remaining receptor pathways were qualitatively evaluated and determined to be insignificant when compared to the risk associated with a future on-site resident.

RFAAP continues to operate as an industrial complex; as such, access is limited by the use of gated entrances and security personnel. On-site workers in the vicinity of the Bioplant Equalization Basin area are one potentially significant human receptor. Because of the security associated with RFAAP, we assume only escorted guests are subject to the risk associated with this area. In the unlikely event a trespasser crosses the area of concern, the trespasser would most likely be subject to the same risk associated with a site visitor. In either situation, visitors which frequent the area of concern are unlikely to experience the same risk associated with an on-site worker. Therefore, under the current scenario, a RFAAP worker is the primary human receptor.

An RFAAP worker can be subject to multiple exposure pathways: inhalation of particulate matter, ingestion, and dermal contact. Soil particles can become windborne and inhaled by the on-site worker. Additionally, a worker can physically handle the contaminated soil, which can lead to absorption by the skin or incidental ingestion. Risks associated with soil contamination can be assumed to be minimal in this instance, however. The soil sample which produced the contaminated soil result is located approximately nine (9) feet below grade, at six (6) inches beneath the former Bioplant Equalization Basin concrete/soil liner. The excavation has been backfilled with clean material and approximately nine (9) feet of clean compacted subgrade material was placed on top of the excavated liner. The nine (9) foot layer of clean soil is a sufficient barrier to soil particle inhalation, ingestion, and dermal contact. Because no complete pathways exist for ground water (no drinking water wells exist), the risks corresponding to potential human receptors for the current working conditions is insignificant.

The closure plan for the Bioplant Equalization Basin states that a future residential use of the property must be considered in the RA. Assuming residential homes are built on the property, on-site residents will experience a much greater potential risk than visitors or trespassers, simply by their proximity to the contamination source.

As with a RFAAP worker, on-site residents will be subject daily to the contaminant concentrations of the soil and ground water. In addition to inhalation of soil particulates, ingestion, and dermal contact with the contaminated soil, no restrictions have been placed by RFAAP on the use of ground water in the area. Therefore, residents can also be exposed through ingestion and dermal contact with ground water. Again, as with the RFAAP worker, we can assume an incomplete pathway for risks associated with soil contamination; however, we have elected not to make this assumption for the assessment of risk. We conservatively assumed that soils excavated during housing construction or well construction have been evenly spread across the remainder of the parcel. This could bring contaminated material to the surface, creating a complete exposure pathway via soil inhalation, ingestion, and/or dermal contact.

The potential pathways quantitatively modeled for this RA pertain to an on-site resident. The potential exposure routes include soil inhalation, ingestion, and dermal contact, and ground water ingestion and dermal contact. Each potential exposure pathway was quantitatively evaluated using the REAMS model default exposure assumptions (where applicable), the April 1998 USEPA Region III Risk Based Concentration Table of toxicity values presented in Table 1, and default values provided in the existing closure plan.

5.4 *HAZARDOUS CONTAMINANTS OF CONCERN (HCOC)*

Radian Corporation of Herndon, Virginia (Radian) collected and analyzed soil samples from eight background locations and seven subsoil samples at RFAAP. The results of this investigation are detailed in the *Final Site Investigation/Evaluation*, February 1997 prepared by Radian. The background samples were used to determine a statistical background value (Critical Value) for all HCOCs. The statistical background values became the threshold values against which the subsoil samples collected from beneath the Bioplant Equalization Basin were compared to determine if a particular sample was "contaminated," i.e., above the statistically generated background threshold value.

The following results indicate the contaminant which exceeds the background threshold concentrations as described above. It is this contaminant for which this RA is being performed. The location of the sample with respect to the former Bioplant Equalization Basin and the threshold values for the listed contaminants are included. Only those tests which exceed the background (threshold) values are included in this table.

Contaminant	Location	Result (ppm)	Critical Value (ppm)
Fluoranthene	Grid #9	0.333	0.006

5.5 *TOXICITY ASSESSMENT*

The toxicological assessment involved the identification of adverse health effects associated with exposure to fluoranthene and the relationship between the extent of exposure and the likelihood of adverse health effects. Fluoranthene is a non-carcinogenic chemical and the toxicity values for non-carcinogenic chemicals are represented by reference doses (RfDs). The toxicity values used in this risk assessment for fluoranthene were derived from the USEPA Region III Risk-Based Concentration Table-April 1998, and are presented in Table 3.

The USEPA Region III Risk-Based Concentration Table provides an oral reference dose but not an inhalation reference dose for non-carcinogenic effects of fluoranthene. Therefore, the RfD for oral inhalation for the non-carcinogenic effects of fluoranthene is assumed to be equal to the RfD for the ingestion of fluoranthene. Although it is recognized that substitution of the exposure route-specific toxicity value may not be applicable for all compounds, it was determined that a more conservative risk estimate is derived by retaining the exposure route without a published toxicity value for consideration in the overall RA.

5.6 *CONTAMINANT CONCENTRATION AT THE POINT OF EXPOSURE*

The table in Section 5.4 provides the sample result which exceeds the critical value determined for the RFAAP Bioplant Equalization Basin site. The development of the concentrations at the points of exposure required using the only sample with a concentration exceeding the critical value. The value of 0.333 parts per million (ppm) fluoranthene was used in the calculations of risk and exposure point concentrations.

For migration of the contaminant from soil to ground water, the maximum contaminant level (MCL) is typically used to mark the starting point for determination of the contaminant concentration of a HCOC. The MCL is the maximum contamination allowed in drinking water. An MCL for fluoranthene was not available at the time of this assessment. Therefore, the tap water concentration taken from the USEPA Region III Risk-Based Concentration Table-April 1998 was used and is presented in

Table 4. Demonstrating a concentration at this level or below gives an acceptable risk for the contaminant in question.

5.7 *RISK EVALUATION AND SUMMARY*

This section combines the information developed in the exposure and toxicity assessment sections to estimate the potential risks to human health posed by the contaminants detected. Since fluoranthene is listed as a non-carcinogenic chemical only non-carcinogenic risk will be discussed herein. A hazard quotient (HQ - non-carcinogens) for exposure to fluoranthene by each route of exposure, exposure pathway, category of receptor, and exposure case are initially estimated separately. The hazard index (HI) is then summed across chemical, exposure routes, and pathways applicable to the same population.

Fluoranthene has quantified non-carcinogenic effects as indicated by the RfDs given in Table 1. The cumulative non-carcinogenic risk must have a hazard index (HI) of less than one, where the HI is the sum of the HQs calculated for each relevant route of exposure. Another aspect of non-carcinogenic risk calculations is that effects are not cumulative for a lifetime, and the susceptibility of effects differs between adults and children. Therefore, different equations and default parameters are necessary to calculate the risks attributed to adults and the risks attributed to children. Likewise, separate HIs must be calculated for both adults and children.

The risk tables for the exposure pathways can be found in Attachment 8; the results of the HI calculations are shown in Table 3 and summarized here. For adults, the HI is approximately 9.18E-05; for children, approximately 2.51E-04. Both values fall well below the HI threshold of one.

Another potential area of contamination is the migration of contaminants to ground water. Percolation through the contaminated zone may generate leachate which can reach the ground water. As shown in Table 4, ERM used the Soil Screening Level Partitioning Equation to estimate the screening level in soil which will generate a concentration no greater than the EPA Region III Risk-Based Tap Water Concentration in the ground water. Using conservative default parameters as necessary, the calculated screening level in soil was determined to be well above the maximum concentration detected. In addition, a dilution attenuation factor (DAF) of one (1) was used instead of twenty (20). The table below illustrates the results.

Contaminant	Site-Specific Screening Level (mg/Kg) (1 DAF)	Maximum Level Detected (mg/Kg)	Below Screening Level?
Fluoranthene	2.0E+02	0.333	Yes

Therefore, based on the level of fluoranthene detected in the subsoils, potential impacts to ground water will not exceed the acceptable criteria (RBC Tap Water).

In summary, the maximum and only detected concentration of fluoranthene poses an acceptable risk under the current use and to a potential future residential population. The non-carcinogenic risk associated with inhalation, ingestion, and dermal absorption of fluoranthene in soil for adults is approximately 9.18E-05; for children, approximately 2.51E-04. These risks are well below the target HI of one.

In addition, when the calculated soil screening values are compared to the detected level, the fluoranthene concentration does not pose a threat to migrate from the soil to the ground water at levels equal to or above the RBC Tap Water Concentration. Therefore, the soil concentration of fluoranthene remaining in the Bioplant Equalization Basin area meets the acceptable risk levels as outlined in the Bioplant Equalization Basin Closure Plan and the Virginia Risk Guidance for risk-based closure.

6.0 *CLOSURE ACTIVITIES COMPLIANCE CERTIFICATION*

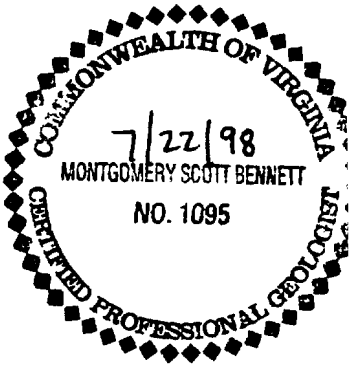
Norfolk District, Corps of Engineers certifies that the closure of the Bioplant Equalization Basin at the Radford Army Ammunition Plant in Radford, Virginia, was performed and completed in accordance with the Virginia Department of Environmental Quality approved Closure Plan dated 12 December 1995.

	7355	VA	
J.W. Blackburn, Jr., P.E.	Registration No.	State	Date

7.0 *RISK BASED CLOSURE ASSESSMENT COMPLIANCE CERTIFICATION*

Environmental Resources Management certifies that the closure of the Bioplant Equalization Basin at the Radford Army Ammunition Plant in Radford, Virginia, was performed and completed in accordance with the Virginia Department of Environmental Quality approved Closure Plan dated 12 December 1995, and amended 9 March 1998 and the VADEQ document titled "Guidance for Development of Health Based Cleanup Goals Using Decision Tree/REAMS Program".

Montgomery S. Bennett, P.G. | 2801 001095 Registration No. | VA State | 7/22/98 Date

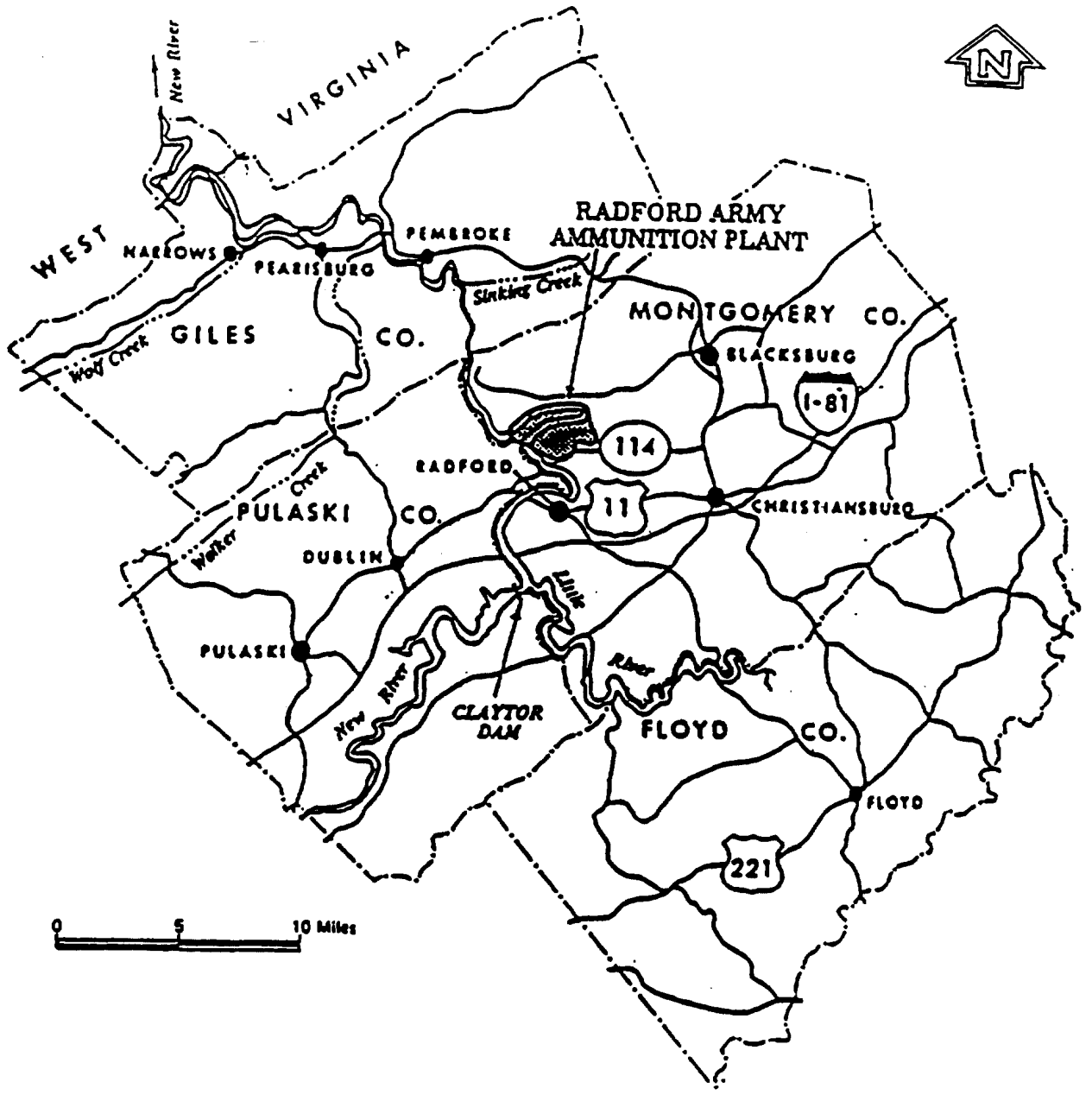


for Radford Army Ammunition Plant

RESIDENT MANAGER
Title

7/30/98
Date

Figures



W.O. #:	28705.00.01
Drawn By/Date:	LJC/7-6-98
Checked By/Date:	
Revised By/Date:	
Checked By/Date:	

Figure 1
Facility Location Map

ERM
9701 Metropolitan Court Suite A
Richmond, VA 23236
(804)330-8990

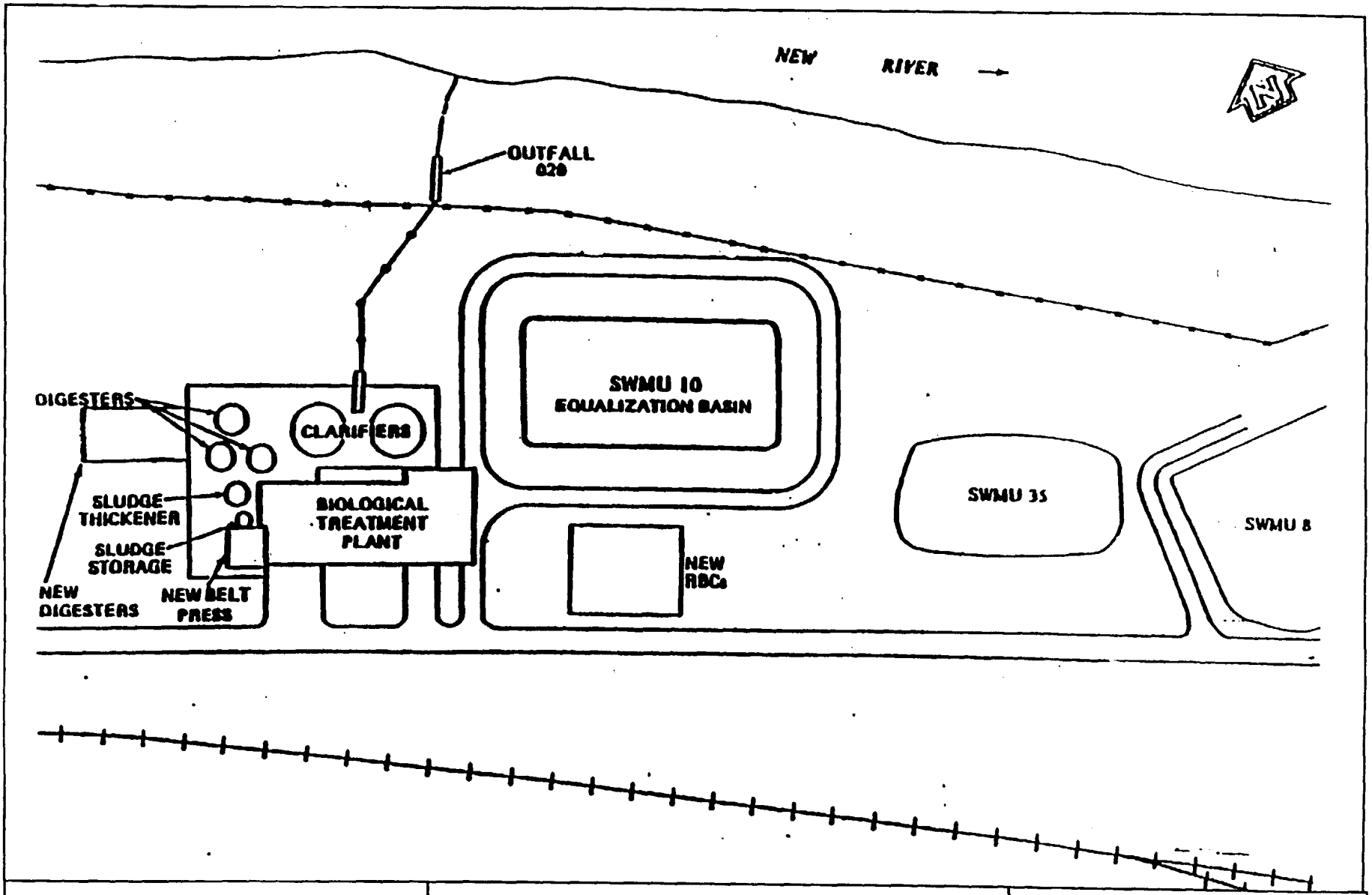


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Figure 2
Former Bioplant Equalization Basin Location Map

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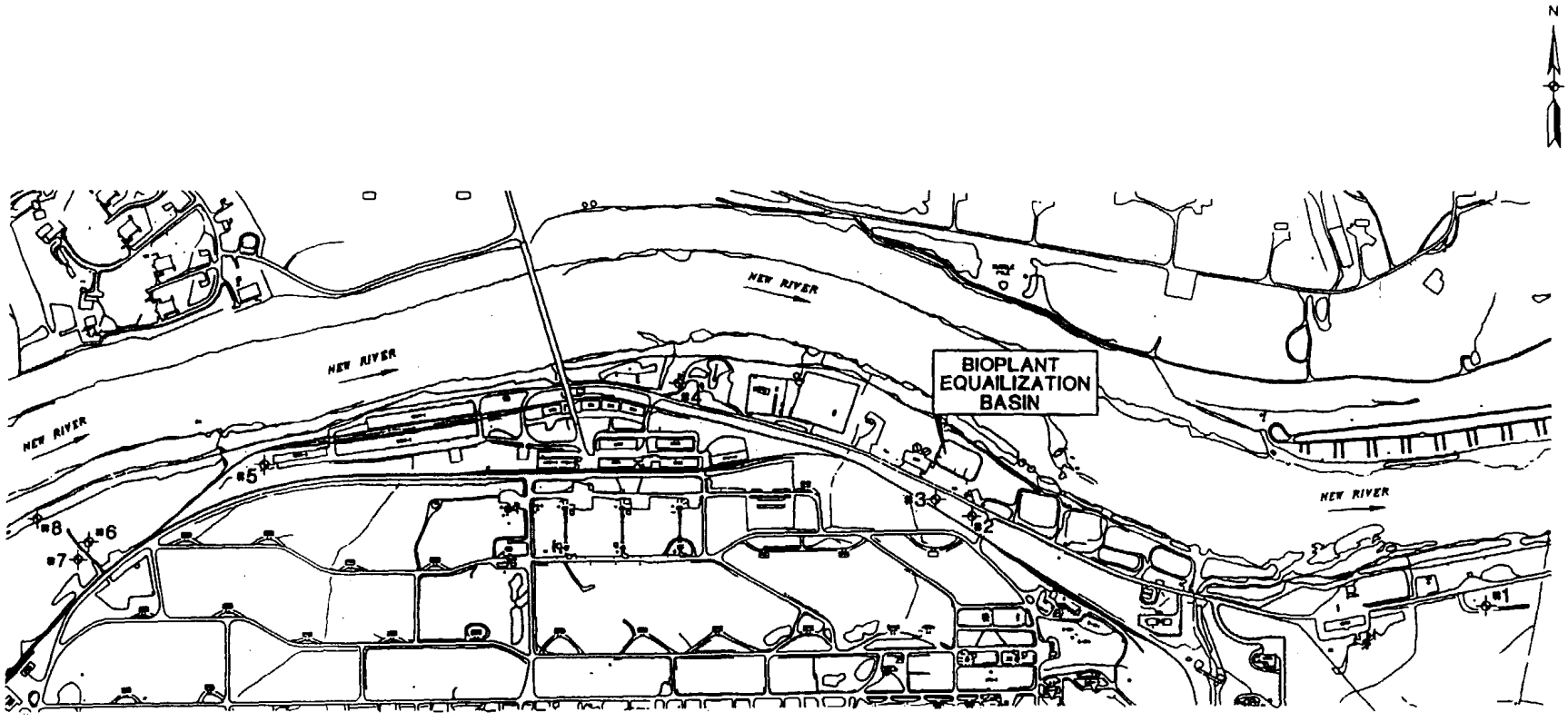
9701 Metropolitan Court Suite A
Richmond, VA 23236
(804)330-8990



LEGEND

⌖ LOCATIONS OF BACKGROUND SAMPLES

GRAPHIC SCALE

W.O. #:	28705.00.01
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Figure 3
Background Sample
Location Map

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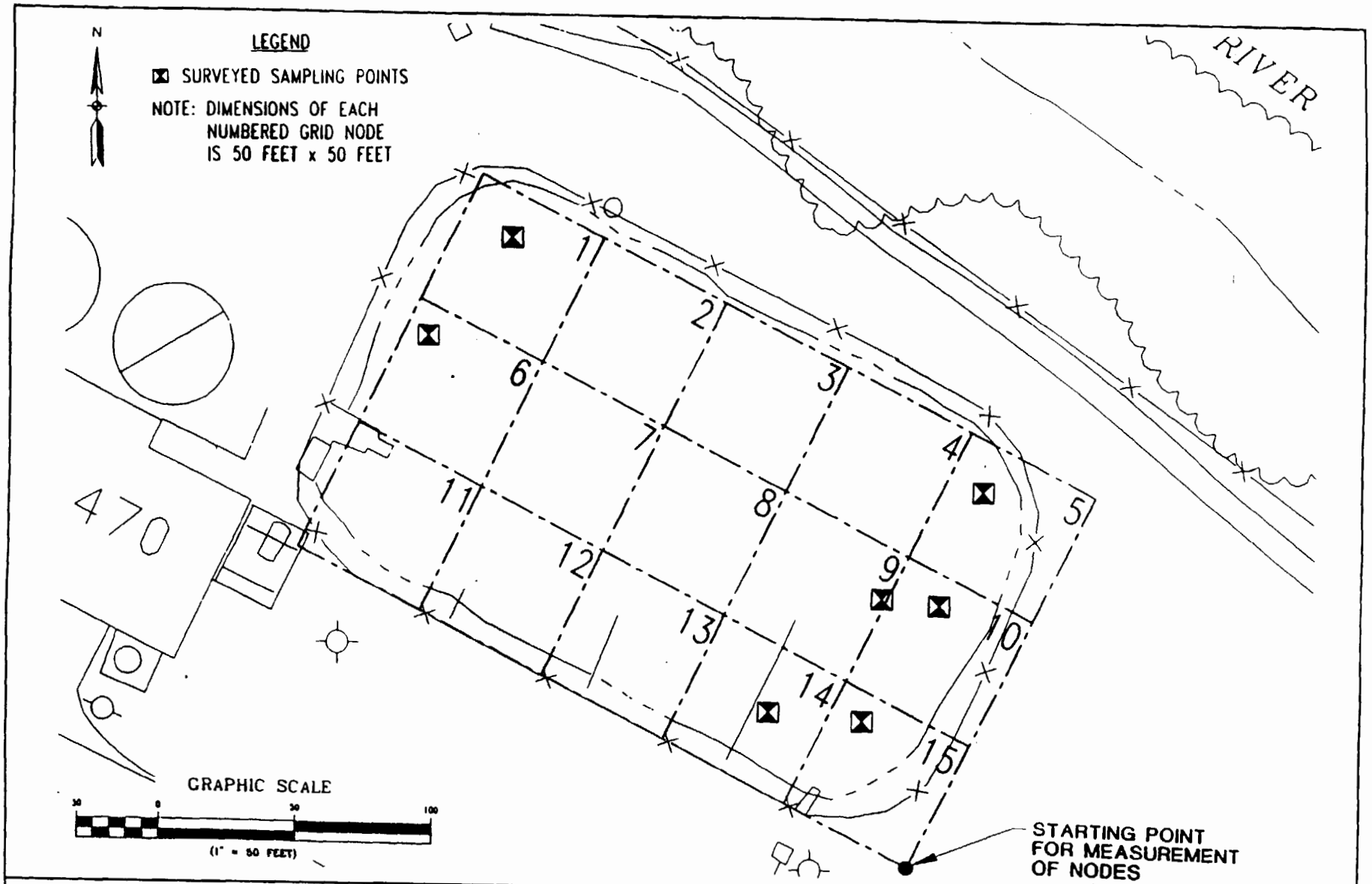
Richmond, VA 23236
(804)330-8990



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Revised By/Date:	
Checked By/Date:	

Figure 4
Basin Subsoil Sample Location Map

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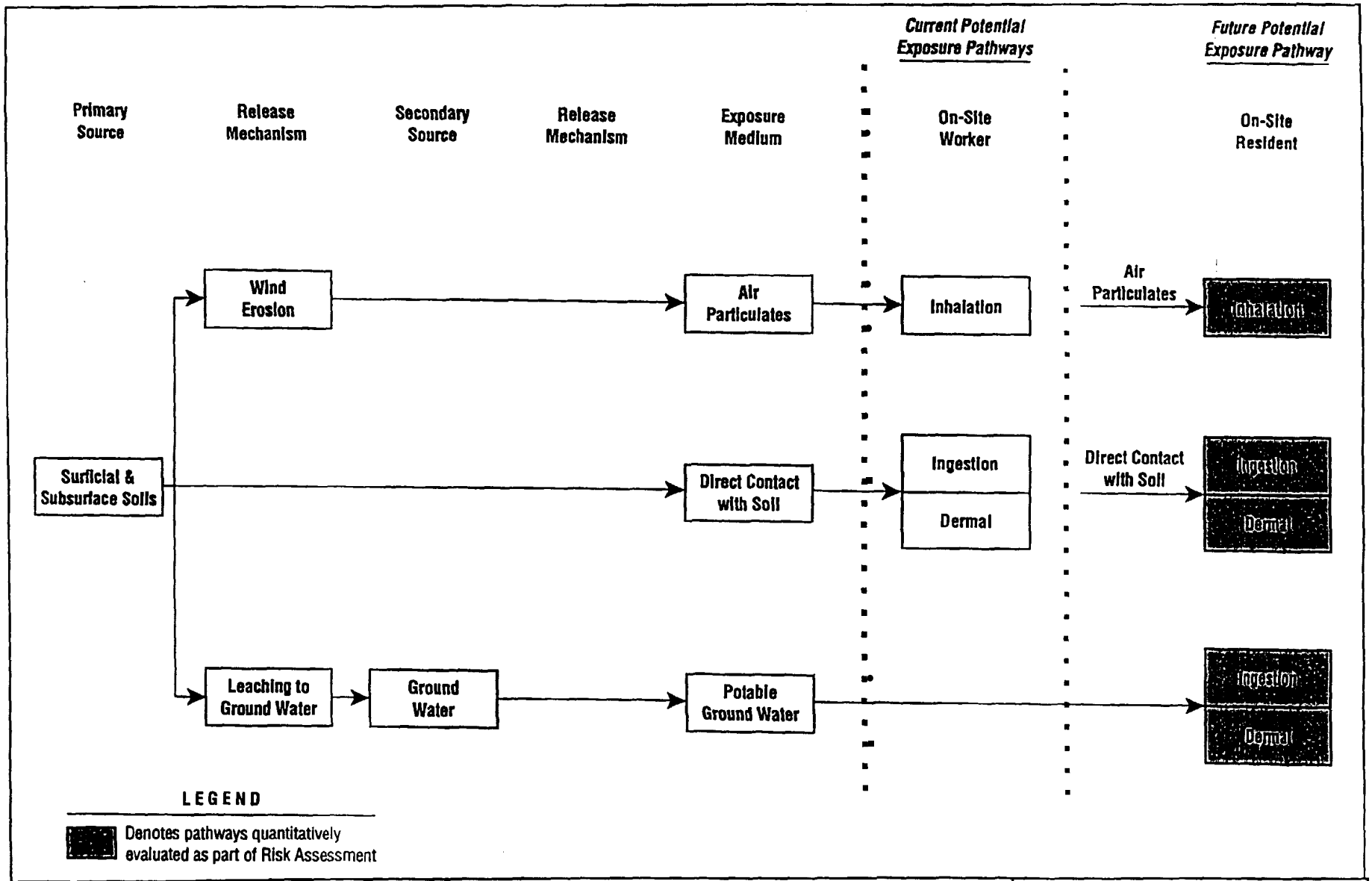

W.O. #:	28705.00.01
Drawn By/Date:	LJC/1-6-98
Checked By/Date:	
Revised By/Date:	
Checked By/Date:	

Figure 5
Site Conceptual Exposure Model (SCEM)

ERM
9701 Metropolitan Court Suite A
Richmond, VA 23236
(804)330-8990

Tables

Table 1

Toxicity Values

Radford Army Ammunition Plant

Radford, Virginia

Contaminant	CAS No.	Carcinogen?	Carcinogenic Effects		Non-Carcinogenic Effects	
			Oral Slope Factor (CPSo) (Kg•day/mg)	Inhalation Slope Factor (CPSi) (Kg•day/mg)	Chronic Oral Reference Dose (RfDo) (mg/kg/day)	Chronic Inhalation Reference Dose (RfDi) (mg/kg/day)
PHA						
Fluoranthene	206440	No	~	~	4.00E-02	4.00E-02

Note: Toxicity value taken from USEPA Region III list (Roy Smith Tables-15 April 1998)

~: Not applicable

The RfDi was assumed to be equal to the RfDo

Table 2

Summary of Potential Exposure Pathways Considered in the Risk Assessment

Radford Army Ammunition Plant

Radford, Virginia

Exposure Medium/ Exposure Route	Current Site Access		Future Site Access		
	RAAP Worker	Visitor	Resident	Construction Worker	Trespasser/Visitor
Soils					
Inhalation	~	~	X	~	~
Ingestion	~	~	X	~	~
Dermal Contact	~	~	X	~	~
Migration to Groundwater					
Ingestion	~	~	X	~	~
Dermal Contact	~	~	X	~	~

"X" Indicates that the pathway was modeled quantitatively in the Risk Assessment.

"~" Indicates that the pathway was qualitatively evaluated, but was determined to be an insignificant exposure route compared to that of a future long-term resident

Table 3

On-site Resident

Human Exposure to Soils (Non-carcinogen)

Radford Army Ammunition Plant

Radford , Virginia

Contaminant	CAS No.	Carcinogen?	Maximum All Soils Conc. (mg/Kg)	Calculated Air (Dust) Conc. (kg/m3)	Non-Carcinogenic (Adult) Hazard Quotient (HQ)			Non-Carcinogenic (Child) Hazard Quotient (HQ)		
					Ingestion	Dermal	Dust Inhalation	Ingestion	Dermal	Dust Inhalation
PAH										
Fluoranthene	206440	No	0.333	4.90E-10	1.14E-05	*8.04E-05*	*3.36E-09*	1.06E-04	*1.45E-04*	*9.41E-09*
Totals					**1.14E-05**	**8.04E-05**	**3.36E-09**	**1.06E-04**	**1.45E-04**	**9.41E-09**

Hazard Index (Adult):	**9.18E-05**
Hazard Index (Child):	**2.51E-04**

NOTES:

Dust concentration in air calculated by multiplying maximum soil concentration by the particulate emission factor (as defined in the closure plan).

Concentration is the only detected concentration.

Values in italics are calculated using oral factors (RfDo)

Table 4

Soil Screening Level Partitioning Equation for Migration to Ground Water

Radford Army Ammunition Plant

Radford, Virginia

Screening Level in Soil (mg/kg) = $C_w [K_d + (\theta_w + \theta_a H')/\rho_b]$

where:

C_w = target soil leachate concentration (mg/L)

K_d = soil-water partition coefficient (L/kg)

θ_w = water filled soil porosity (L_{water}/L_{soil})

θ_a = n-θ_w, air filled soil porosity (L_{air}/L_{soil})

where: n = 1 - ρ_b/ρ_s, soil porosity (L_{pore}/L_{soil})

where: ρ_s = soil particle density (kg/L)

H' = Henry's law constant (dimensionless)

ρ_b = dry soil bulk density (kg/L)

FLUORANTHENE

Screening Level in Soil (mg/kg) = $C_w [K_d + (\theta_w + \theta_a H')/\rho_b]$

where:

C_w =	1.5	1.5 x 1 (RBC Tap Water Concentration x default attenuation factor (DAF)*)
K_d =	1.07E+02	[107,000 Koc (Soil Screening Guidance: User's Guide, Attachment C, page C-3) * foc 0.1% (default value)]
θ_w =	0.3	(default value)
θ_a =	0.1339623	1 - (1.5 / 2.65) - 0.3 ((1 - ρ_b/ρ_s) - θ_w, default values)
H' =	0.00066	(Soil Screening Guidance: User's Guide, Attachment C, page C-3)
ρ_b =	1.5	(default value)

Screening Level in Soil (mg/kg) = 2.E+02 Highest Detected Value (mg/kg) = 0.333

* The default DAF equals 20 for sources up to 0.5 acres in size, however for conservativism, DAF equals 1 was used in this case. Therefore, the concentration of fluoranthene in the soil which will leach to the ground water and produce ground water concentrations approximately equal to the RBC tap water concentration is 20,000 mg/kg, assuming the default parameters provided in the EPA document Soil Screening Guidance: User's Guide (April 1996) are used.

** An MCL for fluoranthene is not available; therefore, the EPA Region III Risk-Based Concentration for tap water was used.

Attachment 1
Closure Plans and Amendment

APPROVED BY
DEQ

CLOSURE, CONTINGENT CLOSURE AND CONTINGENT POST-CLOSURE PLANS
FOR RADFORD ARMY AMMUNITION PLANT'S

EQUALIZATION BASIN
HWMU-10 & SWMU-10

RADFORD, VIRGINIA
EPA ID VA1210020730

RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA
EPA ID VA1210020730
December 12, 1995

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FIGURES

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LIST OF ACRONYMS

CDD Construction, Demolition, and Debris Landfill
CEI Comprehensive Evaluation Inspection
CFR Code of Federal Regulations
CQA Construction Quality Assurance
EEA Explosive Experimental Area
EPA Environmental Protection Agency
FFCA Federal Facility Compliance Agreement
GWMP Groundwater Monitoring Plans
HCOC Hazardous Constituents of Concern
LDR Land Disposal Restrictions
MDL Method Detection Limit
ND Not Detectable
NPL National Priority List
PQL Practical Quantitation Limit
PVC Polyvinyl Chloride
QA/QC Quality Assurance/Quality Control
RAAP Radford Army Ammunition Plant
RBC Risk Based Criteria
RCRA Resource Conservation and Recovery Act
RDT&E Research, Development, Test and Evaluation
RFA RCRA Facility Assessment
RFDs Reference Doses
RFI RCRA Facility Investigation
RSDs Risk Specific Doses
SCS Soil Conservation Service
SPLT Synthetic Precipitation Leach Test
UTS Universal Treatment Standard
VDEQ Virginia Department of Environmental Quality
VI Verification Investigation
VPDES Virginia Pollutant Discharge Elimination System Permit
VSWMR Virginia Solid Waste Management Regulations
VHWMR Virginia Hazardous Waste Management Regulations
WWTP Wastewater Treatment Plant

1.0 INTRODUCTION

1.1 Purpose

The following closure plan is submitted in accordance with the requirements of the Commonwealth of Virginia's Hazardous Waste Management Regulations (VHWMR), § 9.6. The plan identifies the necessary steps to close the Equalization Basin, (EQ Basin), which is a RCRA surface impoundment located at the Radford Army Ammunition Plant in Radford, Virginia; EPA ID No.VA1210020730.

1.2 Facility Identification and Contact Person

EPA ID No. VA1210020730
Owner/Operator - U.S. Army, Radford Army Ammunition Plant / Alliant Tech Systems, Inc.
Address - Radford Army Ammunition Plant, P.O. Box 1, Radford, Virginia 24141-7536.
Contacts Telephone No. - Jerome Redder at (540) 639-7536 or Robert Richardson at (540) 639-8641.

1.3 Background

The facility has operated a hazardous waste management facility subject to regulations promulgated under the Resource Conservation and Recovery Act. The Army is the owner of the Radford Army Ammunition Plant (Radford), located in Radford, Virginia and operated by Alliant Tech Systems (Alliant) which was previously Hercules Incorporated (Hercules). A Notification of Hazardous Waste Activity was filed for Radford with the EPA on August 14, 1980, declaring Radford to be engaged in the generation, treatment, storage, and disposal of hazardous waste under Title 40, Code of Federal Regulations, Part 261.

The EQ Basin is located along the New River in the north-central part of the Main Manufacturing Area. The surface impoundment is the first of nine components that make up a biological wastewater treatment system at Radford. This system treats wastewaters of widely varying characteristics, including non-acidic wastewaters from propellant manufacturing (on both a batch and continuous basis), pre-treated wastewaters from nitroglycerine (NG) manufacturing and alcohol rectification and wastes from recovery of ethyl ether (USEPA, 1987). The wastes treated and sludges generated in the Basin are listed hazardous wastes, hazardous waste code K044 and characteristic waste codes D030. The biological treatment system was built in 1978/1979 and became operational in 1980. Prior to 1980, these wastewaters were discharged directly to the New River.

The EQ Basin is approximately 160 feet wide by 255 feet long. The total depth of the Basin is approximately 10.5 feet. With 7.5 feet of water in the Basin it realizes design capacity of 1,350,000 gallons. The containment walls are constructed of concrete, and the Basin is lined with a soil/cement clay liner. The unit was expanded to its current dimensions since original construction. The Basin's northern and eastern outside embankments are reinforced with rip-rap. Suspended polymeric dividers accommodate aeration/Equalization and divide the Basin into three compartments. According to the plant operator interviewed during EPA's March 1990, facility visit, the Basin has never overflowed. Operating procedures are such that influent flows are cut off if the Basin capacity is reached.

As a regulated interim status surface impoundment, the EQ Basin, under RCRA and the VHWMR, was required to submit a Part B permit application by 11/8/85 or interim status would terminate in accordance with VHWMR § 11.3.E.1. The facility did not submit its Part B permit application until November 26, 1988; therefore, closure of the unit was required. On March 16, 1990, Radford was notified that a closure plan for the EQ Basin was required; however, the Department notified Radford that it would allow the EQ Basin to remain in operation as a "newly regulated unit" until March 15, 1994. A closure plan was submitted as part of the Part B Permit Application. The Department commented on the Part B application on February 2, 1991, and requested additional information. On June 28, 1991, Radford submitted the requested information. On December 2, 1991, Radford re-submitted a RCRA Part B application for the biological waste water treatment plant. On June 1, 1992, Radford submitted a plan for sampling the equalization sludges in accordance with Radford's agreement with EPA. On July 21, 1992, the Department approved the groundwater monitoring plan for the EQ Basin via Section E of the Part B application. On November 3, 1992, a Final Draft Verification Investigation report was received by the Department which contained detailed studies of all SWMUs, including the sampled sludges from the EQ Basin. On October 19, 1993, EPA's Delisting Section recommended denial of petition number 0834 for the sludges from the EQ Basin, and thus they remain a listed hazardous waste. Radford contacted VDEQ's Roanoke Regional Office by phone on March 11, 1994, and notified VDEQ that Radford was not prepared to cease operation of the EQ Basin on March 15, 1994, as stipulated in the Department's March 16, 1990 letter. On March 21, 1994, VDEQ notified Radford that the requirements for immediate closure had arisen from § 3005(j)(6) of RCRA, that the unit was required to close, and should have ceased operations on March 15, 1994. The provision requires that "newly regulated surface impoundment units"

meet the requirements of § 3004(o)(1)(a) of RCRA (minimum technology requirements) or cease receipt of hazardous wastes four years from the date the unit becomes subject to the regulations. The VDEQ notified Radford that continued operation constituted noncompliance. Radford was also notified that the EQ Basin was subject to the Toxicity Characteristics Final Rule (Federal register Vol.55, No.61, March 29, 1990), by VDEQ on March 21, 1994. Since the EQ Basin received toxicity characteristic waste (D030, 2,4-Dinitrotoluene), Radford was notified that the unit must be retro-fitted or have the unit operations cease by March 29, 1994. The VDEQ notified EPA of the pending date for the Toxicity Characteristics Final Rule for appropriate action. Radford responded to the VDEQ notification correspondence the day before the final closure deadline and informed VDEQ that Radford would continue equalization operation while working toward a consent order with VDEQ's Office of Enforcement. On the same day, March 29, 1994, EPA notified Radford to immediately cease operation of the EQ Basin.

Emergency measures were taken by utilizing several abandoned steel tanks as a temporary EQ Basin. Wastewater is held in these tanks and then sent to the holding chamber of the EQ Basin pump station (located at the southwest corner of the Basin). The holding chamber of the EQ Basin is still utilized to deliver wastewater to the biological wastewater treatment plant from the steel tanks. The pump station delivers the wastewater to the biological treatment plant. The pump station was sealed off from the EQ Basin by the installation of a steel plate and gasket at the bar screen at the inlet to the pump station. The EQ basin cannot be "closed" until the unit's pump station is taken off line, and Radford can route all wastewater directly to the newly constructed two concrete equalization tanks each holding 3.82 million gallons. The new tanks are expected to be on line in the spring of 1996. However, all hazardous waste sludges and liquids remaining in the EQ Basin have been removed. Copies of the Hazardous Waste Manifests are on file with the VDEQ.

The Radford Army Ammunition Plant, The Advisory Council on Historic Preservation, and the Virginia Historic Preservation Office are in the process of executing a Memorandum of Agreement (MOA) regarding the subject closure. The reason for the MOA is to protect prehistoric archaeological site 44MY7, which is eligible for the National Register of Historic Places and likely extends under the berm and basin, from damage associated with the closure.

The MOA requires that the Corps of Engineers Construction Contractor provide a properly trained archaeologist (C-SAM) to monitor earth disturbing activity in association with the closure, and direct that all earth disturbing activities cease if significant archaeological remains associated with this site are encountered during the work. In that case, plans will have to be formulated to retrieve significant data if this is feasible and to ensure the protection of archaeological remains. The exact procedures to be followed will depend on the nature of the remains encountered, but will include, at a minimum, the following items which have the potential to effect the closure methods and schedule:

1. The Corps of Engineers contractor will supply additional trained personnel to assist the C-SAM in recovering significant archaeological data.

2. All visible prehistoric features, such as post holes, pit features, burials and midden will be mapped under the supervision of the C-SAM.

3. Archaeological remains will be excavated only as necessary to comply with contaminated soil removal provisions of the closure plan. Protective measures to safeguard discovered archaeological remains shall be as mutually agreed by the C-SAM and the Contracting Officer, and at a minimum, archaeological remains will be protected by a layer of sterile fill (i.e., clean sand) and any other measures necessary to provide for the stabilization.

4. Perimeter fencing will be installed around site 44My7 after closure.

5. If Native American cultural items (possibly including human burials) are encountered, the requirements of the Native American Graves Protection and Repatriation Act will be observed, work which may effect the area must cease, and an emergency permit must be obtained from the Virginia Department of Historic Resources by RAAP. It should be noted that this will trigger an automatic waiting period of at least 30 days, during which time no work may be done on portions of the site which may affect the discovered Native American cultural items.

6. If the soil in which archaeological remains are encountered is so badly contaminated that traditional archaeological data recovery cannot be safely completed, then the maximum practical data recovery will be carried out in the form of photography and other remote recording.

2.0 FACILITY DESCRIPTION

2.1 Site Location

The Radford Army Ammunition Plant (Radford) is a government owned industrial complex located in southwestern Virginia. The Radford Army Ammunition Plant encompasses approximately 4,104 acres and is located in Pulaski and Montgomery Counties. The facility is located approximately 5 miles northeast of the city of Radford, 10 miles west of Blacksburg, and 47 miles southwest of Roanoke, (see figures 2-1, 2-2, 2-3, 2-4, 2-5, 2-6). The New River separates Pulaski and Montgomery Counties and also divides the RAAP into two portions commonly known as the "horseshoe area" and the "main manufacturing area." The main manufacturing area of Radford is located south of the New River meander in Montgomery County, and the horseshoe area of Radford is located within the New River meander in Pulaski County. The EQ Basin unit is located in the main manufacturing area, the north area on the river's edge, Montgomery County. Table 2-1 summarizes the propellants which are manufactured at the facility.

2.2 EQ Basin Description

The EQ Basin was operated from 1980 until March 28, 1994, and was the first of nine components that make up the biological wastewater treatment system at Radford. The EQ basin received wastewater of widely varying characteristics, including non-acidic wastewaters from propellant manufacturing (on both a batch and continuous basis); pre-treated wastewater from nitroglycerine (NG) manufacturing and alcohol rectification; and wastes from recovery of ethyl ether. The basin was originally constructed in the location of a nitrocellulose (NC) fines settling lagoon (USACE, 1981) that was approximately 200' x 100' in size and surrounded by a 7' dike.

The 1980 construction plans show that prior to expanding the nitrocellulose fines lagoon approximately 4' of very soft, wet sludge had to be removed. The new lagoon was expanded to its present dimension of 255' x 160' with a 10.5' dike and a 12" soil cement bottom. No records are available on the soil cement material specification. However, discussions with personnel familiar with the 1980 construction recall that the soil cement bottom was developed using cement mixed into the soil and then compacted. In 1986/87, flood control protection was added via a 5.5' x 0.67' concrete perimeter wall embedded 2.5' into the 10.5' dike. This also provided an additional 2' of freeboard.

2.3 Facility Background

Although Radford is owned by the US Government, it has been operated under contract by Alliant Tech Systems, (previously known as Hercules Aerospace Corporation), since 1941. This facility, which contains over 1,696 buildings and occupies close to 3,649,965 square feet, is the top manufacturer of solid propellants in the United States. The major products manufactured at this facility are solvent and solventless propellants that include single phase (nitrocellulose), double-phase (nitrocellulose and nitroglycerin), and triple phase (nitrocellulose, nitroglycerin, and nitroguanidine) propellants; cast propellants; and high energy propellants. These propellants are ultimately used in small arms, anti-tank weapons, anti-aircraft weapons, rockets, torpedoes, missile systems, igniters, and other numerous ordnance-related items.

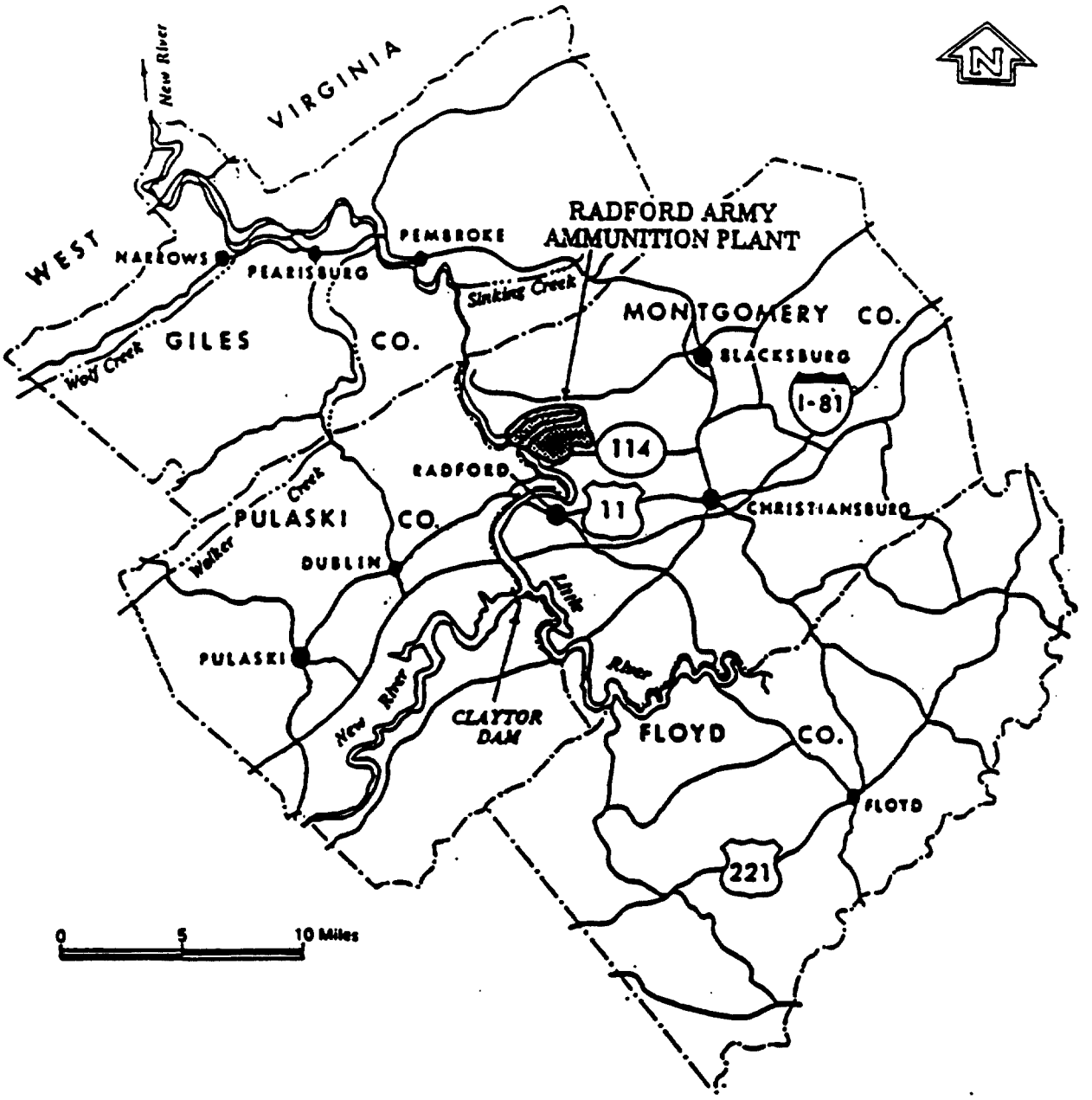


FIGURE 2-1 VICINITY MAP

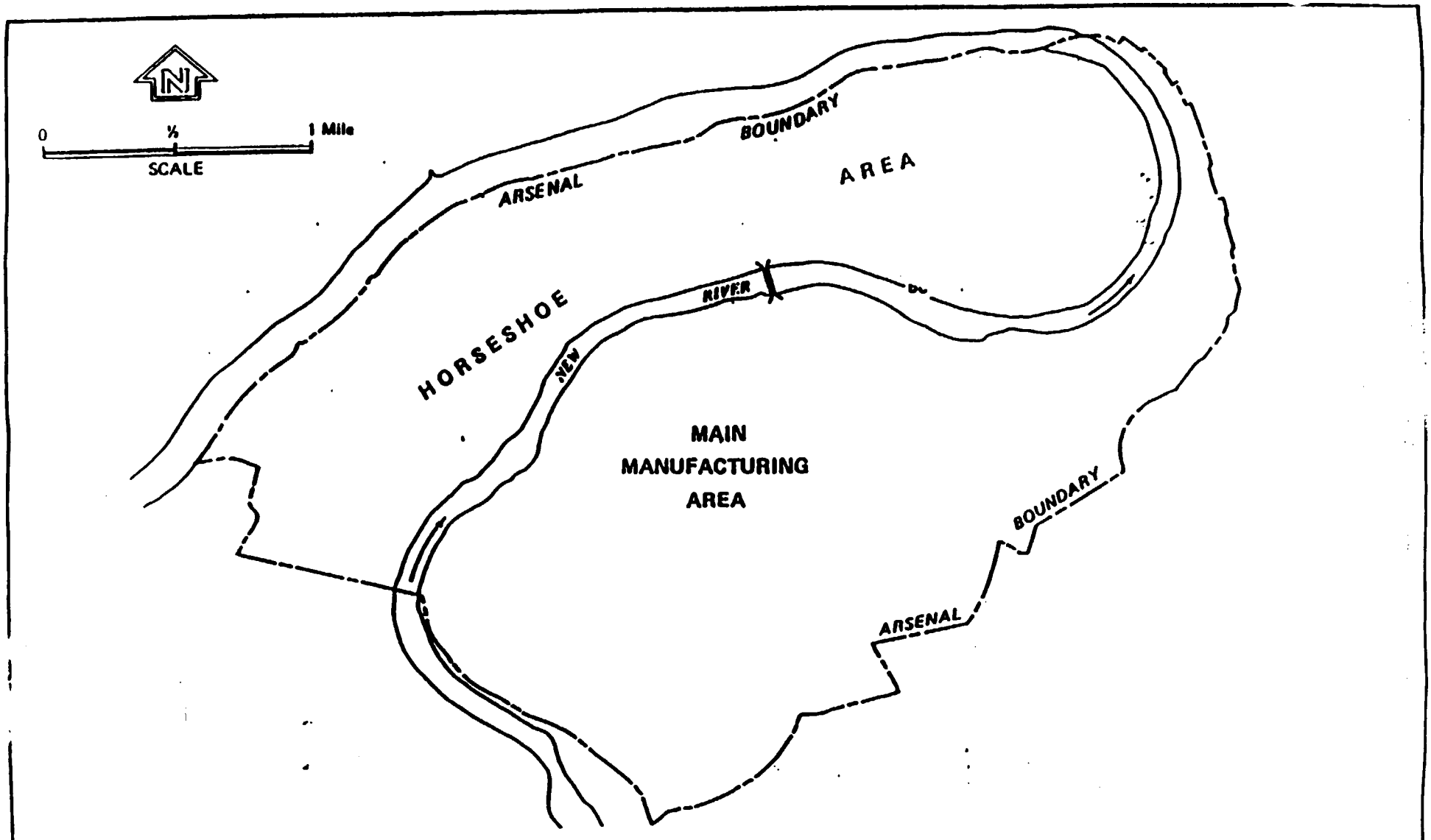


FIGURE 2-2 SITE BOUNDARY

Approximate Boundary of the Radford Army Ammunition Plant Hazardous Waste Management Facility

FIGURE 2-3 TOPOGRAPHIC MAP

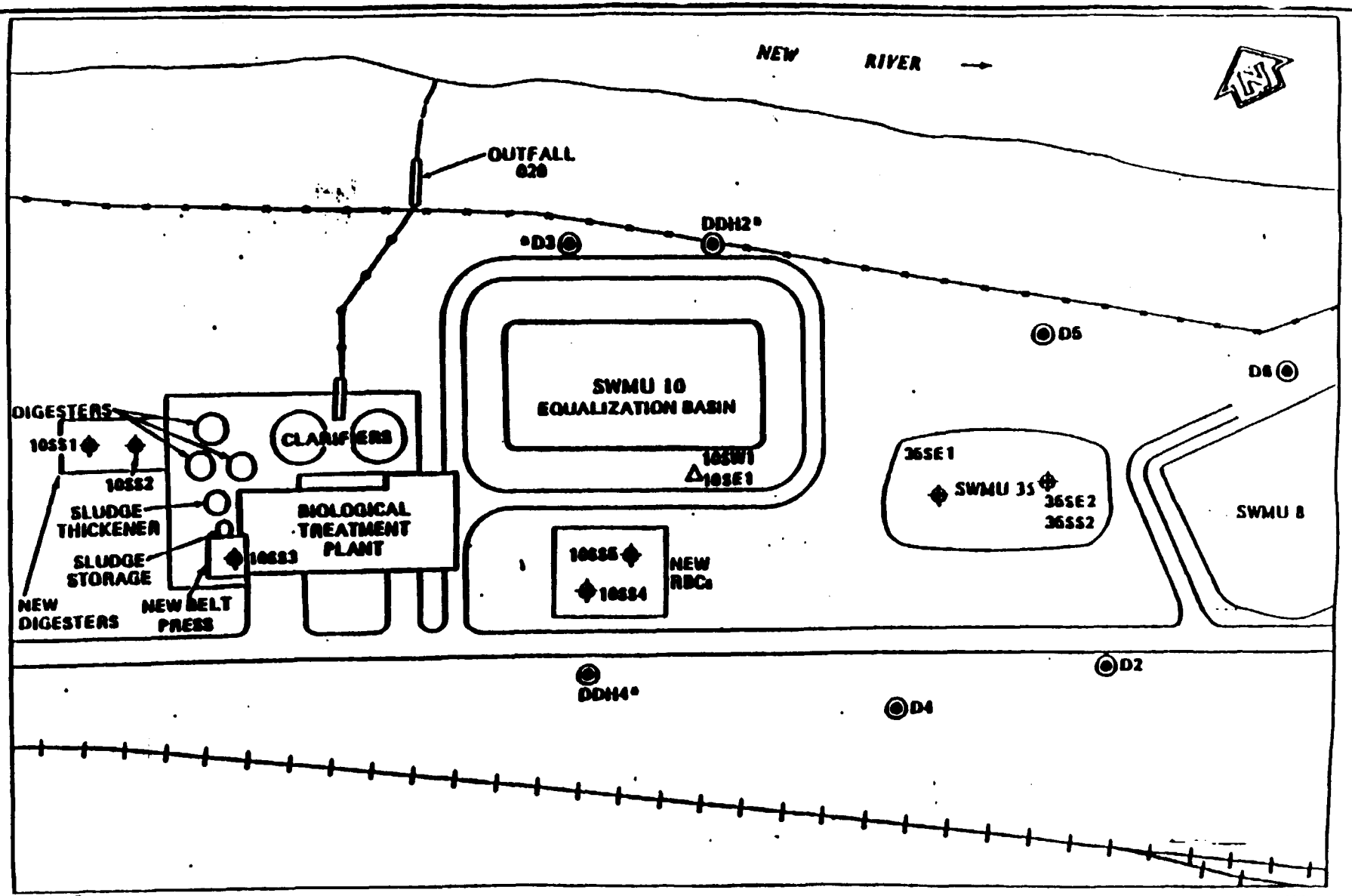
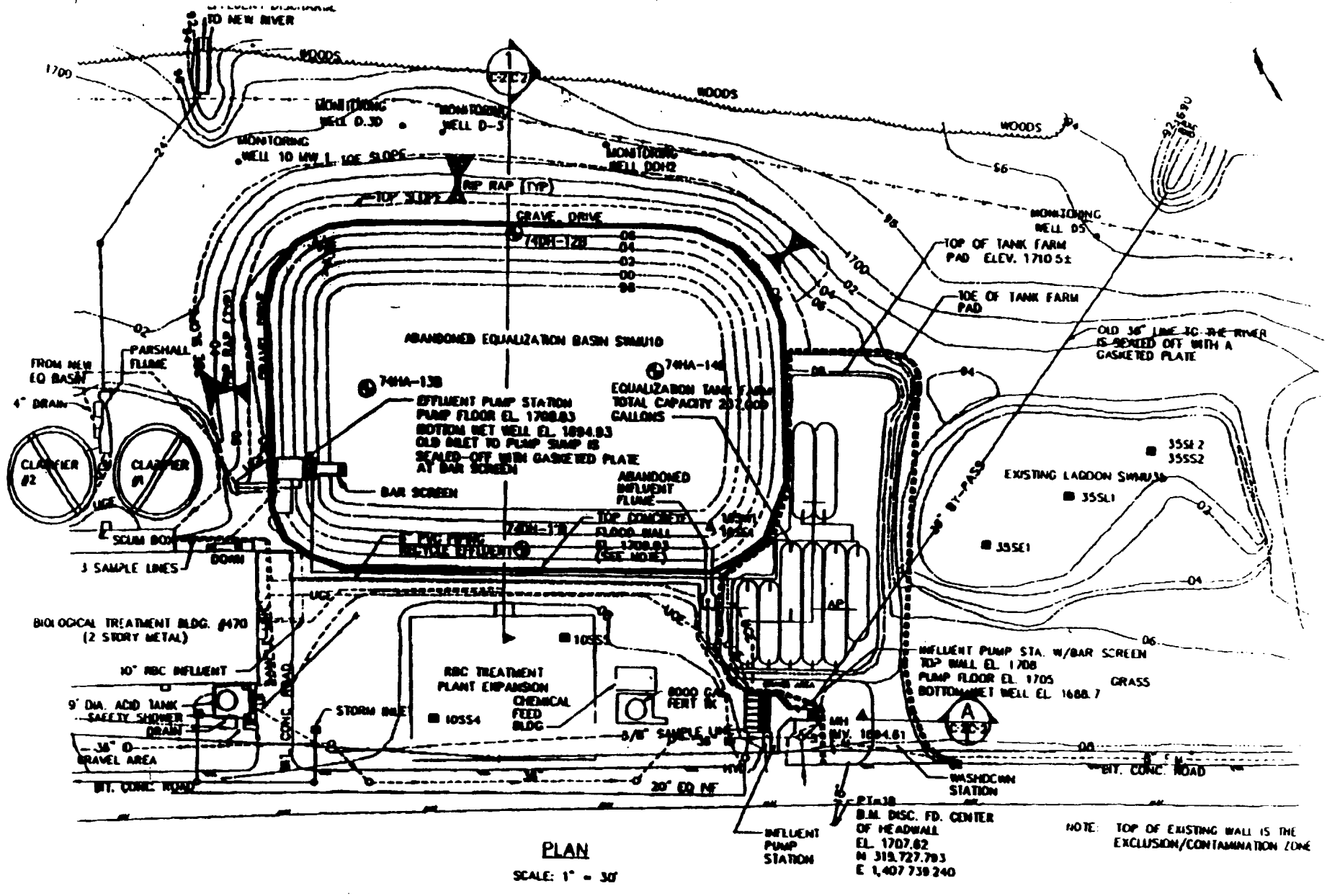

NEW RIVER
OUTFALL 020
DDH2*
*D3
D5
D8
SWMU 10
EQUALIZATION BASIN
10SW1
10SE1
36SE1
SWMU 35
36SE2
36SS2
SWMU 8
DIGESTERS
10SS1
10SS2
CLARIFIERS
SLUDGE THICKENER
BIOLOGICAL TREATMENT PLANT
SLUDGE STORAGE
10SS3
NEW DIGESTERS
NEW BELT PRESS
10SS5
10SS4
NEW RBCs
DDH4*
D4
D2
LEGEND:
Soil Boring/Hand Auger
Waste Water/Sludge sample
Monitoring Well (* sampled)
SITE CHARACTERIZATION PROGRAM
RADFORD ARMY AMMUNITION PLANT, VIRGINIA
Dames & Moore

FIG. 2-4



PLAN

SCALE: 1" = 30'

FIGURE 1
3

PROPELLANTS MANUFACTURED BY RAAP

Categories of Propellant	Number of Propellants Manufactured	Major Chemical Constituent(s)	Weight Percent	Organic Solvents used in the Production of Solvent-Propellants
o Single-base propellants	15	nitrocellulose	40-100	diethyl ether ethyl alcohol
o Double-base propellants	31	nitrocellulose nitroglycerin	25-84 10-45	ethyl alcohol acetone
o Triple-base propellants	4	nitrocellulose nitroglycerin nitroguanidine	19-29 18-24 45-55	ethyl alcohol acetone
o Cast and extruded propellants	3	nitrocellulose nitroglycerin	49-54 31-37	nitroglycerin triacetine
o Miscellaneous	4	nitrocellulose nitroglycerin acetone propylene glycol dinitrate	0-65 0-16 0-59 0-77	acetone

Source: RCRA Part B Permit Application

TABLE 2-1 PROPELLANTS MANUFACTURED BY RADFORD

2.4 Wastewater Treatment Plant Background

The EQ Basin was equipped with four surface aerators and four subsurface jet injection type aerators. From the EQ Basin, the wastewater was pumped at a constant rate to the biological treatment system. As originally designed, the biological treatment system consisted of two parallel trains of six rotating biological contactors (RBCs). The first two RBCs in each train were designed to operate anaerobically; the remaining four units were to operate aerobically. Following start-up, it was discovered that the anaerobic RBCs were hindering plant performance, and they were subsequently converted to aerobic RBCS. At present, the plant is operating with 12 aerobic RBCs on line. These units have a total surface area of 611,200 square feet. The RBCs are run as three-stage systems, with the first two RBCs in each train operated as a single stage (USEPA, 1987).

From the RBC trains the wastewater flows to two circular, center-feed, peripheral weir clarifiers. Clarified effluent is discharged to the New River at NPDES Outfall No. 029.

Sludge handling consists of aerobic digestion, chemical conditioning, and belt press dewatering. The three digesters are maintained at about 75 percent of capacity to prevent overflows. The sludge from the digesters is a listed hazardous waste (KO44, sludge from the treatment of wastewater from explosives manufacturing (USAEHA 1980a)). Prior to February 1990, the sludge was landfilled in Fly Ash Landfill No.2 (SWMU 29); at present, it is containerized and shipped to an off-post hazardous waste landfill.

2.5 Type of Wastes Managed at the Facility

The major products of manufacture at Radford are explosives and rocket propellants. There are five major categories of propellants produced at the facility. These categories are:

- Single base propellants (primary constituent nitrocellulose);
- Double base propellants (primary constituents nitrocellulose and nitroglycerine);
- Triple base propellants (primary constituents nitrocellulose, nitroglycerine, and nitroguanidine);
- Cast and extruded propellants; and
- Miscellaneous items

"Off-specification" propellants which do not meet Army production standards and "NG slums" are the waste materials which are treated and incinerated at the facility. NG slums are generated from cleanup of nitroglycerine (NG) in the production process and contain nitroglycerine, sawdust (to absorb the liquid), and triacetin (to desensitize the NG). All of the waste materials described above are regulated as hazardous waste by virtue of the fact that they exhibit the hazardous characteristic of reactivity pursuant to VHWMR § 3.8.

3.0 CLOSURE PLAN

3.1 Introduction

The following closure plan for the EQ Basin has been prepared to meet the requirements of VHWMR Sections 9.6.L, 10.6 and 10.10.I.

3.2 Closure Performance Standards

Upon approval and implementation, and in accordance with VHWMR § 9.6., this plan will close the facilities and site in a manner that:

- Minimizes the need for further maintenance, and
- Controls, minimizes or eliminates, to the extent necessary to prevent threats to human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to the ground or surface waters or to the atmosphere.
- Complies with the closure and post closure care requirements of § 9.6. and 9.10.F.

Groundwater will be monitored in accordance with the Groundwater Quality Assessment Plan (as updated) until:

- "Clean" closure for both saturated soils (groundwater) and unsaturated subsoils have been demonstrated; or,
- A post-closure care permit for the cap maintenance and/or groundwater monitoring requirements is obtained.

The specific procedures and criteria for determining "clean" closure with respect to groundwater will be specified in the Groundwater Quality Assessment Plan (as updated).

The closure performance standards will be accomplished by; (1) demolition, removal and decontamination of piping, pumps and concrete; (2) subsoil sampling to identify any contaminated soil requiring removal; (3) either contamination removal or closure in-place by executing the contingent closure plan; and (4) completion of the requirements contained in the groundwater quality assessment plan (as updated).

If clean closure is not economically feasible, Radford may abandon attempts to clean close the soils (if found to be contaminated) and close any remaining contamination in place by closing with a landfill cap. The procedures to meet these performance standards are detailed herein.

Sampling of the subsoils to show that constituent levels are not statistically higher than background concentrations will be the demonstration for clean closure for soils. If subsoils cannot feasibly be shown to have statistically less than or equal to background levels of constituents, then the facility can attempt a clean closure by use of health based standards. Changing the performance standards from background to health based standards or Risk Based Criteria requires a closure plan modification. A closure modification could be discussed and agreed upon by Radford and VDEQ prior to a closure plan modification submission by Radford. The facility retains the option at any time to abandon a clean closure attempt, and to close as a landfill as delineated in § 9.13 and the contingent closure plan in section four of this plan.

3.3 General Closure Approach

The water and sludges were removed from the EQ Basin prior to closure. The water and sludges were properly disposed of according to the VHWMR by transporting all hazardous waste to a permitted RCRA hazardous waste disposal facility by a Virginia permitted hazardous waste transporter. Pumps and ancillary piping will be removed and decontaminated. The perimeter flood control concrete wall will be removed and disposed of as appropriate. Soil sampling and testing will identify sub-soils to be removed for disposal. Testing of the subsoils will be performed to confirm that the closure performance standards have been met. Once any contamination has been removed, the excavation will be back-filled with clean soils, graded to promote positive drainage, and re-vegetated. Equipment will be decontaminated in an approved manner. The contaminated materials (i.e. possibly soils, sludges, concrete, pipes, pumps and equipment rinsate) will be tested for Hazardous Waste characteristics. If the contaminated material tests positive as a characteristic hazardous waste the contaminated material shall be transported to a permitted RCRA hazardous waste disposal facility by a permitted hazardous waste transporter. If the contaminated material does not exhibit any Hazardous Waste characteristic the contaminated material shall be disposed of in accordance with the VSWMR. In the event Radford abandons the clean closure attempt, the basin

will be backfilled with clean soils to promote positive drainage, and covered with a RCRA 2-1-2 composite clay cap. If the soils close "dirty", the post closure permit will include soil and groundwater post closure requirements.

3.4 Maximum Waste Inventory

The maximum inventory of waste that could be placed in the unit at any one time over its active life was 1.35 million gallons, which is the reported maximum capacity of the impoundment.

3.5 Analyte List

The analyte list, or the hazardous constituents of concern, are defined as those materials which may have come into contact with the unit during its lifetime. Hazardous constituents of concern for this closure are based on knowledge of the plant's operational history. The following table 3-1 lists the hazardous constituents of concern for closure. The associated analysis methods and detection limits are also provided.

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
1	Acrolein; 2-Propenal	8030A 8240A 8316	7 (5) 300	7 - -
2	Aldrin	8080A 8081 8250A 8270B	0.04 0.34 19 (10)	3 22 1,300 -
3	Arsenic	6010A 6020 7060A 7061A 7062	530 0.2 10 20 10	530 0.2 10 20 10
4	Barium	6010A 6020 7080A 7081	20 0.2 1,000 -	20 0.2 1,000 -

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
5	Benzene	8020A 8021A 8240B 8260	2 0.09 5 1	2 **0.09** 5 5
6	Beryllium	6010A 6020 7090 7091	3 0.2 50 2	3 0.2 50 **2**
7	Bis(2-chloroethoxy)methane; Bis(2-chloromethoxy)ethane; Ethane, 1,1'-[methylenebis(oxy)]bis[2chloro	8010B 8110 8250A 8270B 8410	- 5 53 10 -	- **5** 3,600 660 -
8	Bis(2-chloroethyl)ether	8110 8250A 8270B 8410	3 57 10 -	**3** 3,800 660 -
9	Bis(2-chloro-1-methylethyl)ether; 2,2'dichlorodiisopropyl ether; Bis(2-chloroisopropyl) ether	8010B 8110 8250A 8270B 8410	- 8 57 10 -	- **8** 3,800 660 -
10	Bis(2-ethylhexyl)phthalate	8060 8061 8250A 8270B	20 2.7 25 -	1,000 **180** 1,700 -
11	Butyl benzyl phthalate; Benzyl butyl phthalate	8060 8061 8250A 8270B 8410	3.4 0.42 25 10 -	230 **28** 1,700 660 -
12	Cadmium	6010A 6020 7130 7131A	40 0.2 50 1	40 0.2 50 **1**
13	Carbon disulfide	8240B	100	**100**

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
14	Carbon tetrachloride	8010B 8021A 8240B 8260	0.03 0.1 5 1	**0.03** 0.1 5 5
15	Chlordane	8080A 8081 8250A 8270B	0.14 0.37 (10) -	**9.4** 15 (200) -
16	Chlorobenzene	8010B 8020A 8021A 8240B 8260	0.01 2 0.03 5 1	**0.01** 2 **0.03** 5 5
17	p-Chloro-m-cresol; 4-Chloro-3-methylphenol	8040A 8270B 8410	3.6 20 -	**240** 1,300 -
18	Chloroform; Trichloromethane	8010B 8021A 8240B 8260	0.02 0.2 5 1	**0.02** 0.2 5 5
19	2-Chlorophenol	8040A 8250A 8270B 8410	3.1 33 10 -	**210** 1,300 660 -
20	Chromium	6010A 6020 7090 7191	70 0.2 500 10	70 0.2 500 **10**
21	Cyanide	9010A 9012	20 -	**20** -
22	trans-1,2-Dichloroethylene	8010B 8021A 8240B 8260	0.02 0.5 5 1	**0.02** 0.5 5 5

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
23	Di-n-butyl phthalate	8060	3.6	240
		8061	3.3	**220**
		8250A	25	1,800
		8270B	10	-
		8410	-	-
24	Dieldrin	8080A	0.02	**1.3**
		8081	0.44	-
		8250A	25	1,700
		8270B	(10)	-
25	Diethyl phthalate	8060	4.9	330
		8061	2.5	**170**
		8250A	19	1,300
		8270B	10	660
26	2,4-Dimethylphenol	8040A	3.2	**210**
		8250A	27	1,800
		8270B	10	660
27	Dimethyl phthalate	8060	2.9	**190**
		8061	6.4	430
		8250A	16	1,100
		8270B	10	660
		8410	-	-
28	4,6-Dinitro-o-cresol; 4,6-Dinitro-2-methylphenol	8040A	160	11,000
		8270B	50	**3,300**
		8410	-	-
29	2,4-Dinitrotoluene	8090	0.2	**13**
		8250A	57	3,800
		8270B	10	660
		8330	0.02	250
		8410	-	-
30	2,6-Dinitrotoluene	8090	0.1	7
		8250A	19	1,300
		8270B	10	660
		8330	0.31	260
		8410	-	-
31	Di-n-octyl phthalate	8060	30	2000
		8061	0.49	**33**
		8250A	25	1,700
		8270B	10	660
		8410	-	-

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
32	Endosulfan I	8080A 8081 8250A 8270B	0.14 0.3 (10) -	9.4 21 (200) -
33	Endosulfan II	8080A 8081 8250A 8270B	0.04 0.4 - -	3 24 - -
34	Endrin	8080A 8081 8250A	0.06 0.39 (10)	4 36 (200)
35	Fluoranthene	8100 8250A 8270B 8310 8410	(200) 22 10 2.1 -	(200) 1,500 660 140 -
36	Fluorene	8100 8250A 8270B 8310 8410	(200) 19 10 2.1 -	(200) 1,300 660 140 -
37	Heptachlor	8080A 8081 8250A 8270B	0.03 0.4 19 (10)	2 20 1,300 -
38	Heptachlor epoxide	8080A 8081 8250A 8270B	0.83 0.32 22 (10)	56 21 1,500 -
39	Hexachlorobenzene	8081 8120A 8121 8250A 8270B 8410	- 0.5 $5.6x10^{-2}$ 19 10 -	- 30 3.8 1,300 660 -

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
40	Hexachlorobutadiene	8021A	0.2	**0.2**
		8120A	3.4	230
		8121	$1.4X10^{-2}$	0.94
		8250A	9	600
		8260	1	5
		8270A	10	660
		8410	-	-
41	Hexachlorocyclopentadiene	8081	-	-
		8120A	4	300
		8121	2.4	**160**
		8250A	-	-
		8270B	10	660
		8410	-	-
42	Hexachloroethane	8120A	0.3	20
		8121	$1.6x10^{-2}$	**1.1**
		8250A	16	1,100
		8270B	10	660
		8410	-	-
43	Lead	6010A	420	420
		6020	0.2	0.2
		7420	1,000	1,000
		7421	10	**10**
44	Mercury	7470A	2	**2**
		7471A	2	**2**
45	Methoxychlor	8080A	1.8	**120**
		8081	-	-
		8250A	-	-
		8270B	10	-
46	Methyl bromide; Bromomethane	8010B	0.3	**0.3**
		8021A	11	11
		8240B	10	10
		8260	1	5
47	Methyl chloride; Chloromethane	8010B	0.1	**0.1**
		8021A	0.3	**0.3**
		8240B	10	10
		8260	1	5

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
48	Methylene chloride; Dichloromethane	8010B 8021A 8240B 8260	- 0.2 5 1	- 0.2 5 5
49	Methyl Ethyl Ketone; 2-Butanone; MEK	8015A 8240B	- 100	- 100
50	Naphthalene	8021A 8100 8250A 8260 8270B 8410	0.6 (200) 16 1 10 -	0.6 (200) 1,100 5 660 -
51	Nickel	6010A 6020 7520	150 0.2 400	150 0.2 400
52	Nitrobenzene	8090 8250A 8270B 8330 8410	36 19 10 6.4 -	2400 2,400 660 260 -
53	N-Nitrosodimethylamine	8070 8250A 8270B 8410	1.5 - (10) -	1.5 - - -
54	Pentachlorophenol	8040A 8151 8250A 8270B 8410	5.9 0.76 36 50 -	400 1.6 2,400 3,300 -
55	Phenol	8040A 8250A 8270B 8410	1.4 15 10 -	94 1,000 660 -
56	Polychlorinated biphenyls; PCBs	8080A (8250)	(50) (100)	3,000 (2,000)

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
57	Selenium	6010A 7740 7741A 7742	750 20 20 30	750 **20** **20** **30**
58	Silver	6010A 6020 7760A 7761	70 0.2 100 2	70 0.2 100 **2**
59	Tetrachloroethylene; Tetrachloroethene; Perchloroethylene; PCE	8010B 8021A 8240B 8260	0.01 0.4 5 1	**0.01** **0.4** 5 5
60	Thallium	6010A 6020 7840 7841	400 0.2 1,000 10	400 0.2 1,000 **10**
61	Toluene	8020A 8021A 8240B 8260	2 0.1 5 1	2 **0.1** 5 5
62	Toxaphene	8080A 8081 8250A	2.4 0.86 -	160 **57** -
63	1,2,4-Trichlorobenzene	8021A 8120A 8121 8250A 8270B 8260 8410	0.2 0.5 1.3 19 10 1 -	0.2 30 87 1,300 660 **5** -
64	1,1,1-Trichloroethane; Methyl chloroform	8010B 8021A 8240B 8260	0.01 0.3 5 1	**0.01** 0.3 5 5
65	1,1,2-Trichloroethane	8010B 8021A 8240B 8260	0.07 - 5 1	**0.07** - 5 5

No.	TABLE 3-1 HAZARDOUS CONSTITUENTS OF CONCERN	SW-846 METHOD	PQL µG/L (WATER)	PQL µG/Kg (SOIL)
66	Trichloroethylene; Trichloroethene	8010B 8021A 8240B 8260	0.01 0.1 5 1	**0.01** 0.1 5 5
67	Trichlorofluoromethane	8010B 8021A 8240B 8260	(10) 0.3 (5) 1	(10) **0.3** - 5
68	2,4,5-Trichlorophenol	8250A 8270B 8410	- 10 -	- **660** -
69	2,4,6-Trichlorophenol	8040A 8250A 8270B 8410	5.8 27 10 -	**390** 1,800 660 -
70	Vinyl chloride	8010B 8021A 8240B 8260	0.06 0.2 10 1	**0.06** 0.2 10 5

3.6 Cleanup Targets

Closure to background levels will constitute soil's clean closure. Background levels will be determined from soil samples collected in areas that have not been affected by the operation of the EQ Basin. Background soil samples will be collected in an area with a depositional environment similar to the sediments underlying the EQ Basin, i.e., same approximate depth, color, odor, etc. The sampling analysis section of the closure plan includes detailed information on background sampling. The groundwater monitoring plan (as updated) outlines the procedures and protocols necessary to demonstrate that the groundwater is either "clean" or a that a release from the unit has occurred.

3.7 Procedures for Removing, Transporting, Treating, and Disposing of Wastes

VHWMR Section 10.10.I.1.a requires that all sludge and other contaminated components of the Basin (i.e. piping, pumps, concrete, liner materials, subsurface soils, etc.) be decontaminated or removed for surface impoundment soils to be "clean closed". To meet these requirements, Radford will remove all contaminated materials.

3.7.1 Removal of Wastewater and Sludge

The wastewater shall removed to a "FRAC" tank and then disposed of as an K044 waste and appropriate characteristic wastes at an approved RCRA hazardous waste treatment, storage, or disposal facility by a permitted hazardous waste transporter. The remaining sludge in the Basin shall be solidified using coal combustion by-products "flyash", as approved by VDEQ. The solidified sludge shall then be disposed of as K044 waste and appropriate characteristic wastes at an approved RCRA hazardous waste treatment, storage, or disposal facility by a permitted hazardous waste transporter. All hazardous waste generator requirements of VHWMR Parts V and VI shall be followed. No wastes will be stored for greater than 90 days.

3.7.2 Concrete Flood Control Protection Perimeter Wall Removal

In 1986/87, flood control protection was added via a 5.5' x 0.67' concrete perimeter wall embedded 2.5' into the 10.5' dike. This provided an additional 2' of freeboard. The liquid in the impoundment never reached a level that touched the concrete perimeter wall, based on daily visual inspections of the unit. The concrete flood control protection perimeter wall must be removed for clean closure. All hazardous waste generator requirements of VHWMR Parts V and VI will be followed. Four randomly located

concrete chip samples will be taken from the wall and analyzed for Hazardous waste characteristics. If the chip samples do not exhibit any hazardous waste characteristics the concrete may be disposed of in accordance with VSWMR, at a permitted CDD landfill.

3.7.3 Ancillary Equipment Decontamination and Removal

All ancillary equipment which is not decontaminated will be disposed of based on analytic test results or assumed to be a hazardous waste. The piping, drains, concrete, and pumps will be removed and decontaminated or disposed of according to the VHWMR and VSWMR. Piping, valves, and pumps will be dismantled and placed in a washdown station. Decontaminated piping can be disposed of as scrap metal. The concrete sump and flow gate areas will be excavated, demolished, and disposed of in accordance with the disposal options set forth in section 3.7.2. (the flood wall). If in good condition and successfully decontaminated, pumps, valves, and piping can be placed in storage for possible future use. Pipes, pumps, concrete, and valves which cannot be decontaminated will be transported to a permitted RCRA hazardous waste disposal facility by a permitted hazardous waste transporter. The materials will be transported by a permitted hazardous waste transporter to a RCRA approved hazardous waste treatment, storage, or disposal facility. All hazardous waste generator requirements of VHWMR Parts V and VI will be followed.

3.7.4 Removal of Sludges

Sludges were removed, treated and disposed of in accordance with VHWMR. Rainwater accumulated in the basin after the sludges have been removed will be pumped into the headworks of the Biological treatment Plant.

3.7.5 Soil Liner Removal

The investigation/assessment described herein will be implemented to determine hazardous waste characteristics associated with the one foot thick soil liner and to determine if clean closure of the soil cement is achievable.

Data will be collected by performing the following tasks:

- Collect sufficient data to determine the horizontal and vertical extent of contamination in the soil cement liner. (This will entail sampling laterally, and possibly expanding the testing grid)
- Collect sufficient data to calculate the quantities of the affected soil cement liner.
- Statistically compare samples to representative background samples for designated closure parameters to evaluate achievement of clean closure.

The soil cement liner will be tested for the established HCOCs according to the methods outlined herein. If found to exhibit a characteristic of hazardous waste, then the soil cement liner will be placed in plastic-lined trucks or containers and transported to an approved RCRA hazardous waste, treatment, storage or disposal facility by a permitted hazardous waste transporter. If the soil cement liner does not exhibit characteristic but is statistically above the calculated background level the soil cement liner will be handled in accordance with VSWMR.

The contingent closure plan may be implemented at any time Radford decides to abandon the clean closure attempt. A determination of the appropriate point to discontinue excavation and begin implementation of the contingent closure plan will be based on actual field conditions encountered.

The Basin will be excavated as rapidly as possible to lessen the possibility of a precipitation event that may transport contaminants through the unsaturated zone to the New River. Radford will schedule and plan the excavation work appropriately after analytical testing of the soil cement liner to limit the occurrence of contaminant transport due to exposure by excavation. Visually contaminated soil cement liner may be excavated and removed as removal excavation progresses.

3.7.6 Subsoil Investigation

The investigation/assessment described herein will be implemented to determine whether residual hazardous waste constituents associated with the wastewater leached into the underlying subsoils, and to determine if clean closure of the soils is achievable. All hazardous waste materials excavated will be transported by a permitted hazardous waste transporter to a RCRA approved hazardous waste treatment, storage, or disposal facility. All hazardous waste generator requirements of VHWMR Parts V and VI will be followed. Data will be collected by performing the same tasks outlined in the previous section.

The subsoils will be tested for the constituents in Table 3-1 according to the methods outlined. If subsoils are found to exhibit a characteristic of hazardous waste, then the subsoils will be placed in plastic-lined trucks or containers and transported to an approved RCRA hazardous waste, treatment, storage or disposal facility by a permitted hazardous waste transporter. If the subsoils do not exhibit characteristic but is statistically above the calculated background level the subsoils will be handled in accordance with VSWMR.

The contingent closure plan or a request to modify the closure plan to incorporate Risk Based Closure may be implemented at any time Radford decides to abandon the clean closure attempt. A determination of the appropriate point to discontinue excavation and begin implementation of the contingent closure plan or request to modify the closure plan to incorporate Risk Based Closure will be based on actual field conditions encountered.

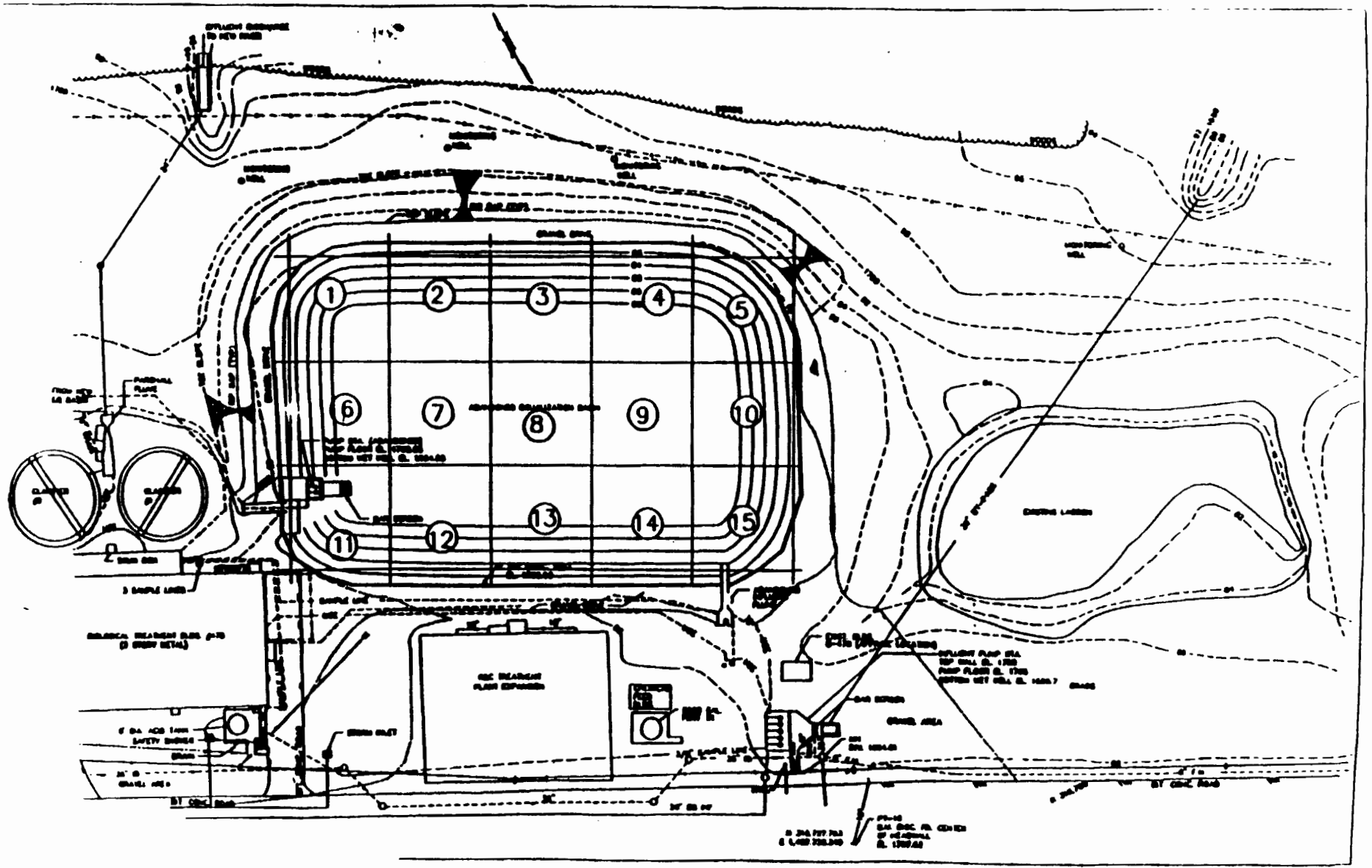
The Basin will be excavated as rapidly as possible to lessen the possibility of a precipitation event that may transport contaminants through the unsaturated zone to the New River. Radford will schedule and plan the excavation work appropriately after analytical testing of the subsoil to limit the occurrence of contaminant transport due to exposure by excavation.

3.8 Overview of Subsoil Testing Program

To show that a hazardous waste unit is statistically clean, a testing program is required which carefully and adequately assures quality while minimizing field and lab errors. Inadequate sampling and analysis can lead to incorrect conclusions about a unit, and Radford will perform sampling and analyses in a methodical and efficient manner to draw appropriate conclusions about the state of the subsoils. The following soil sampling and analysis plan details the necessary sampling procedures and analysis methods that will be employed to verify clean closure of the soils.

This section describes the specific assessment protocols to be utilized to determine if clean closure can be achieved for the EQ Basin subsoils. The methodology presented below is based on meeting the data requirements outlined. Figure 3-1 shows the 15 grid nodes developed for the basin. The grid consists of 50'x50' sections.

LOCATION OF POSSIBLE SAMPLING POINTS



The plan described below was developed in accordance with sound standard statistical methods. All data obtained will be reviewed, summarized, and analyzed according to the methods described in this section. Statistical techniques used throughout the analysis will be clearly explained and will be supported by citing appropriate references. Full citations can be found in the References. The closure plan consists of the followings aspects:

- Background characterization
- Initial random sampling of the subsoils
- Possible excavation, repeated sampling, or contingent closure
- Repeat excavation and sampling or contingent closure
- "Hot spot" sampling of the subsoils if random sampling indicates hot spots exist.

The initial random sampling will be conducted to determine if clean closure can be achieved and whether soil removal will be required to achieve clean closure. A "hot spot" sampling approach may be used to better delineate contaminated areas for excavation and subsequent disposal, depending on the results from random sampling. The samples will be discrete samples. Radford Army Ammunition Plant reserves the option, at any point during the EQ Basin subsoils assessment, to abandon attempts to demonstrate clean closure and immediately implement contingent and contingent post closure, or to request to modify the closure plan to incorporate health based criteria.

The subsoils will be evaluated by collecting a minimum of seven soil borings, randomly distributed across the grid nodes. Samples will be collected at the surface (0-3 inches), 6 inches, 12 inches, 18 inches, and

24 inches. The samples will be analyzed by vertical stratum for the established hazardous constituents of concern. If analytical results of the surface samples are below the generated background cleanup goal, the unit will be considered clean and no additional sampling and analysis will be performed.

If the surface samples' analytical results are statistically above background levels, each successive set of samples (6 inches, 12 inches, 18 inches, 24 inches) will be analyzed until all sample analytes are statistically below the background levels of constituents. The subsoils will be excavated to the depth where all sample analytes are below the background levels.

Alternatively, Radford may choose to sample, test, and compare each one of the 15 sampling node locations. The nodes located as "hot spots" by this testing will then be excavated to a point where the sample analytes are below clean-up goals.

If random sampling indicates that contamination is widespread across the EQ Basin in a layer, then the layer may be excavated without performing additional sampling to reduce sampling costs. On the other hand, if it appears that contamination is localized, more sampling and testing may be performed with the intention of reducing disposal costs.

If random sampling results in a node sample above the critical background value, then the entire representative six inch lift must be excavated. During hot spot sampling, only the node which exceeds the critical value must be excavated. The excavation of "hot spot nodes" will be the entire 50'x50' grid.

A sufficient number of samples will be analyzed to statistically confirm clean closure. Sample values will be compared to the upper tolerance limits as discussed in "Background Sampling". Data values reported as less than the Practical Quantitation Limit will be treated as one half (½) the Practical Quantitation Limit (PQL) unless the facility chooses another method in accordance with the methods outlined in Guidance on Statistical Methods for Groundwater Data Analysis at a Solid Waste or Hazardous Waste Site, Virginia Department of Environmental Quality, Office of Waste Resource Management, 1994, and by the procedures summarized in Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance (April, 1989).

If the samples taken at any level contain hazardous constituents of concern statistically above the background levels, a decision may be made to continue sampling and excavation, discuss with VDEQ health based performance standards, or to implement the contingent closure plan. A determination of the appropriate point to discontinue excavation and begin implementation of the contingent closure plan or discuss health based performance standards will be based on actual field conditions encountered.

3.8.1 Background Soil Sampling

Background conditions will be established as follows. Four background samples are the minimum number to achieve statistically usable background data. VDEQ recommends 8 background sampling locations for Radford's EQ Basin Closure. It is Radford's option to select more than eight background sampling locations to provide variance in the statistical background. The sampling locations shall be in soil geologically similar to the soil under the concrete EQ Basin liner. These background sample locations will be selected from an area of the plant reasonably assumed (based on general knowledge of the area and plant operations) to be uncontaminated by any industrial activities that could have resulted in past or

present releases of hazardous constituents. Background soil sample results along with the quality assurance quality control (QA QC) documentation required by SW-846 will be submitted to the VDEQ prior to performing statistical comparisons for approval of background soil sample locations. All data will be verified via Data Quality Objectives (DQO). Data quality objectives must be met before performing statistical comparisons. The DQO verification process includes checking if the appropriate analytical method for each analyte was used, check if laboratory reported PQLs are appropriate, and are they below the required performance standard. For example, the method with the lowest detection limit does not have to be used once the performance standard (background) is established, as long as the method detection limit is below that performance standard. The DQO must be validated for the sampling data to be statistically useful.

Standard statistical methods will be used to test assumptions of normality and to check for possible data outliers; techniques supported by the statistical literature will be used, and relevant references will be cited; (i.e, "Outliers in Statistical Data," V. Barnett and T. Lewis, 1984). For normality, Shapiro-Wilk test is appropriate. For outliers, test methods presented in the EPA guidance on "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance, April 1989, page 8-11, or ASTM Papers: E-178-80 & E-178-75, Standard Practice for Dealing with Outlying Observations or other procedures published in a peer reviewed Journal is appropriate.

Any outlier data identified will either be:

- Replaced by data obtained in a subsequent supplemental background sampling effort;
- Replaced by the sample value closest to the outlier value (if no further supplemental background sampling is conducted); or

If any other method(s) are identified to handle outliers, justification will be provided for the use of the selected method(s).

Data transformations will be applied, as needed, to ensure that the key assumptions are met when computing interval estimates and/or conducting hypothesis tests. We need to mention that data transformation must be used cautiously when constructing tolerance and confidence intervals. For example, depending on the data set, a log-transformation tolerance limit could be an entire order of magnitude higher than the maximum value in the background sample. This is one reason why log-transformation should not be used as a default procedure for parametric statistical test methods in detecting contamination. Therefore, the default method for determining the background value will be the highest value of the background data, when the data is not normal or not log-transformed normal.

Radford Army Ammunition Plant reserves the option to take additional background samples for purposes of determining whether collected data are non-normal so that appropriate adjustments can be made.

Special handling will be required for samples with "not-detected" values as the analytical result. Therefore, the attached "Guidance on Statistical Methods for Groundwater Data Analysis", version 2.0 dated August 10, 1995, will be used to determine the procedure for non-detects. The number and type of non-detects will determine the procedure and thus numerical replacement for "not detected."

After an appropriate assessment of the background data is conducted and the data are formally approved by the VDEQ, a background critical value will then be calculated based on a one-sided upper tolerance limit.

3.8.2 Initial Physical Observation

Radford Army Ammunition Plant may observe physical signs of contamination including discoloration of subsoils, odor, X-ray fluorescence (XRF), or others. If physical signs of contamination are observed, Radford reserves the option to excavate potentially contaminated subsoils until the physical signs of contamination are no longer apparent prior to initial random sampling. XRF will analyze the soils samples for total lead. The XRF data will be used to guide the excavation and aid in removal of contaminated soils prior to initial random sampling. While XRF can be a screening tool for removal, all removed soils must be appropriately characterized. Soil material shall be disposed of in accordance with VHWMR and VSWMR.

3.8.3 Random Sampling

Random sampling is the preferred first sampling event strategy to minimize sampling cost and to characterize the subsoils. The sample grid will be assembled by field personnel prior to sampling. Wooden stakes or other suitable material will be used to mark all points along the sample grid.

A minimum of seven (7) soil borings, distributed randomly across the 15 grid nodes will be advanced to a depth of 24 inches. The seven nodes selected for sampling will be determined via use of a random number generator. All seven samples taken will be analyzed for each of the hazardous constituents of concern specified in this closure plan. Additional borings may be placed in areas of suspected contamination. Samples will be collected at the surface, 6 inches, 12 inches, 18 inches, and 24 inches.

In the event that the contaminated soils cannot be practically removed, then the contingent closure plan will be implemented. A determination of the appropriate point to discontinue excavation and begin implementation of the contingent closure plan will be based on actual field conditions encountered.

The surface samples will be collected using stainless steel hand corers. A stainless steel auger will be used for collecting the 6, 12, 18, and 24 inch samples. The auger will be forced down into the soil and then withdrawn. The bottom of the six inch soil layer will be placed in the sample container. If the desired depth cannot be reached using the hand auger or if the soil is tightly packed, then a portable power auger will be used for sample collection. Soil sampling will be performed in accordance with the representative sampling methods contained in VHWMR Appendix 3.2.

A random approach as described in SW-846 will be used to select sampling locations within the grid. Seven samples will be collected from each 6 inch lift, unless results indicate more samples will be needed. The equations in SW-846, Chapter nine, page 3 require calculating if enough samples were taken, which requires knowing a regulatory threshold value called "RT." The regulatory threshold value will be the critical value, calculated from the background, using a tolerance interval statistic. If testing results indicate more samples will be needed, this implies that the appropriate number of samples to collect for a lift is found to be more than the actual number of samples taken. The statistical equations for random sampling are shown in SW-846, Chapter nine, page 3. This random sampling approach discussed is based on a statistical confidence interval method. Thus, for a particular clean closure parameter, if the equations are satisfied for the number of samples, and the statistic of the individual random sample values is at or below the established background or health based level, then the EQ Basin subsoils will be considered "clean" with respect to that clean closure parameter and no further sampling for that parameter will be required.

However, if the statistic of the individual random sample values is above the established background or health based level, then the data will be evaluated for trends. Based on the random data generated, Radford may decide to excavate the whole representative lift based on the data, decide to abandon the clean closure attempt, or choose to further delineate any contamination via "hot spot" sampling (discussed below). The decisions to move from one method to another will be based on actual field conditions encountered.

3.8.4 "Hot Spot" Sampling

Based on the results of the initial random sampling, supplemental "hot spot" delineation sampling will be conducted for all clean closure parameters. (However, as previously noted, Radford reserves the option at any point in the sampling process to abandon attempts to achieve clean closure and immediately implement the Contingent Closure and Post-Closure Plans.)

With respect to the tolerance limit approach discussed herein as a hot spot methodology, many references can be cited, but the method and numbers quoted in this section come from Handbook 91, Experimental Statistics, United States Department of Commerce, National Bureau of Standards, issued August 1, 1963. From this reference (specifically pages 2 through 14 subsection 2.5.3), the upper tolerance limit for a normal distribution is as follows:

$$X_{cv}=X_{ave}+(K)(s)$$

where, X_{cv} is the critical value computed for the one sided upper tolerance limit;

X_{ave} is the computed average of the background samples;

s is the computed standard deviation of the background samples; and,

K is a theoretically-determined value given in a table.

The parameter K (or $K_{95\%,95\%}$) establishes the upper tolerance limit such that there is a 95% chance that at least 95% of the time, the actual constituent background concentration will be below this upper bound. The value of this parameter for eight samples (n=8) is 3.188. To establish clean closure of the soil, the results of the analyses of each sample will be compared to the upper tolerance limit for the HCOCs. If the values for each HCOC are below the respective upper tolerance limit, then the sample has been demonstrated to be "statistically clean."

The established statistical conditions are to be 95% confident that at least 99.75% of the background population can be expected to lie below the critical value, X_{cv}. Therefore, if a clean closure parameter observed in a EQ Basin soil sample yields a value that exceeds X_{cv}, then it will be concluded that the soil (in the sample's representative location) is statistically greater than background and must be removed to establish clean closure of the soil.

If implemented, the hot-spot delineation method will proceed as follows:

1. Additional sampling of the existing surface soil (0-6) inch layer will be conducted at the remaining (15-7=8) eight grid nodes not previously sampled under the previous random sampling effort. These additional samples will be analyzed for all clean closure parameters for which clean closure was not confirmed under the previous random sampling effort.
2. For all 15 grid nodes sampled, independent comparisons will be made of each individual node sample value to the background critical value (X_{cv}).

The parameter K (or $K_{95,95}$) establishes the upper tolerance limit such that there is a 95% chance that at least 95% of the time, the actual constituent background concentration will be below this upper bound. The value of this parameter for eight samples (n=8) is 3.188. To establish clean closure of the soil, the results of the analyses of each sample will be compared to the upper tolerance limit for the HCOCs. If the values for each HCOC are below the respective upper tolerance limit, then the sample has been demonstrated to be "statistically clean."

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2. For all 15 grid nodes sampled, independent comparisons will be made of each individual node sample value to the background critical value (X_{cv}).

The protocols detailed above will continue to be extended to soil layers below.

Discuss risk/health based performance standards, and modify the closure plan to incorporate risk based closure performance standards.

As previously stated, the facility reserves the option, at any point during the EQ Basin subsoils assessment, to abandon attempts to demonstrate clean closure based on background, and propose a closure plan modification based on health based performance standards with DEQ, or immediately implement contingent closure and post-closure.

3.9 Field Quality Control

To ensure the collection of representative samples, the following field quality control procedures will be utilized during the closure operations.

Equipment blanks will be collected after every 20th sample. If equipment blanks indicate contamination, then resampling will occur only if sample results are above cleanup levels. Samples will be analyzed for the hazardous constituents of concern identified in this document. Laboratory quality control will be according to the methods detailed in SW-846, Chapter 1, (as updated).

3.9.1 Sample Preservation and Maximum Holding Times

Soil samples usually require no preservation other than storing at 4°C until analyzed. The maximum holding times vary for different measurements. Table 3-2 provides the maximum holding times for certain inorganic and organic analyses. Although these criteria were specifically designed and tested for water samples, they are also applicable for soil sampling studies (Barth and Mason, 1984).

TABLE 3-2 REQUIRED CONTAINERS AND MAXIMUM HOLDING TIMES FOR SOIL SAMPLES

Name	Container	Maximum Holding Time
Inorganic Tests: Acidity	P,G	14 days
Alkalinity	P,G	14 days
Ammonia	P,G	28 days
Chemical Oxygen Demand	P	28 days
Cyanide, total and amenable to chlorination	P,G	14 days
Metals: Chromium VI	P,G	24 hours
Mercury	P,G	28 days
Metals, except chromium VI and mercury	P,G	6 months
Nitrate	P,G	48 hours
Nitrate-nitrite	P,G	28 days
Nitrite	P,G	48 hours
Oil and grease	G	28 days
Organic carbon	P,G	28 days
Orthophosphate	P,G	48 hours
Phenols	G only	28 days
Phosphorus (elemental)	G	48 hours
Phosphorus, total	P,G	28 days
Sulfate	P,G	28 days
Sulfide	P,G	7 days
Sulfite	P,G	Analyze immediately
Organic Tests: Volatile Organics	4 ounce, (120 ml) wide mouth glass with teflon liner	14 days
Semivolatile Organics/Organochlorine Pesticides/PCBs	8 ounce, wide mouth glass with teflon liner	Samples must be extracted within 14 days and extract analyzed within 40 days following extraction.

Notes: Soil samples collected for purgeable organic compounds analyses shall be thoroughly mixed and containerized as soon as possible after sampling. The samples shall be placed in the sample container so that no head space is left in the container after the container is closed.

3.9.2 Split Samples, Spiked Samples and Blanks

Blanks, split samples and spiked samples are collected to provide a measure of the internal consistency of the sample collection and handling methodology and to provide an estimate of the components of variance and the bias in the analytical process. Samples can be split to:

- Provide a measure of the within sample variability.
- Provide material for spiking in order to test recovery.
- Provide a measure of the sample extraction error.

The component of variation that is measured by a split sample is determined by the location of the sample splitting. A field split measures errors associated with field handling and within sample variation. A split of samples made in the laboratory for extraction purposes measures the extraction error (Barth and Mason, 1984).

A true split of sediment, soil or sludge samples is almost impossible to accomplish under field conditions. The difficulty of splitting a sample increases as the sample's moisture content increases. The sample should be considered a duplicate sample, rather than a split sample (EPA Region IV, Standard Operating Procedures and Quality Assurance Manual, 1986).

Spike samples are made by adding a known amount of a reference chemical to one of a pair of split samples. The recovery of the analytical process is measured by comparing the analysis results of the spiked sample with the non-spiked sample. The difference in results provides a measure of the analytical bias.

Spike samples are difficult to prepare with soil material. Usually, the spike solution is added to the extract of the soil. Utilizing this procedure avoids the problem of mixing, etc., but does not provide a measure of the interaction of the chemicals in the soil with the spike nor does it provide an evaluation of the extraction efficiency. Due to these constraints, field spikes are not commonly used (Barth and Mason, 1984). Field spikes will not be used in these investigations.

Blanks are collected to provide measures of various cross-contamination sources, background levels in the reagents, decontamination efficiency and any other potential errors that can be introduced from sources other than the sample. The blanks associated with field QA/QC include the trip blank, field blank and equipment blank. A trip blank measures any contamination that may be introduced into the sample during shipment of containers from the laboratory to the field and back to the laboratory. A field blank measures input into the sample from contaminated air or dust. An equipment blank measures chemicals that may have been in the sample container or on the tools after equipment decontamination is complete.

The SW-846 recommends that QA/QC samples be collected at least once with every analytical batch with a minimum of once per twenty samples. This sampling frequency has also been stated in the document Soil Sampling Quality Assurance Users Guide (Barth and Mason 1984).

Table 3-3 presents a breakdown of the recommended field QA/QC procedures for soil sampling. The contracting laboratory may desire to collect more QA/QC samples than detailed. Prior to sampling, Radford will consult with the contracting laboratory about the appropriate QA/QC procedures. These procedures will be in accordance with SW-846 (as updated).

TABLE 3-3 FIELD QA/QC PROCEDURES FOR SOIL SAMPLES

PROCEDURE	COMMENTS
1. Field Blank	Field blanks are metal-and/or organic free water aliquots that contact sampling equipment under field conditions and are analyzed to detect any contamination from sampling equipment, cross-contamination from previously collected samples, or contamination from conditions during sampling (i.e. airborne contaminants that are not from the waste being sampled). One sample of site tap water will be collected every day in which tap water is used for decontamination purposes.
2. Duplicate Samples	Field duplicates are employed to document precision. The precision in sample duplicates is a function of the variance of waste composition, the variance of the sampling technique, and the variance of the analytical technique. Duplicate samples should be collected in the field by aliquotting a sample into separate containers. One duplicate sample will be collected for every twenty samples. The containers should be labeled as duplicate samples.
3. Trip Blanks	Trip blanks are used to detect any contamination or cross-contamination during handling and transportation. Trip blanks should accompany sample containers to an from the field. The appropriate trip blank containers should be filled with analyte-free water. Preservations and additives will be added as required for each parameter group. Trip blanks should be sealed and stored in an ice chest where real samples will be stored and transported. A pair of trip blanks will accompany each cooler containing empty or filled volatile sample containers.
4. Equipment Blanks	An equipment blank should be prepared for each parameter group sampled where a particular piece of sampling equipment was employed for sample collection and subsequently decontaminated in the field for use in additional sampling. The equipment blank should be composed in the field by collecting, in the appropriate container for the parameter group, a blank water rinse from the equipment (auger, pump tubing, etc.) after execution of the last step of the proper field decontamination protocol. Preservatives or additives must be added to the equipment blank where appropriate for each parameter group. The type and frequency of these samples are specified within the text discussing the extent of contamination sampling.

NOTES:
1) Reference: SW-846, Chapter Nine, Pages Nine 61-63; Chapter One Page 1-10.
2) Field QA/QC samples should be collected at least once with every analytical batch with a minimum of once per twenty samples.

3.9.3 Sampling Equipment Decontamination

All non-disposable sampling equipment will be decontaminated between each sample. Those sampling implements which cannot be decontaminated effectively will be containerized and properly disposed of based on sample analytical results.

The decontamination of sampling equipment (hand auger, scooplula, trowel, etc.) will be performed as follows and follows the decontamination procedures for sampling equipment (EPA Region IV, Standard Operating Procedures and Quality Assurance Manual, 1986.):

1. Clean with tap water and a soap solution (A phosphate-free laboratory detergent such as Alconox, Aliquinox, Liquinox will be used for cleaning) using a brush if necessary to remove particulate and surface films.
2. Rinse thoroughly with Radford's potable water.
3. Rinse thoroughly with deionized water.
4. Rinse thoroughly with organic-free water and allow to air dry as long as possible. If organic-free water is not available, allow equipment to air dry as long as possible. Do not rinse with distilled or deionized water.

All rinsate waters will be contained and analyzed for the constituents of concern prior to discharge. Disposal of rinsate will be performed based on sampling results and in accordance with the VHWMR. All sampling equipment will be decontaminated prior to sampling, between sample depths, and between samples unless new or dedicated (i.e. used only for one sample) equipment is used. Sampling equipment will be disposed of as hazardous waste at the conclusion of the sampling program, where appropriate.

Large equipment used for closure activities will be cleaned prior to its use on site. The decontamination of the larger sampling equipment will occur in a temporary constructed decontamination area. A 20-ft x 30-ft area will be graded with at least a 2% slope towards one corner of the area. The area will be lined with an appropriate plastic liner to prevent infiltration of decontamination water into the soils. The area will drain into a polyethylene container. Rinsate and other wastes generated during decontamination will be placed into 55 gallon drums. This proposed decontamination area has been designed so as not to meet the definition of a surface impoundment. Following closure, the large sampling equipment will be decontaminated using steam cleaning followed by a potable water rinse.

All wastes generated during the decontamination process will be accumulated in 55 gallon drums for less than 90 days accumulation.

The decontamination area's synthetic liner will be disposed of in accordance with the VHWMR and VSWMR. If analytical results show the liner is a hazardous waste by characteristic, then the liner will be transported via a Virginia permitted hazardous waste transporter and disposed of off-plant at an approved hazardous waste facility. If it is not hazardous, it will be disposed of in a permitted debris or sanitary landfill.

The rinsate collected during the decontamination process will be transferred to 55-gallon drums for storage until test results are received. If the water in the drums tests to be hazardous, it will be accumulated according to VHWMR, § 6.4.E., transported via a Virginia permitted hazardous waste transporter and disposed of off-plant at an approved hazardous waste facility. If it is not hazardous, it will be disposed of in the biological waste water treatment plant with VDEQ approval. Equipment blanks will be collected for decontamination quality control.

3.9.4 Sample Handling

Each sample jar should be clearly labeled with an identifying number, the point of sampling as documented on a diagram of the area, the time and date of sample collection, the name of the individual responsible for sample collection, and the parameters for analysis.

When the sample jars are shipped to the laboratory, a seal will be placed on the shipping container in such a way that the containers cannot be opened in transport without breaking the seal.

A chain-of-custody record will be maintained to document the responsibility for sample possession from the time of collection until the analysis is completed.

A field log book will be maintained. The sample location, the time, date, parameters for analysis, and approximate volume of each sample will be recorded. The appearance of the sample, the conditions at the time of sampling and any other relevant field observations will be recorded.

3.10 Sample Custody

Sample identification and chain-of-custody establishes the documentation and control required to identify and trace a sample from collection to completion of analysis. Sample identification and chain-of-custody will be maintained during all closure activities conducted at Radford Army Ammunition Plant through the following chain-of-custody procedures and documentation:

- Sample labels, which prevent misidentification of samples;
- Custody seals to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory;

- Field logbook and pictures to record information about closure activities and sample collection;
- Chain-of-custody record to establish the documentation necessary to trace sample possession from the time of collection to laboratory analysis; and
- Sample analysis request sheet to inform the laboratory of pertinent information noted in the field logbook.

The purpose of these procedures is to ensure that the quality of the sample is maintained during its collection, transportation, storage and analysis. A sample is in custody if it is (1) in someone's physical possession or view, (2) locked up, or (3) kept in a secure area that is restricted to authorized personnel. As few persons as possible should handle samples in the field. The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person. The site team leader for the closure activities will determine whether proper custody procedures were followed during field work and decide if additional samples are required.

3.10.1 Sample ID

Identification sample labels are to be attached to the field sample containers. Gummed paper labels or tags should be used. The tags should contain the following information:

1. Name of collector
2. Date and time of sample collection
3. RAAP-#10-XX-YY-ZZ
   where: RAAP = Site name (RAAP)
   #10 = Unit Number
   XX = Grid Location Number
   YY = Sample Depth (As depth below datum, i.e., bottom of concrete liner)
   ZZ = Special Code as follows:
   01-Normal Sample
   02-Duplicate Sample
   03-Field Blank
   04-Trip Blank
4. Type of sample with brief description (i.e., grab, composite, background, soil, liquid, concrete, bedding material; random, "hot spot", decontamination test, etc.)

Sample information will be printed on the label in a legible manner using waterproof ink. The identification on the label must be sufficient to enable cross reference with the laboratory logbook. Sample labels will be affixed to the sample containers prior to or at the time of sampling. The labels will be filled out at the time of collection. Custody seals are reprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Seals are placed over the cap of the individual sample

bottle and in as many places as possible on shipping containers. The seals will be affixed to the sample bottles and shipping containers before the samples and containers leave the custody of the sampling personnel. The custody seals will at a minimum contain the following information:

- Sample number (This number must be identical with the number on the sample label)
- Name of collector
- Date and time of sampling
- Place of collection

Field logbooks are necessary to provide sufficient data to enable field participants to reconstruct events that occurred during the closure activities. All pertinent sampling and field survey information will be recorded in a logbook. All logs will be kept in a waterproof bound notebook with numbered pages (8-1/2 by 11 inches). All entries will be printed in waterproof ink. No pages will be removed and corrections will be made by drawing a single line through the incorrect data and initializing and dating the correction that was made to the side of the error. Entries in the logbook should contain at a minimum the following information:

- Location of sampling point (and location code XX-YY-ZZ as stated above)
- Name and address of field contact
- Type of waste (i.e. soil, sludge, wastewater)
- Suspected waste composition, including concentrations (i.e, D008)
- Number and volume of samples taken
- Purpose of sampling (i.e. contract number, closure activities)
- Description of sampling point and sampling methodology
- Date and time of collection
- Collector's sample identification number
- Sample distribution and how transported (i.e. name of laboratory, UPS, Federal Express)
- References, such as maps or photographs, of the sampling site
- Field observations
- Any field measurements made (i.e. pH, conductivity)
- Signatures of personnel responsible for observations

A chain-of-custody record will accompany every sample. The record should contain the following information:

- Sample number
- Signature of collector
- Date and time of collection
- Place and address of collection
- Waste type
- Signature of persons involved in the chain of possession
- Inclusive dates of possession

Documentation of a photograph is crucial to its validity as a representation of an existing situation. Therefore, the following information regarding photographs will be recorded in the Field Logbook:

- Date, time, location of photograph
- Photographer
- Weather conditions
- Reasons why photograph was taken
- Sequential number of photograph and the film role number
- Camera lens system used

Once the photographs have been developed, this information will be recorded on the back of the photograph.

Photographs cannot be readily taken without the permission of Radford Army Ammunition Plant's Commanding Officer. Thus, prior to closure activities, a request will be made to the Commanding Officer asking for permission to photograph the closure activities.

A sample analysis request sheet will accompany the sample on delivery to the laboratory. The person who collects the sample will complete the field portion of the form. All pertinent information recorded in the field logbook will also be included on the sample analysis request sheet. The laboratory portion of the form will be completed by laboratory personnel. The following minimal information will be recorded:

- Name of person receiving the sample
- Laboratory sample number
- Date and time of sample receipt
- Sample allocation
- Analyses to be performed

All samples will be delivered to the laboratory as soon as practicable (usually within 1 or 2 days after sampling and samples must always be kept at 4°C). The sample will be accompanied by a chain-of-custody record and also by a sample analysis request sheet. The sample will be delivered to the laboratory personnel who is authorized to receive samples.

Sampling locations at the EQ basin will be marked with stakes and surveyed to determine the coordinate and elevation where possible. Once the stake is marked and in place, the area will be photographed. The stake will be marked with the appropriate station and/or sample number.

Samples collected from each location, other than those collected for on-site field measurements or analyses, will be identified by using a standard label which is attached to the sample container.
For sampling packing and shipping, Radford Army Ammunition Plant will comply with the U.S. Postal Service Regulations, Department of Transportation Regulations and/or the Virginia Regulations Governing Transportation of Hazardous Materials.

3.11 Data Reporting

During the EQ Basin Closure, the following data reporting will be conducted:

- Background soil sampling results along with the QA/QC documentation required by Chapter 1 of SW-846 will be submitted to the VDEQ prior to performing statistical comparisons for approval of background soil sample locations.
- Upon completion of the sub-soil assessment sampling, the data will be tabulated and the required statistical comparisons performed. The results will be submitted to the VDEQ for review. Based on the results, either:
- Clean closure will be achieved and the corresponding closure certification report will be prepared and submitted to the VDEQ.
- Additional soil removal efforts will be conducted in an attempt to achieve clean closure.
- Contingent closure and post closure will be implemented as detailed in this plan.

3.12 Groundwater Closure

Groundwater at the EQ Basin has been monitoring since 1981. An up to date monitoring plan was established in 1992 when the Part B Application was submitted. Background data was submitted in May 1995 to DEQ. The subsequent quarterly statistical data was submitted in the Fall of 1995. The Groundwater Quality Assessment Plan shall be the document that regulates groundwater closure at this site.

Groundwater will be monitored in accordance with the Groundwater Quality Assessment Program (as updated) until:

- Clean closure for both saturated soils (groundwater) and unsaturated soils (subsoils) have been demonstrated; or,
- A post-closure care permit is obtained for the unit.

The specific procedures and criteria for determining "clean" closure with respect to groundwater will be specified in the groundwater quality assessment plan (as updated). The procedures for determining clean closure for groundwater are outlined in detail in the groundwater quality assessment plan.

Background concentrations will be established for all wells, and for all constituents in Table 3-1. For each parameter on the "clean" closure list, specific statistical methods listed in the groundwater quality assessment plan will be used to make statistical comparisons.

3.13 "Clean" versus "Dirty" Closure and Post Closure Permitting (if required)

After the approved statistical well data comparison and subsoil sampling is performed and analyzed, the following three scenarios are possible:

1. If "clean" closure with respect to both the soil and groundwater is achieved, then no further groundwater monitoring will be required and a post closure permit will not be required.

2. If the soils are determined "clean" closed and the groundwater is not "clean" closed, then the groundwater will have been determined to have been contaminated. Therefore, quarterly sampling of the groundwater will be required, pursuant to the VHWMR § 9.5.D, during the post-closure care period and a post closure permit will be required.

3. If the soils are not clean closed and the groundwater is determined to be clean closed, then monitoring of the groundwater will be required pursuant to the VHWMR § 9.5.C and 10.5, during the post-closure care period. In addition, a final cover system will be placed over the area to address non-clean closure of soils and a post closure permit will be required.

The reader is referred to the separate Groundwater Quality Assessment Plan for further details on the groundwater monitoring system and groundwater sampling/analytical protocols.

3.14 Certification of Closure

Radford Army Ammunition Plant will provide for an independent licensed Professional Engineer in the Commonwealth of Virginia to verify that the EQ Basin was closed in accordance with this closure plan. The independent engineer's certification will include all documentation such as daily reports, test results, observations, photographs, etc. which demonstrate that the closure was completed in accordance with this approved plan.

The certification of closure will be submitted, by registered mail, to the Director of the Commonwealth of Virginia's Department of Environmental Quality. The certification will be submitted within 60 days of the completion of final closure. The certification will be signed by both the independent licensed Professional Engineer and the responsible official for Radford Army Ammunition Plant.

3.15 Closure Schedule

Efforts to closure the unit in accordance with the approved closure plan will commence immediately upon receipt of approval from VDEQ. The regulations require that the final closure of a hazardous waste unit be completed within 180 days of receipt of the Commonwealth of Virginia's written notice of approval (VHWMR Section 10.6.D.2). The regulations also state that an extension to the closure process may be approved by the Commonwealth of Virginia if the final closure activities will take longer than 180 days (VHWMR Section 10.6.D.2.a(1)). Table 3-4 shows the proposed closure schedule.

TABLE 3-4 CLOSURE SCHEDULE DURING CLEAN CLOSURE ATTEMPT	
Activity	Day
Closure Plan Approved	0
Sample Background Calculate Background Critical Value/ Submit Results to VDEQ for approval of background (DEQ response 7 days)	20
Remove and Decontaminate Piping, Pumps, Concrete	30
Take Soil Samples in Subsoil Assessment	40
Receive Lab Analyses/ Statistical Analysis and Submit to VDEQ	60-160
Remove contaminated soil/ resample/ or contingent close	60-160
Receive Additional Lab Analyses/ Statistical Analysis and Submit to VDEQ	60-160
Submit Monthly QA/QC Reports as Work Continues	monthly
Remove contaminated soil/ resample/ or contingent close	60-160
Repeat Sampling and Excavation as Necessary to "Clean" Close or submit a letter to VDEQ and go to Contingent Closure Plan	160
Equipment Decontamination	161
Receive Lab Analyses of Pre- and Post- Rinses	170
Submit Final Report of QA/QC on Work Performed	180-240

Should an extension be required to perform the necessary tasks, Radford will inform VDEQ of the need for an extension prior to moving off schedule. Please see the contingent closure plan's contingent closure schedule for estimates of construction times.

3.16 Clean Closure Excavation Filling

Once any contamination has been removed, the excavation will be back-filled with clean soils, graded to promote positive drainage, and re-vegetated.

4.0 CONTINGENT CLOSURE PLAN

4.1 Introduction

In the event that all contaminated soils cannot be practically removed, Radford will notify the Virginia Department of Environmental Quality, Waste Division and begin implementation of the following contingent closure plan and the contingent post-closure plan.

Knowledge of the EQ Basin, plus knowledge gained from attempting clean closure will be utilized in determining the area and boundaries of the landfill. The entire open area will be covered by the RCRA cap. If, during cap construction, additional information becomes available, cap coverage will be extended or reduced accordingly. All changes to the cap boundaries will be fully documented.

4.2 VHWMR Contingent Closure Plan Requirements (VHWMR Sections 10.10.I.1.b and 10.10.I.3.a(1))

Contingent closure plan requirements are outlined in VHWMR Section 10.10.I.1.b. These requirements consist of three main elements: (1) elimination of free liquids; (2) stabilization of remaining wastes to a bearing capacity sufficient to support a final cover; and (3) construction of a final cover designed and constructed to:

- Provide long-term minimization of the migration of liquids through the closed pond;
- Function with minimum maintenance;
- Promote drainage and minimize erosion or abrasion;
- Accommodate settling and subsidence so that the cover's integrity is maintained; and
- Have a permeability less than or equal to the permeability of any native subsoils present.

4.3 Contingent Closure Implementation

All free liquid will be removed, characterized, and disposed. Any sludge, soil liner, associated concrete structure, piping and bedding materials will be removed. Contaminated subsoils will then be removed as practicality dictates and as detailed in the closure plan. A final cover will then be installed if clean closure is no longer to be attempted or is no longer economically feasible.

4.4 Final Cover Design

A typical schematic of the multi-layer RCRA cover is illustrated in Figure 4-1. The cover will contain three layers. From the surface down these are: a top layer consisting of vegetation and soil; a soil drainage layer, and a low-permeability bottom layer. The design requirements for each layer are discussed below.

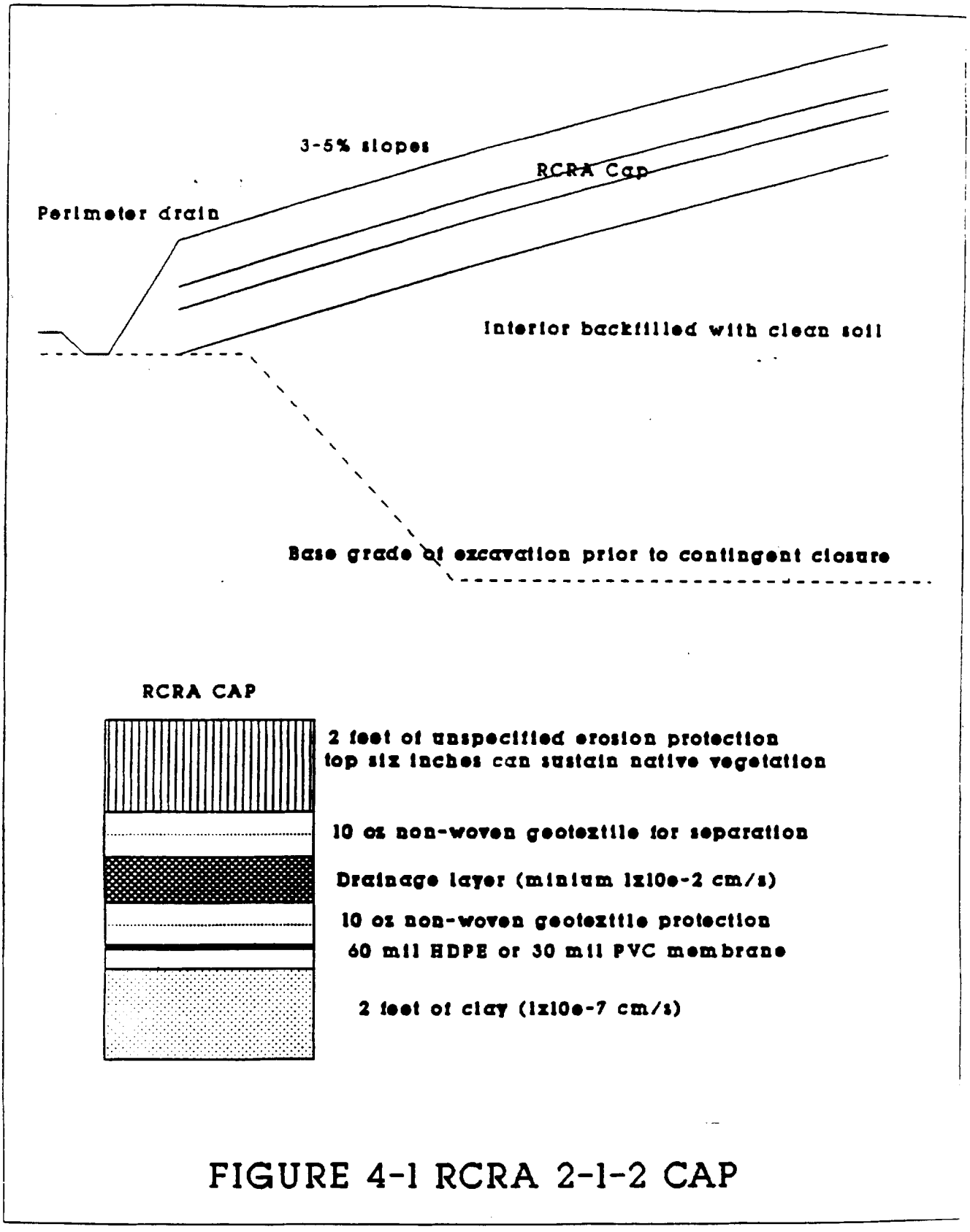

FIGURE 4-1 RCRA 2-1-2 CAP

4.4.1 Plans and Discussion

Available information from previous closure activities will determine the boundary of the landfill. All changes to the area capped will be documented with photographs and surveyed so the final as-built drawings are accurate. Photographs also will be taken to document each stage of cap construction. An independent, professional engineer registered in the Commonwealth of Virginia will be on-site during all cap construction activities to ensure that the cover system is constructed in accordance with this closure plan. The Quality Control/Quality Assurance (QA/QC) Plan discussed this document will be followed during cap construction; the contractor's quality control officer (CQCO) will maintain complete QA/QC records as outlined.

4.4.2 Specifications

The construction specifications for this closure plan are to be provided in a report, *Specifications for EQ Basin Closure*, once it is decided that clean closure will no longer be attempted and submitted to VDEQ from Radford, in accordance with the schedule. In the case of conflicting information between the construction specifications and the closure plan, the closure plan will take precedence. Radford Army Ammunition Plant will develop final construction drawings and specifications for the EQ Basin final cover. These construction drawings and specifications will meet the design requirements detailed herein. Also, Radford will finalize the Construction Quality Assurance (CQA) plan for the final cover system.

The following sections, at a minimum, will be included in the construction specifications:

- General Paragraphs
- Clearing and Grubbing
- Excavation
- Filling
- Clay Cap Placement
- FML Cap
- Geofabrics
- Drainage Layer Construction
- Erosion Layer Construction
- Erosion and Sediment Control
- Leachate Collection and Removal System
- Decontamination Area Construction
- Fencing
- Turf

- Cast-in-Place Concrete (Minor Construction)
- Signs
- Groundwater Monitoring System

The following plan sheets will be submitted to VDEQ:

- Cover Sheet
- Pre-Closure Conditions
- Existing Conditions
- Final Grading Plan
- Gas, Leachate, and Groundwater Monitoring Plan Sheet
- Erosion and Sediment Control
- Cross Section of EQ Basin
- Details

4.4.3 Cap Design

Closure will be initiated by grading the site to slopes between 3-5 percent and constructing a RCRA cap to cover all areas where waste is left in place. The landfill cap will consist of a 24-inch clay liner with a maximum permeability of 1 X 10^{-7} cm/sec, a 60-mil high density polyethylene (HDPE) flexible membrane cap (FMC) in direct and uniform contact with the clay liner, a 10-ounce geotextile fabric filter, a 12-inch drainage layer designed to maintain less than 12 inches of head above the FMC, a second 10-ounce geotextile filter fabric, an 18-inch erosion layer, and a 6-inch topsoil layer which can sustain native plant growth.

4.4.4 Cap Foundation

The site will be cleared of existing vegetation in preparation for placement of the RCRA cap.
It will be graded to provide a slope of 3-5 percent over the area. Clean backfill will be obtained from an off-site borrow area to establish the base for the cap.

4.4.5 Settlement Potential

Since all the waste materials and containment structures will be removed from the EQ Basin prior to placement of the cover, the foundation material beneath the cover will be compacted soil fill. Installation of the cap will not introduce loading rates on the foundation in excess of those historically observed. For these reasons, the potential for further settlement, consolidation, or creep of these foundation materials is minimal. Each soil layer of the cover is compacted as it is placed and it is therefore not anticipated that

objectionable settlement of the cap will occur. Settlement is not anticipated in the final cover and thus the ability of the cap to minimize infiltration should not be compromised.
The average depth of frost penetration in the Radford area is 15 inches (EPA). The top layer (the soil and root zone layer) will be constructed at a thickness of 24 inches. Frost penetration will only extend into the top layer of the cover and not to the low permeability compacted clay layer. Frost will not adversely affect the cover performance.

4.4.6 Bearing Capacity and Stability

The existing area is judged to have sufficient bearing capacity for the cap system. The HDPE cap material was selected for its flexibility and durability in the event settlement does occur. Preparation and placement of a protective bedding layer is required to cushion and support the FMC. The compacted subgrade and protective bedding layer will support the FMC and protect it from irregularities in the foundation soil during the post-closure period. The bedding layer for this RCRA cap is the uppermost lift of the clay layer. This bedding material will be free of rock, fractured stone, debris, cobbles, rubbish, and roots. The surface of this layer will be fine-finished with a vibrating roller prior to placement of the FMC.

A 10-ounce, non-woven polypropylene geotextile filter fabric with a puncture resistance of at least 600 N will cover the FMC and prevent penetrations from angular stones in the drainage layer.

The upper bedding layer will be placed soon after installation, seaming, and seam testing of the FMC. As sections of the FMC are approved by the CQCO and Radford representative, placement of the drainage layer will begin. No vehicles will be allowed to drive directly on the FMC. The geotextile and drainage layer stone will be placed on the FMC with the drainage stone spread to its full depth before vehicles are driven on the FMC. The drainage stone layer will be used as a bridge for equipment movement on the FMC. The drainage stone will be placed at the base of the slopes and pushed up the slopes to minimize damage to the underlying geotextile and FMC. Equipment used in construction of the cap will be limited to 6 psi or less ground contact pressure. Materials will be placed on the liner using only wide tracked vehicles.

As sections of the drainage layer are completed, the second geotextile fabric filter will be placed followed by the 18-inch erosion and 6-inch topsoil layers.

The QA/QC Plan discusses inspections, monitoring, and testing needed to ensure the foundation is properly installed to support the FMC.

4.4.7 Cap System

The cap will be constructed and closure will proceed as follows:

The site will be cleared and grubbed (as necessary) to ensure adhesion between the existing soil and the cap system. Backfill will be placed to establish the slopes for the cap system.

No gas vents will be required due to the removal and nature of the waste.

A 2-foot thick low-permeability clay barrier with an in-place saturated hydraulic conductivity of no more than 1×10^{-7} cm/sec will be constructed over the cap foundation to provide a base for the flexible geomembrane liner and minimize liquid infiltration should the geomembrane fail.

A geomembrane liner will be placed on the clay layer to prevent infiltration of precipitation through the cover and into the underlying waste. The geomembrane cap will provide maximum flexibility to conform with any settlement which may occur. The liner will be textured to provide added stability to the side slopes and allow increased friction necessary for support of the drainage media. The liner will have enough tensile strength and durability to withstand the applied force of the topsoil layer for the duration of the closure and post-closure periods without breakdown or reduced ability to perform as designed.

A 10-ounce per square yard non-woven geotextile fabric filter, designed to protect the FMC from puncture by the overlying drainage layer, will serve as the upper bedding layer for the FMC. The synthetic filter material will be non-woven polypropylene mat with sufficient tensile strength and durability to withstand the applied force of the drainage and soil layers for the duration of the closure and post-closure periods without breakdown or a reduction in its ability to perform as designed.

A 12-inch drainage layer of VDOT No. 8 clean crushed stone (containing no calcium carbonate) with a minimum permeability of at least 1.1 cm/sec will be placed on the geotextile. This layer is designed to remove surface water which infiltrates the top layer and maintain a head of less than 12 inches on the FMC.

A geotextile filter layer designed to allow surface water infiltration and separate the overlying soil layer from the underlying drainage layer will be placed over the drainage layer. The filter layer will be an 10 oz/sy non-woven geotextile fabric filter designed to prevent clogging of the drainage

layer. The synthetic filter material will be non-woven polypropylene mat with a minimum permittivity of 0.8/sec and tensile strength and durability to perform as designed throughout closure and post-closure.

An 18-inch erosion layer of common fill will be placed over the geotextile filter fabric and drainage layer. A 6-inch layer of topsoil capable of sustaining vegetation will be placed over the erosion layer. These soil layers will protect underlying layers from mechanical and frost damage.

The entire area will be seeded to stabilize the soil and prevent erosion. Seed will be applied at a rate of 200 lbs/acre in the following percentages:

Kentucky 31 on Turf Type Tall Fescue	95-100%
Kentucky Bluegrass	0-5%

Fertilizer (10-20-10) will be applied at 28 lbs/1000 square feet (sf) and lime (pulverized agricultural grade limestone) will be applied at 90 lbs/1000 sf. All seeding operations will be conducted in accordance with the *Virginia Sediment and Erosion Control Handbook*, Third Edition (1992).

4.4.8 Clay Liner

A 2-foot thick low-permeability clay barrier will be constructed over the cap foundation to provide a base for the flexible geomembrane liner and to reduce liquid infiltration should the geomembrane fail. The clay soil used in the liner will be free of rock, clods, and soil, debris with a minimum of 20% fines (20% passing the No. 200 sieve), maximum of 10% retained on the No. 4 sieve, plasticity index between 10 and 35 percent, and maximum in-place permeability of 1×10^{-7} cm/sec. The layer will be placed in 6-inch lifts and compacted to 95% of its maximum dry density and within 2 to 4 percent wet of optimum moisture content as determined in the Standard Proctor test (ASTM Method D-698). In-place hydraulic conductivity will be measured using the two-stage borehole method.

If the water content of the clay borrow is less than specified during the design, water will added by spraying from a truck or large hose before the clay is compacted. Adequate curing time must be allowed. If the clay is too wet, it will be allowed to dry before compaction. Efforts will be made to reduce clod size during excavation and placement to achieve the required permeability. The clay will be compacted using equipment such as sheepsfoot rollers to achieve the required compaction/permeability and bonding between lifts. The surface of each lift will be scarified so there will be an adequate bond with the lift above it. The edges of the lifts will be beveled or overlapped to ensure complete coverage. The final lift

of the clay layer will be compacted with a steel drum roller to obtain a uniform, smooth surface for the FMC. To prevent drying resulting in cracking, the clay layer will be kept moist until the geomembrane is placed. The maximum slope of the capped area is 2.5%. Material will be placed at the toe of the slope and worked upward to the top.

The low permeability layer must be entirely below the maximum depth of frost penetration estimated for the area in which the facility is located. According to the EPA, the frost depth is approximately 15 inches in the Radford area. The top of the clay liner will be 3 feet below grade which is well below the frost penetration depth.

A small-scale construction test pad will not be constructed on the cap because of the relatively small size of the EQ Basin.

4.4.8.1 Clay Material Specifications

The 2-foot clay layer of the cap will be constructed of borrow materials. The material must possess an in-place recompacted coefficient of permeability (k) equal to or less than $1x10^{-7}$ cm/sec. Testing and inspection methods necessary to ensure this in-place permeability are detailed in the subsequent sections.

The clay material will meet the following requirements in order to be classified as select clay fill for use in construction of the clay liner.

- Clay will be classified according to the Unified Soil Classification System (USCS) as CH or CL (ASTM D 2487-83). A liquid limit of at least 30, plasticity index (PI) equal to or greater than 15, and a fines content of greater than 50% passing the No. 200 sieve will be considered for proper classification.
- Select clay fill materials will be reasonably free of gypsum, ferrous, and/or calcareous concretions and nodules, refuse, roots, or other deleterious substances.

4.4.8.2 Preconstruction Testing

All soil to be used for construction of the clay cap will be inspected by the CQA inspection personnel. Rock fragments, boulders and cobbles contained in the soil will not exceed 3 inches in any dimension. Material will be inspected to remove limbs, roots, and other deleterious materials to the extent practical. Continuous and repeated visual inspection of the materials being used will be performed by the Contractor to ensure that proper soils are being used.

The Quality Assurance tests specified in the following tables will be performed on material proposed for liner construction at the specified frequencies and whenever a change in material occurs. Tables 4-1 and 4-2 delineate the quality controls for construction of the two foot thick relatively impermeable clay cap.

TABLE 4-1 CLAY BORROW SOURCE TESTING

Factor to be Inspected	CQA Inspection Method/Test	Sampling Frequency
Grain Size Analysis	ASTM D-422 and ASTM D-1140	1 per 1000 CY
Moisture Content	ASTM D-2216	1 per 1000 CY
Specific Gravity	ASTM D-854	1 per 5000 CY
Soils Classification	ASTM D-2487	1 per 5000 CY
Atterburg Limits	ASTM D-4318	1 per 5000 CY
Moisture Density Curve	D-698, D-1557, and/or reduced proctor (15 blows per inch)	1 per borrow source
Lab Permeability	ASTM D-5084	1 per 10,000 CY

TABLE 4-2 TESTING METHODS AND FREQUENCIES DURING CONSTRUCTION OF THE LINER

Factor to be Inspected	CQA Inspection Method	Sampling Frequency
Clay Layer Thickness	Observation and Field Measurement	5/lift
Moisture Content	ASTM D-3017, D-4643, D-4944, or D-4959 calibrated against ASTM D-2216	5/lift
Density	ASTM D-2922 or D-2937 calibrated against ASTM D-1556 or D-2167	5/lift
Classification	ASTM D-2487	1/lift
Atterburg Limits	ASTM D-4318	1/lift
In-situ Permeability	Two-Stage Borehole Test, ASTM Draft Test Method	3
Lab Permeability	ASTM D-5084	3/lift

The moisture/density relationship to control actual field placement of the clay cap will be established using a laboratory procedure. The coefficient of permeability relative to minimum compaction will be determined in the laboratory as follows:

A sample of the selected material which will be used to construct the clay cap will be taken to the laboratory.

A standard moisture-density curve will be developed to determine optimum moisture content and maximum dry density of the compacted soil in accordance with the Standard Proctor Test, ASTM D698.

A sample will be compacted at or above optimum moisture content to a density of not less than 90% of the maximum dry density.

Permeability tests will be conducted in accordance with ASTM D 5084 to determine the coefficient of permeability (k). If k is less than $1x10^{-7}$ cm/sec., the soil will be placed in accordance with the permitted plans at a density of not less than 90% of the maximum dry density (as determined in ASTM D698). If k is greater than $1x10^{-7}$ cm/sec, the soil will either be considered to be unsuitable and another source(s) will be located and tested, until the permeability requirement is met, or a series of tests varying moisture content and density will be conducted to determine an alternate moisture or density standard which conforms to the specified maximum permeability.

4.4.8.3 Clay Cap Construction

Select clay fill material will be applied such that the lift thickness (after compaction) will be no greater than 6 inches. Thinner lifts are permissible. Prior to compaction, each lift of select clay fill material will be thoroughly diced to provide soil particle sizes less than 4 inches in diameter. Equipment or truck traffic on the surface will not be permitted during the period between scarifying and placement of the following lift. In order to ensure that the clay liner becomes one continuous mass of clay from bottom to top of the liner, the surface of each lift must be maintained at the specified moisture content and it must be scarified (lightly chopped with a disc), not smooth, when covered by the succeeding lift.

After scarifying of the underlying lift, representative samples of the new lift will be taken and tested for moisture content prior to any compactive efforts. If the moisture content is within the specified range (range determined by laboratory testing of borrow source), compaction may begin. If the moisture content is outside of this range, the select clay fill will be wetted or dried and reworked accordingly. The select fill should be sprinkled or sprayed with water (most probably from a water truck) and dozed, wind-rowed, and/or disc-plowed to uniformly increase moisture content of the clay if the material is below the optimum moisture content. The select clay fill should be dozed, wind-rowed, and/or disc-plowed to help air dry the clay if the moisture content is too high.

Each lift will be thoroughly compacted and satisfy moisture and density controls through field testing before a subsequent lift is placed. Compaction of lifts will be conducted as follows:

- Compaction of lifts will be performed with an appropriately heavy, properly ballasted, penetrating-foot compactor (such as a CAT 815 or equivalent) subject to approval from the CQA inspection personnel. A minimum of 6 passes will be required on each lift regardless of whether the lift meets density specifications. This requirement is to allow thorough remolding of the clay by kneading action.

- The daily work area will extend a distance no greater than necessary to maintain moist soil conditions (facilitate bonding) and continuous operations. Desiccation and crusting of the lift surface will be avoided as much as possible.

- If desiccation and crusting of the lift surface occurs before placement of the next lift, this area will be sprinkled with water and then scarified and tested for water content to ensure uniform moisture before placement of a subsequent lift.

- Transition from full depth liner to beginning of adjacent new section will be accomplished by sloping (cutting back) the end of a full depth section at 5:1 (horizontal to vertical) or flatter for tying in a new lift. Alternatively, each new lift will be benched into the previously constructed liner at 2-foot horizontal intervals.

- Dozer or scraper equipment will not be used for primary compaction efforts.

The select fill will be compacted to meet or exceed the density determined from the Standard Proctor Test, described in the previous preconstruction testing section. Densities less than the specified density will be recompacted and/or removed and reworked to meet density objectives. In addition, unless laboratory testing indicates otherwise, the compacted material's dry density/moisture content will lie within the 80% saturation line, to be established from tested specific gravities.

No select fill will be placed or compacted during a sustained period of temperatures below 30°F. Select fill may be placed and compacted during periods of early morning and evening freezing temperatures with warming trends above freezing during the day. During construction, finished lifts or sections of compacted clay liner may be sprinkled with water as needed to prevent drying and desiccation. At the end of each construction day's activities, completed lifts or sections of compacted clay liner will be sealed by rolling with a rubber tired or smooth drum rollers and sprinkled with water as needed.

The compacted clay cap will be a minimum of 24 inches. Thickness of the clay liner on the side slopes will be measured perpendicular to the slope face. The as-built thickness of the compacted clay liner will be determined by non-destructive survey methods as described below. An individual lift may be sampled upon completion (but prior to subsequent lift placement) with an approved sampler or other investigative tool, but the resulting penetration will be properly backfilled with hand tamped select clay fill or bentonite. Samples of the in-place compacted clay liner will be tested and evaluated prior to acceptance.

After completion of a segment of compacted clay cap, but before installation of the subsequent layers of the cap. The top of the clay will be surveyed to ensure that: (a) the specified thickness of compacted clay liner has been achieved; (b) the top of the clay liner slopes across the cell at the grades specified on the permitted plans.

4.4.9 Flexible Membrane Cap

4.4.9.1 Materials Specification

The geomembrane will be constructed of 60-mil HDPE, 30 mil VLDPE, or 30 mil PVC. Raw polymer specifications and manufactured sheet specifications for the HDPE membrane are as follows:

HDPE	TEST METHOD	VALUE
Gauge	---	60 mils
Density	ASTM D1505	0.94
Melt Flow Index (g/10 min.) (max)	ASTM D1238 Condition E (190°C, 2.16 kg.)	0.5
Minimum Tensile Properties	ASTM D 638 Type IV (Dumbbell at 2 ipm)	
1. Tensile at Break (lbs/inch width)		216
2. Tensile at yield (lbs/inch width)		126
3. Elongation at Break (%)		630
4. Elongation at Yield (%)		12
5. Modulus of Elasticity	ASTM D882	1.1
Tear Resistance	ASTM D1004	41
Low Temp Brittleness	ASTM D746	-112
Dimensional Stability	ASTM D1203	-2
Carbon black content	ASTM D-1603	2%

These specifications may be superseded by more stringent specifications of the manufacturer. Radford will submit the exact type of membrane proposed for use and the manufacturer's product specifications.

4.4.9.2 Differential Settlement in the Foundation Soils

Due to the small area to be capped and minimal depth of backfill soil the differential settlement effects are negligible. During clearing and grubbing operations and placement of soil fill to establish the final grade for cap placement compaction will occur. Settlement resulting in foundation compression and soil liner compression will be minimal. There is no solid waste in place like landfills to biodegrade and cause settlement or gas production.

4.4.9.3 Strain Requirements at the Anchor Trench

The membrane and geotextile will be anchored in a trench at the toe of the cap. In the case of the membrane, the anchor trench does not affect the potential for sliding because it is at the toe rather than at the top of the slope. For these reasons, calculation of strain requirements of the anchor trench is not applicable.

4.4.9.4 Strain Requirements Over Side Slopes

The membrane and geotextile must be strong enough to resist tensile forces acting from the weight of the soil above. The selection of membrane provides maximum strength during installation. The steepest slope of the capped area will 5%. At such "flat" slopes, the membrane will support its own weight and not slide. The membrane will be beneath 2 feet of cover soil and 1 foot of granular drainage material which is well below the 8-inch frost penetration depth, reducing stresses associated with climatic conditions.

4.4.9.5 Chemical Compatibility

Polyethylene and PVC liners are non-reactive with most leachate constituents (Koerner, 1986). The liner will be placed above the waste constituents in the "landfill" and, therefore, will not contact chemicals in the "landfill." The liner will be in direct contact with the clay barrier soil layer and the granular drainage layer. The only liquid contacting the liner will be precipitation that percolates into the granular drainage layer.

4.4.9.6 Liner Strength Requirements and Integrity Under Mechanical Stresses

The membrane must be capable of withstanding both the stresses of installation and stresses after placement. The 60-mil HDPE membrane, 30 mil VLDPE, or 30 mil PVC membrane is suitable for both conditions. The 60-mil thickness and strength of the HDPE will provide sufficient strength to withstand installation stresses such as wind, temperature and seaming. The flexibility and strength of 30 mil PVC or VLDPE liner will provide sufficient strength to withstand installation stresses such as wind, temperature and seaming. As previously discussed, the membrane will be placed on a smooth clay foundation, free

of rocks, clods, and other debris that might puncture the geomembrane. A geotextile fabric filter will be placed over the membrane to protect it from the overlying stone drainage layer. No vehicles will be driven on the membrane until the geotextile and 12-inch stone drainage layer have been placed.

Prior to installation, the membrane will be protected from sunlight and the weather by a cover or under a temporary shelter. After placement, the liner will be covered with the geotextile and stone layer as quickly as possible after approval of seaming. The 3-foot cover (1-foot granular drainage layer and 2-foot soil layer) will provide long-term protection from mechanical and thermal stresses. Except during installation, the geomembrane will not be exposed to wind, sunlight, or direct precipitation.

4.4.9.7 Friction Factors

The literature indicates a friction angle of approximately 11 to 14 degrees for polyethylene sheets and clay. A review of available literature indicates a friction angle of 16 degrees between the polyethylene sheets and overlying geotextile. These friction angles are more than adequate for use on a small relatively "flat" cap design for an impoundment closure.

4.4.9.8 Best Anchorage Configuration for the FMC

The anchorage of the membrane is not a design issue. The liner will be anchored in a one-foot wide, two-foot deep trench located at the edge of the cap system around the perimeter of the "landfill." This is a typical anchoring method shown in EPA guidance documents.

4.4.9.9 Soil Cover Stability on Top of FMC

Stability of cover soil is an important concern in designing a landfill cap. However, due to the small size, and relatively flat slopes, sliding instability is negligible. A geotextile will be placed between the flexible membrane and the drainage layer to provide reinforcing and increase friction. Another layer of geotextile will be provided between the drainage layer and the soil erosion protection layer. Calculations show that the erosion layer will be stable, and universal soil loss is much less than 2 for 5% slopes, less than 100 feet of slopes, and a moderate stand of grass.

4.4.9.10 Installation

The earthwork contractor will be responsible for preparing and maintaining the subgrade in a condition suitable for liner installation. The clay liner subgrade will be smooth and firm. Sharp stones, gravel, debris, or any other objects which could penetrate the liner will be removed. Any ruts caused by the compaction equipment or the geomembrane placement equipment will be leveled. The subgrade will be visually inspected prior to installation of the membrane.

The membrane will be delivered to the site on rolls, stored off the ground in small stacks, and protected with a covering or stored in a temporary storage shelter. The storage space will be protected from theft, vandalism, and passage of vehicles. Geosynthetics will be handled in a manner to prevent physical damage, contamination, and exposure.

Before moving a roll from the storage site, an anchor trench 2-feet and 1-foot wide will be completed. Slightly rounded corners will be provided where the geomembrane adjoins the trench to avoid sharp bends in the geomembrane.

The construction contractor will submit a geomembrane layout plan to the owner and CQCO for approval prior to placing the membrane. The membrane will be installed during dry, moderately warm weather to minimize the effects of thermal expansion and contraction. The manufacturer's instructions will be followed for liner placement and seam overlap. The method used to unroll the panels will not cause scratches or crimps in the geomembrane. Sandbags will be placed along the edges of the geomembrane to prevent uplift pressures of up to 37 psf and the resulting wind damage. Field panels will be placed one at a time in a manner which minimizes wrinkles.

The panels will be seamed immediately after placement following the manufacturer's recommended seeming procedures. The ambient temperature should be above 5° F during seaming. Surfaces to be seamed will be clean and dry when the seams are made. Seams will be oriented parallel to the line of maximum slope. All field seams will be non-destructive tested in accordance with ASTM D 4437 seam evaluation using the vacuum box technique. Destructive tests will be performed on test specimens in accordance with ASTM D-413 and ASTM D-638 for peel and shear of geomembrane seams. One sample will be taken for destructive testing every 500 linear feet of weld.

The liner will be covered within the time limits specified by the manufacturer. The geotextile fabric will be placed on the geomembrane as soon as possible after approval of the geomembrane placement. The stone drainage layer will be placed on the geotextile using equipment which will either not need to move on to the cap area or rubbered tired equipment. Vehicles will be driven only on the full depth stone drainage layer or subsequent soil cover. Vehicles will not be allowed to drive directly on the geomembrane or geotextile layers.

QA/QC procedures to be followed during cap installation, including inspections, material certifications, and testing will be discussed in Section 7 of this document.

4.4.10 Filter Layer

The design properties of concern for the geotextile filter layer above the drainage layer are permittivity and clogging potential. The minimum permittivity required for the geotextile is 6.0×10^{-1} /sec. The permittivity of the geotextile specified in the design is 0.08/sec, well above the minimum. Therefore, the geotextile will easily allow surface water to flow through it to the drainage layer.

The potential for the geotextile to clog must be evaluated using site specific cover soil and recommended geotextile. The suggested test is the U.S. Army Corps of Engineers Gradient Ratio Test CW-02215 with the gradient ratio calculated value less than 3. The chosen geotextile must have an apparent opening size (O_{95}) meeting the following specifications (recommended by Carroll, 1983 and Chen, 1981):

$$O_{95}/D_{85}<2.0$$
$$O_{95}/D_{15}>2.0$$

Clogging potential will be determined by the contractor after the source of the backfill is selected and the specific geotextile is chosen.

The geotextile filter located above the FMC is designed as a protective layer and permittivity of this geotextile is not a concern.

4.4.11 Drainage Layer

The drainage layer is required to reduce the head of water on the soil barrier layer and also to prevent water backup into the vegetative layer. The minimum thickness of the middle drainage layer will be 12 inches. The saturated hydraulic conductivity of the drainage materials will not be less than $1x10^{-2}$ cm/sec at the time of installation.

The upper portion of the drainage layer will be designed to prevent clogging, and will be overlain by a synthetic fabric filter or graded granular material. The upper slope will be at least 3 percent after allowance has been made for settling and subsidence, and will be overlain by granular materials such as sand. The granular material will be no coarser than 3/8 inch and classified as SP. The material will be crushed and angular with no debris that may damage the underlying flexible membrane liner, or fines that may lessen permeability, or dissolvable minerals such as lime.

Discharge from the drainage layer will flow freely so that fluid does not back up into the vegetative layer during a major sustained storm event. The drainage layer will be sloped to an exit drain which will allow the percolated water to drain.

4.4.12 Vegetative Layer

The top layer is required to retain soil moisture, minimize root penetration into the barrier layer, and provide greater tolerance to the adverse impact of erosion. The top layer will have a thickness of no less than 24 inches, of which a minimum of the top six inches will be topsoil and will contain sufficient nutrients necessary for the growth and sustenance of a vegetative cover.

The entire area will be seeded to stabilize the soil and prevent erosion. Seed will be applied at a rate of 200 lbs/acre in the following percentages:

Kentucky 31 on Turf Type Tall Fescue	95-100%
Kentucky Bluegrass	0-5%

Fertilizer (10-20-10) will be applied at 28 lbs/1000 square feet (sf) and lime (pulverized agricultural grade limestone) will be applied at 90 lbs/1000 sf. All seeding operations will be conducted in accordance with the *Virginia Sediment and Erosion Control Handbook*, Third Edition (1992). Cover vegetation should be drought resistant, persistent, erosion resistant and adapted to local conditions.

The surface drainage system will be capable of efficiently conducting runoff across the cap. The drainage ditches will be adequate to accommodate the runoff from a 24-hour, 25-year storm.

4.4.13 Drainage Evaluation

In order to limit runoff infiltration and to limit erosive velocities from runoff on the impoundment surface it is recommended that a uniform 3-5% grade be incorporated into the design of the final cover. One of the most effective ways to minimize surface water infiltration through the final cover is to divert runoff away from the closed structure. Since the site will be graded for positive drainage, and based on existing site topography, positive drainage will be maintained away from the site. Run-on from an off site source is not expected due to site specific conditions.

4.4.14 Survey Control

The following procedures will be followed with respect to the survey of the completed clay cap:

- The completed clay surface will be surveyed, before the placement of subsequent cover layers, to verify that grades are in accordance with the plans. In addition, a comparison of the pre- and post-clay cap construction surveys will be conducted to verify construction to the permitted thickness.

4.4.12 Vegetative Layer

The top layer is required to retain soil moisture, minimize root penetration into the barrier layer, and provide greater tolerance to the adverse impact of erosion. The top layer will have a thickness of no less than 24 inches, of which a minimum of the top six inches will be topsoil and will contain sufficient nutrients necessary for the growth and sustenance of a vegetative cover.

The entire area will be seeded to stabilize the soil and prevent erosion. Seed will be applied at a rate of 200 lbs/acre in the following percentages:

Kentucky 31 on Turf Type Tall Fescue	95-100%
Kentucky Bluegrass	0-5%

Fertilizer (10-20-10) will be applied at 28 lbs/1000 square feet (sf) and lime (pulverized agricultural grade limestone) will be applied at 90 lbs/1000 sf. All seeding operations will be conducted in accordance with the *Virginia Sediment and Erosion Control Handbook*, Third Edition (1992). Cover vegetation should be drought resistant, persistent, erosion resistant and adapted to local conditions.

The surface drainage system will be capable of efficiently conducting runoff across the cap. The drainage ditches will be adequate to accommodate the runoff from a 24-hour, 25-year storm.

4.4.13 Drainage Evaluation

In order to limit runoff infiltration and to limit erosive velocities from runoff on the impoundment surface it is recommended that a uniform 3-5% grade be incorporated into the design of the final cover. One of the most effective ways to minimize surface water infiltration through the final cover is to divert runoff away from the closed structure. Since the site will be graded for positive drainage, and based on existing site topography, positive drainage will be maintained away from the site. Run-on from an off site source is not expected due to site specific conditions.

4.4.14 Survey Control

The following procedures will be followed with respect to the survey of the completed clay cap:

- The completed clay surface will be surveyed, before the placement of subsequent cover layers, to verify that grades are in accordance with the plans. In addition, a comparison of the pre- and post-clay cap construction surveys will be conducted to verify construction to the permitted thickness.

A minimum of one cross-section for every 100 linear feet of cell length and width will be surveyed. At a minimum, survey points will be established at the top, mid-point, and bottom of each slope. These survey points will be coincident with those of the previous cross-section lines.

Acceptable tolerances on survey coordinates will be ±0.2 feet on elevations and ±1.0 foot on coordinates. The clay cap will be greater than or equal to the thickness specified.

The CQA inspection personnel certifying the survey results will be either a Registered Land Surveyor or a Professional Engineer.

The CQA Officer will certify that the clay cap meets the requirements in the plans and specifications and submit documentation to the Project Manager.

4.5 Construction Quality Assurance Plan

The CQA plan will detail procedures for inspecting the quality of construction materials and the construction practices employed during their placement. The CQA plan will further provide assurance that: (1) the materials for each layer are as specified in the design specifications; (2) each layer is constructed as specified in the plans; and (3) all layers of the final cover are uniform and damage-free. The CQA plan can be found in the appendix.

4.6 Site Access

Access to the Radford Army Ammunition Plant is severely limited due to the on site security required for operations. All vehicles entering the Radford must pass through the main entrance and a second security checkpoint before approaching the site. Existing fences, gates, and vegetation will be utilized to restrict unauthorized access to the waste disposal area. A clearly visible and legible sign will be maintained at the closure area indicating the hazards.

4.7 Engineer's Certification of Contingent Closure

Radford will provide for an independent licensed Professional Engineer in the Commonwealth of Virginia to verify that the EQ Basin was closed in accordance with the specifications in this closure plan. The independent engineer will be present during all closure activities. The independent engineer's certification will include all documentation such as daily reports, test results, observations, photographs, etc. which demonstrate that the closure was completed in accordance with the approved plan.

The certification of closure will be submitted, by registered mail, to the Director of the Commonwealth of Virginia's Department of Environmental Quality. The certification will be submitted within 60 days of the completion of final closure. The certification will be signed by both the independent Professional Engineer and the responsible official for Radford Army Ammunition Plant.

4.8 Notification of Type, Quantity and Location of Wastes

No later than 60 days after certification of closure of the EQ Basin, Radford will submit to the County Board of Supervisors and to the Director of the Commonwealth of Virginia's Department of Environmental Quality a record of the type, location, and quantity of hazardous waste located in the closed EQ Basin.

4.9 Survey Plat

Within 60 days of closure, a survey plat indicating the location and dimensions of the EQ Basin closure as a landfill with respect to permanently surveyed benchmarks will be submitted to the local zoning authority and to the Director of the Commonwealth of Virginia's Department of Environmental Quality. The plat will be prepared and certified by a Professional Land Surveyor in the Commonwealth of Virginia. Radford will submit a certification to the Director that a survey plat and record of the type, quantity, and location of the hazardous wastes has been submitted to the local zoning authority.

4.10 Deed Restriction

Within 60 days of certification of closure of the Basin, Radford will record in accordance with state and local law, a notation on the deed to the facility property, or on some other instrument which is normally examined during title search, that will in perpetuity notify any potential purchaser of the property that:

- The land has been used to manage hazardous wastes; and
- Its use is restricted under VHWMR Section 10.6; and
- The survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each hazardous waste unit required by VHWMR Sections 10.6.G and 10.6.J.1., have been filed with the local government and with the Director of the Commonwealth of Virginia's Department of Environmental Quality.

Radford will submit to the Director a certification stating that the facility has recorded the notation specified in VHWMR Section 10.6.J.2.a. A copy of the document in which the notation has been placed will also be submitted.

4.11 Post Closure Care Permit Application

Within 180 days of contingent closure, an application for a post-closure care permit with the applicable permit fee will be submitted to the Virginia Department of Environmental Quality, Waste Division.

4.12 Contingent Closure Schedule

The contingent closure schedule for the EQ Basin is detailed in Table 4-3.

TABLE 4-3 CONTINGENT CLOSURE SCHEDULE

Activity	Days
If contaminated soils cannot be practically removed, notify VDEQ, then begin construction of final cover system.	0
Survey Excavation	0
Backfill with Clean Soils	10
Submit Plan Sheets, Geomembrane Type & Layout, Erosion Control Plan with Support Calculations, and Specifications	20 60
Begin Construction of Cap	
clay	90
geomembrane	100
geotextile	110
drainage layer	120
geotextile	130
soil	140
topsoil spread	150
topsoil seeded and erosion controls placed	160
Submit Monthly QA/QC Reports	170
Submit Final Report of QA/QC on Work Performed	180
Submit Certification of Closure	
Within 60 Days of Completed Cap Construction Submit: Record of Type, Location, and Quantity of Waste Closed in Place Certification Letter that Survey Plat was Submitted to Local Zoning Authority with copy of Survey Plat Certification Letter that Permanent Notation was made on Property Deed, with Wording Submitted to VDEQ for Approval	180-240
Within 180 Days of Completed Cap Construction Submit: Application for Post Closure Care Appropriate Application Fee	180-360
Upon Completion of the 30 Year Post-Closure Care Period: Within 60 Days of Completion of the Post Closure Care Period Submit a Certification Letter that Post-Closure is Completed	30 years + 60 days

5.0 CONTINGENT POST-CLOSURE PLAN

5.1 Introduction

Post-closure care will begin after completion of contingent closure and continue throughout the post-closure care period. Post-closure care consists of maintaining the final cover and performing monitoring, and response, as necessary, to prevent adverse impacts to human health and the environment (VHWMR Sections 10.6.H through 10.6.K, 10.10.I.2, and 10.10.I.3.a.(2)).

Post-closure activities will be directed by the requirements of this plan until the post-closure permit becomes effective. The post-closure requirements will be as follows.

5.2 Post-Closure Care Period

Unless extended or reduced by subsequent modification of this plan or by permitting action, the post-closure care period will begin after closure of the EQ Basin and continue for 30 years after that date.

5.3 Ground Water Monitoring and Reporting

The ground water monitoring system, detailed in the document Groundwater Quality Assessment Plan (as updated), will be maintained for ground water compliance monitoring throughout the post-closure care period.

5.4 Maintenance of Final Cover

The integrity and effectiveness of the final cover will be maintained for a period of thirty years. The vegetative cover will be mowed at least twice yearly and re-fertilized in accordance with the recommendations of the local office of the U.S. Department of Agriculture's Soil Conservation Service (SCS). The cover and drainage system will be inspected quarterly during the first year and every 6 months thereafter by a qualified person. These inspections will determine if there have been any changes to the structural integrity of the cover due to settling, subsidence, erosion, and if the vegetative cover is well established and healthy. Following cap placement, the cover drainage system will be inspected weekly to initially establish the effectiveness of the drainage system design. Any damage or failure of the cover and/or drainage system will be repaired within 30 days of inspection.

Any erosion or ponding will be repaired by excavating the cover materials, regrading, and replacing the cover according to the QA/QC specifications to prevent surface water infiltration. Bald and spottily vegetated areas will be disked and otherwise prepared for re-vegetation. New topsoil will be added as

necessary. Re-vegetation will stabilize the surface from further erosion by wind and water and will contribute to the development of a naturally fertile and stable surface environment. Mulching, seeding with native grasses, and fertilizing will be performed as soon as possible after regrading/disking, and in accordance with the recommendations of the local SCS office.

5.5 Maintenance of Groundwater Monitoring Wells

Groundwater monitoring wells require regular inspections and maintenance over time in order to maintain them in the originally completed condition. Monitoring wells should be inspected and maintained for the following potential conditions or problems, at each sampling event:

- Aboveground portions of monitoring wells should be inspected for evidence of tampering or actual physical damage each time the well is sampled or checked for static ground water level.

- The total depth of monitoring wells should be checked in order to ascertain if there has been excessive sediment influx into the well casing that could potentially clog the well screen.

- Unusual well conditions may warrant using downhole geophysical tools or a downhole camera in order to properly assess deep hole well conditions of both riser casing and well screen.
- Extreme or unexpected water level changes may also be indicators of downhole casing or screen problems. Very low levels may indicate a problem such as screen clogging with sediment or bacterial growth.

- Maintenance should be performed on ground water monitoring wells as required, and should consist of purging the well to clear any sediment influx over time and to allow checking for unusual or unexpected well conditions that may have developed since initial well completion.

5.6 Maintenance of Run On and Runoff Control Structures

The Commonwealth of Virginia requires a plan for continued maintenance of storm water management facilities. Where local government does not choose to accept maintenance responsibility the responsible entity is required to accept maintenance responsibility and a maintenance agreement must be entered into with the local government.

In order to guard against the cumulative effects of erosion and storm damage it is important to prepare and follow a maintenance plan for the facility. Inspections will be conducted as indicated in the inspection reports. Maintenance will be conducted as indicated below.

- The cap surface, adjacent swales, storm water management area will be inspected quarterly and after major storm events.
- Berms shall be specifically inspected for evidence of slope failure, erosion and overall integrity.
- Evidence of erosion, outlet structure blockage, vegetation over-growth, and other features which may effect the function of the drainage system for the facility shall be noted.
- After an inspection is conducted, if required, areas of erosion shall be filled and seeded with appropriate cover vegetation, swales and berms shall be inspected by qualified personnel and assessments of the integrity of the structures made.

5.7 Benchmark Integrity

Numerous USGS benchmarks are located at Radford Army Ammunition Plant. All survey work will be conducted using at least one of these benchmarks. Due to the controlled nature of Radford, the benchmarks should be secure.

5.8 Post-Closure Inspection Log [VHWMR Section 10.6.H.1.a.(2)]

The Post-Closure Inspection Log form is included in the Appendices. This form will be utilized to guide and document the above-described inspection activities.

5.9 Recordkeeping/Contact Persons

The post-closure care plan and records (i.e. inspection logs) will be maintained at the facility. The plan and records will be available for review by the Commonwealth of Virginia's Department of Environmental Quality.

The Radford Army Ammunition Plant representative to contact about post-closure care will be:

EPA ID No. VA1210020730
Owner/Operator - U.S. Army, Radford Army Ammunition Plant / Alliant Tech Systems, Inc.
Address - Radford Army Ammunition Plant, P.O. Box 1, Radford, Virginia 24141-7536.
Contacts Telephone No. - Jerome Redder at (540) 639-7436 or Robert Richardson at (540) 639-8641.

5.10 Certification of Completion of Post-Closure Care (VHWMR 10.6.K)

No later than 60 days after completion of the established post-closure care period, Radford Army Ammunition Plant will submit to the Commonwealth of Virginia's Department of Environmental Quality Director, by registered mail, a certification that the post-closure care period for the EQ Basin was performed in accordance with the specifications in this approved post-closure plan. The certification will be signed by the official representative for Radford and an independent Professional Engineer in the Commonwealth of Virginia.

5.11 Post Closure Inspection Form

SAMPLE POST CLOSURE INSPECTION LOG SHEET
SURFACE IMPOUNDMENT CLOSURE

Scheduled Inspection (Yes or No):____
Supplemental Inspection (Yes or No):____

Date:_____ Time _____ Inspector:_____

Inspection Item		Potential Problems	Status
1.	Security Controls	Missing	
	Fencing	Damaged	
	Warning Signs	Inadequate	
2.	Erosion Controls	Inadequate slope vegetation	
3.	Final Cover	Erosion damage	
		Settlement subsidence or displacement	
		Water pooling inadequate drainage	
		Insect rodent damage	
		Damaged/dead vegetation	
		Trees,shrubs, or other deep rooted growth	
4.	Drainage System (Runon Runoff Controls)	Drainage Blocked	
		Debris Present	
		Inadequate Drainage	
5.	Benchmarks	Missing/damaged	
		No Identification	
6.	Groundwater Monitoring System	Not capped/locked	
		Damaged	
		No identification	

Overall Status (Acceptable or Unacceptable):_____

OBSERVATIONS:_____

CORRECTIVE ACTION TAKEN AND DATE:_____

6.0 QUALITY ASSURANCE QUALITY CONTROL (QA/QC) PLAN INTRODUCTION

6.1 Introduction

This QA/QC Plan is provided as part of the Contingent Closure for the EQ Basin at the Radford Army Ammunition Plant. The purpose of this Plan is to establish standards that, when followed by the Owner's inspection personnel (Quality Control - QC Engineer or Officer), will ensure that the contractor constructs the cap in accordance with the plans and the VHWMR. Radford will be responsible for ensuring through the implementation of the QA/QC Plan that the terms and conditions of the closure plan are fulfilled during construction. The Radford representative on the site, hereinafter referred to as the Project Manager, will be responsible for coordination between Construction Contractor(s) and the QC Engineer (or Officer), as well as for the overall project management during construction and implementation of the full QA\QC Plan attached to this document as an appendix.

Prior to construction, the Project Manager, the Contractor and the QC Officer will review the proposed cover plans for clarity and completeness. In the event that additional clarification is required, the design engineer will be consulted for necessary clarification or modifications.

6.3 QC Engineer

A QC Engineer, who will be an independent party and not responsible to the Construction Contractor, will be contracted by Radford during construction of the cover. The QC Engineer must be a Professional Engineer, licensed in the State of Virginia. The QC Engineer will direct the construction inspection, testing and documentation efforts with specific responsibilities for the following activities:

- Ensure that the attached full QA\QC Plan is implemented so that the final structure constructed meets the design requirements and the VHWMR.
- Reviewing the construction plans and specifications for clarity and completeness.
- Reporting and documenting construction activities to the owner (and VDEQ in a final report) that the plans and specifications were followed by the contractor.
- Educating the QA\QC inspection personnel on the QA\QC requirements and procedures.
- Scheduling and coordinating the QA\QC inspection activities.

- Directing and supporting the QA/QC inspection personnel in performing observations and tests with respect to test equipment calibration, and data collection, validation, reduction, interpretation and reporting.

- Reviewing and interpreting all data sheets and reports associated with the construction activities and reporting them to Radford.

- Identifying work that should be accepted, rejected, or uncovered for observations, or work that may require special testing, inspection or approval, and reporting it to Radford.

- Rejecting defective work and verifying that corrective measures have been implemented.

- Furnishing to the facility representative and to the Contractor the results of all observations and tests as the work progresses, and coordinating with the Contractor when modifications to the plans are necessary to ensure compliance with the specified design.

6.4 QA\QC Inspection Personnel

The responsibilities of the QA\QC inspection personnel will include:

- Conducting independent on-site inspection of construction activities to assess compliance with the facility design plans and specifications.

- Verifying that the equipment used for testing meets the QA\QC specified test requirements, and that all tests are conducted according to the QA\QC Plan procedures.

- Reporting to the QC Engineer the results of all inspections, including work that is not of acceptable quality or that fails to meet the specified design.

6.5 Project Meetings

6.5.1 Preconstruction QA\QC Meetings

A meeting will be held to resolve any uncertainties following the award of the construction contract. The Project Manager, the QA\QC inspection personnel and the Contractor will be present. The topics of the meeting will include, but will not be limited to:

- Providing each organization representative with the QA\QC documents and the supporting information.

- Reviewing all aspects of the site-specific QA QC Plan to ensure understanding of the responsibilities, duties and inspection/monitoring procedures.

- Discussing the established procedures or protocol for handling construction deficiencies, repairs and retesting.

- Reviewing methods for documenting and reporting inspection data, and for distributing and storing documents and reports.

- Identifying any changes to the QA\QC Plan necessary to ensure that construction will be conducted in accordance with the permit.
- Discussing procedures for the location and protection of construction materials and for the prevention of damage to the materials from inclement weather or other adverse events.

6.5.2 Daily Progress Meetings

A progress meeting will be held daily at the work area just prior to commencement or just following the completion of work. At a minimum, the meeting will be attended by the Contractor and the QA\QC inspection personnel. The purpose of the meeting will be to:

- Review the previous day's activities and accomplishments.

- Review the work locations and the activities for the day.

- Identify the Contractor's personnel, and the equipment assignments for the day.

- Discuss any potential construction problems.

Daily meetings will be documented by a member of the QA\QC inspection personnel, and copies of the documentation will be compiled into a weekly summary report for submission to Radford.

6.5.3 Problem or Work Deficiency

A special meeting may be held when and if a problem or deficiency is present or is likely to occur. At a minimum, the meeting will be attended by the Contractor and the QA\QC inspection personnel. The purpose of the meeting will be to define and resolve a problem or a recurring work deficiency as follows:

- Define and discuss the problem or deficiency.
- Review alternative solutions.
- Implement a plan to resolve the problem of deficiency.

These meetings will be documented by a member of the QA\QC inspection personnel, and the documentation will be included in the weekly summary report.

6.6 Test Equipment Calibration

All field test equipment will be kept under the control of the QA\QC inspection personnel. The QA\QC inspection personnel will be fully trained in the use of equipment, test procedures, and interpretation of results for each piece of test equipment. A copy of the calibration certificate will be kept by the QC Engineer. The equipment will be calibrated in accordance with the Quality Assurance procedures.

Calibration of nuclear density gauges will conform to the frequencies and methods outlined in ASTM D 2922-78 and D 3017-78. Unstable or erratic gauges will not be used for density testing and will be immediately removed from the site.

6.7 Non-Conforming Test Results

Density and moisture content test locations which fail to meet or exceed construction criteria will require reworking. The boundaries of the area to be reworked will be defined by the closest test locations which meet density and moisture content specifications. The non-conforming area will be reworked, dried or wetted as necessary, and retested. A non-conformance report will be prepared for areas which do not meet construction specifications after reworking and retesting.

Laboratory permeability test results which demonstrate a permeability above 1×10^{-7} cm/sec will be immediately brought to the attention of the QC Engineer. Non-conforming permeability test results may result in a review of previous test results, retesting, and/or a reevaluation of compaction criteria. After review and/or retesting areas which do not meet the specified permeability will require reworking.

All non-conformance reports will be brought to the attention of the Project Manager by the QC Engineer and will be documented in the Quality Assurance files.

6.8 Documentation

6.8.1 Daily Recordkeeping

Standard daily reporting procedures will include preparation of a summary report with supporting inspection data sheets. When appropriate, problem identification and corrective measures reports will be appended.

6.8.2 Daily Summary Report

A standard Daily Summary Report will be prepared by the QC Engineer or the QA\QC inspection personnel. This report will summarize that day's construction activities and the chronological framework for identifying and recording all other reports. The Daily Summary Report will include the following information:

- Unique identifying sheet number for cross-referencing and document control.
- Date, project name, location, or other identification.
- Data on weather conditions.
- Reports on any meetings held and their results.
- Unit processes and locations of construction underway during the time frame of the Daily Summary Report.
- Equipment and personnel present on-site, including subcontractors.
- Descriptions of areas and/or activities being inspected and/or tested, and related documentation.
- Description of off-site materials received, including any Quality Control certifications received.
- Calibration of test equipment.
- Decisions made regarding approval or rejection of materials or construction activity, and any corrective actions taken.
- Reference to pertinent data sheets or corrective measures reports prepared.
- Signature of the QC Engineer or the QA\QC inspection personnel preparing the report.

6.8.3 Inspection Data Sheets

Pertinent observations and laboratory and/or field data will be recorded on inspection data sheets. A standard data sheet format will be developed by the QC Engineer. Where possible, a checklist will be used to ensure that no pertinent factors of a specific observation are overlooked. Inspection data sheets will include the following information:

- Unique identifying sheet number for cross-referencing and document control.
- Description of the inspection activity.
- Location of the inspection activity or location where sampling or testing activities occurred.
- Type of inspection activity and procedure used.
- Recorded observation or test data, with related calculations.
- Results of the inspection activity or test results and comparison with specification requirements.
- Personnel involved in the inspection activity.
- Signatures of the appropriate QA\QC inspection personnel and concurrence by the QC Engineer.

6.9 Acceptance Reports

All daily inspection summary reports and inspection data sheets will be reviewed by the QC Engineer. The documentation will be evaluated and analyzed for internal consistency and for consistency with similar work.

This information will periodically be assembled and summarized into acceptance reports for submittal to Radford. These reports should indicate that the materials and construction processes comply with the permitted plans.

6.10 Final Documentation

At the completion of the project, a final certification report will be issued by the QC Engineer and transmitted to Radford. This document will include, but not be limited to, the following:

- Scope of work. — Plans & specs
- All daily field reports. - Need
- ✓ All laboratory and field test results.
- ✓ Test methods. —
- Evaluation of all test results with respect to project specifications.
- Any non-conformance reports. — have USACOE draft bullets of any done
- Personnel involved with the project and their respective qualifications.

- As-built drawings and survey notes.
- Certification of final construction as meeting or exceeding construction specifications. This certification should be signed and stamped by the QC Engineer.

At the completion of the project, Radford will submit a final report to the VDEQ - Waste Division. This report will include a summary of the observations and testing conducted during construction, deviations from design and material specifications (with justifying documentation), and as-built drawings. This document will be prepared and certified correct by the QC Engineer and included as part of the QA\QC Plan documentation.

6.11 Document Control

The QC Engineer will initiate a project filing system which will include, but not be limited to, the following:

- File copy of the Quality Assurance procedures, updated as necessary.
- Photographic construction documentation.
- Survey measurements.
- Field and laboratory test results.
- Daily and weekly field results and reports.
- Field certification reports including as-built drawings.
- Non-conformance and corrective action reports.
- Minutes of construction meetings.

6.12 Storage of Records

During all construction activities, the QC Engineer will be responsible for all facility QA\QC documents. This includes the QC Engineer's copy of the design plans, the QA\QC Plan, and the originals of all the data sheets and reports. Duplicate records will be maintained by the facility to avoid loss of this information if the originals are destroyed. A copy of all documents will be maintained by Radford throughout the post-closure care period.

7.0 REFERENCES

Andrews, Miller and Associates, Inc., Operations and Maintenance Manual for the Wastewater Treatment Plant, Naval Surface Warfare Center, Dahlgren, Virginia, Contract No. N62477-80-C-0328, July, 1982.

Barth and Mason, Soil Sampling Quality Assurance User's Guide, U.S. Environmental Protection Agency, EPA-60014-84-043, May, 1984.

Commonwealth of Virginia/Department of Waste Management, Hazardous Waste Management Regulations, Amendment 10, (VR 672-10-1), February, 1990.

ERCE, Draft Ground Water Monitoring Plan for the Land Treatment Unit, Dahlgren, Virginia, Contract No. N62477-90-C-0170, August, 1990.

ERCE, Draft Ground Water Monitoring Plan for the Sludge Drying Beds, Dahlgren, Virginia, Contract No. N62477-90-C-0170, August, 1990.

ERCE, Draft Ground Water Monitoring Plan for the Surface Impoundments, Dahlgren, Virginia, Contract No. N62477-90-C-0170, August, 1990.

ERCE, Draft Closure, Contingent Closure, and Contingent Post-Closure Plans for the Polishing Ponds, December 1990.

Final Covers on Hazardous Waste Landfills and Surface Impoundments, U.S. Environmental Protection Agency, July 1989.

Fred C. Hart Associates, Inc., Initial Assessment Study of Naval Surface Weapons Center, Dahlgren Laboratory, Dahlgren, Virginia, Contract No. N62474-81-C-9384, May, 1983.

Martin, John F. et al., Closure of Hazardous Waste Surface Impoundments, U.S. Environmental Protection Agency, PB87-155537, September 1982.

Mitchell, James K., "Kettleman Hills Waste Landfill Slope Failure I: Liner System Properties / II:Stability Analyses", Journal of Geotechnical Engineering, Vol 116, No4, ASCE Publications, April, 1990.

Mustafa, Dr. Golam and Howard Freeland, Guidance on Statistical Methods for Ground Water Data Analysis at a Solid Waste or Hazardous Waste Site, The Department of Environmental Quality, Office of Waste Resource Management, June 1994.

O'Brien and Gere Engineering, Inc., Navy Assessment and Control of Installation Pollutants, Confirmation Studies at Naval Surface Weapons Center, Dahlgren, Virginia, Contract No. P11 N62477-83-0113, February, 1986.

Risk Reduction Engineering Laboratory, Final Covers on Hazardous Waste Landfills and Surface Impoundments, U.S. Environmental Protection Agency, EPA 1530-SW-89-047, July, 1989.

U.S. EPA, Interim Final RCRA Facility Investigation (RFI) Guidance. Volumes I and II , U.S. Environmental Protection Agency. PB89-200299, May 1989.

U.S. EPA, Protocol for Evaluating Interim Status Closure/Post-Closure Plans, Office of Solid Waste, U.S. Environmental Protection Agency, August, 1986.

U.S. EPA, Region IV, Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, April, 1986.

U.S. EPA, Test Methods for Evaluating Solid Waste: Physical Chemical Methods, Third Edition, SW-846, Office of Solid Waste and Emergency Response, U.S. Environmental Protection Agency, Washington, D.C., September, 1986.

U.S. EPA Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, Interim Final Guidance, Office of Solid Waste, Waste Management Division, U.S. Environmental Protection Agency, February 1989.

U.S. EPA, Statistical Analysis of Ground water Monitoring Data at RCRA Facilities, Draft Addendum to Interim Final Guidance, Office of Solid Waste, Permits and State Programs Division, U.S. Environmental Protection Agency, July 1992.

U.S. EPA, Test Methods for Evaluating Solid Waste, November 1986.

U.S. EPA, EPA Study Area Analysis Naval Surface Warfare Center, Dahlgren, Virginia, November 1992.

Utah State University, Guidance Manual on Hazardous Waste Land Treatment Closure/Post-Closure, U.S. Environmental Protection Agency, PB87-183695, April, 1987.

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FINAL

GUIDANCE ON STATISTICAL METHODS FOR GROUNDWATER DATA ANALYSIS AT A SOLID WASTE OR HAZARDOUS WASTE SITE

THE DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF WASTE RESOURCE MANAGEMENT

Prepared by:

Dr. Golam Mustafa

and

Mr. Howard Freeland

Guideline Version 2.0
August 10, 1995

GUIDANCE ON STATISTICAL METHODS FOR GROUNDWATER DATA ANALYSIS AT A SOLID WASTE OR HAZARDOUS WASTE FACILITY
THE DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF WASTE RESOURCE MANAGEMENT
August 10, 1995

The following guidance is provided for groundwater data analysis at a solid waste or hazardous waste facility. Please note that these guidance is subject to change depending on new scientific knowledge, changes in regulations and policies. If you have any questions or suggestions regarding the text of this guidance, please contact Dr. Golam Mustafa at (804)-762-4197, or Mr. Howard Freeland at (804)-762-4219.

1. **Verification of the Upgradient and Downgradient Monitoring Wells; Locations, Depths and Groundwater Yields:**

The verification of monitoring wells locations, depths and groundwater yields must include, but is not limited to:

a. Piezometric contour maps should be used to verify the locations for the upgradient and downgradient monitoring wells.

b. Vertical depths and the screen locations for each monitorin wells must be checked using the well logs. For statistical comparison make sure that the upgradient and the downgradient monitoring wells are placed on the same portion of the aquifer or a portion of the aquifer which is hydraulically connected and similar in geochemistry.

c. Make sure that the monitoring wells are yielding adequate groundwater for samples.

d. If the hydraulic conditions do not allow a determination of what wells are upgradient, sampling at other wells that are representative of background groundwater quality should be used for statistical comparison.

2. **Verification of the Data Quality Objectives (DQO):**

The DQO verification process must include, but is not limited to:

a. Check if the appropriate (and/or approved by DEQ) analytical method(s) for each analytes were used.

b. Check if the laboratory reported MDLs/PQLs are appropriate (and/or approved by DEQ), and are below the MCLs/ACLs or the GWPS, or other applicable standards established in the facility permit. If the laboratory reported MDLs/PQLs are above the MCLs/ACLs or the GWPS, or other applicable standards established in the facility permit, then the facility must submit a demonstration (e.g., matrix interference study for MDL/PQL) showing that the laboratory specific MDLs/PQLs are appropriate.

c. Check if the samples are physically and/or seasonally independent. Physical independence is usually achieved by collecting samples at certain time intervals depending on the flow characteristics of the groundwater. If replicate samples were collected, then use an average of the replicates as an independent sample. For a given situation, it may be difficult to avoid seasonality in groundwater samples. If the data exhibite an obvious seasonal trend, then the data should be treated to remove the seasonal component using appropriate statistical methods. In general, to detect or remove a seasonal trend, at least three years of monthly or quarterly data is needed. For the initial phase of groundwater monitoring, the groundwater samples should be collected at a minimum of monthly or quarterly intervals to assure independent samples.

3. **Treatment of Censored Data:**

When 15% or fewer of the background data values are less than the MDL and/or PQL for the given constituent(s), the treatment of censored data values shall be based upon information concerning the following characteristics for each constituent and analytical method:

a. Method of Detection Limit (MDL; as published in SW-846),
b. Practical Quantitation limit (PQL; as published in SW-846),
c. Limit-of-Detection (LOD; as determined within the laboratory), and
d. Limit-of-Quantitation (LOQ; as determined within the laboratory).

In general, the laboratory Limit of Detection and Limit of Quantitation should be known, such that the following treatments are warranted:

A. In those cases where the laboratory LOD is known and verified and approved by the DEQ, then any data less than the LOD shall be treated as one-half of the LOD.

B. In those cases where the laboratory LOQ is known and verified and approved by the DEQ, then any data greater than the laboratory LOD, but less than the laboratory LOQ, shall be treated as one-half of the laboratory LOQ.

C. In those cases where the laboratory LOD is not known, then any data reported as "not detected," shall be treated as one-half of the appropriate published SW-846 MDL.

D. In those cases where the laboratory LOQ is not known, then any data reported as greater than MDL, but "less than PQL" shall be treated as one-half of the appropriate published SW-846 PQL.

When more than 15%, but less than or equal to 50% of the background data values are less than the MDL and/or PQL for the given constituent(s), the treatment of censored data values should be as follows:

a. If the detected-only values are normally distributed, then use Cohen's or Aitchison's method of adjustment for the mean and standard deviation.

b. If the detects-only values are log-normally distributed then use the log-normal delta distribution (or log-transformed Cohen's or Aitchison's method of adjustment) to adjust the mean and standard deviation.

When more than 50% of the background data values are less than the MDL and/or PQL for the given constituent(s), the treatment of censored data values shall be according to the procedures presented in sections 7.(c) through 7.(f) of this guidance.

4. **Treatment of Missing Data:**

In the event of a failure to obtain chemical analytical data for one or more constituents from one or more wells, then those wells shall be re-sampled for those constituents as soon as is practical to do so.

5. **Treatment of Outliers:**

The presence of outliers should be tested for the upgradient wells and/or background period for the downgradient wells in accordance with EPA guidance presented in Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance, April, 1989, page 8-11 or ASTM Papers: E-178-80 & E-178-75 (Standard Practice for Dealing With Outlying Observations) or other procedures published in a peer reviewed Journal. It is common to find outliers in environmental data. The question often asked is: Should we remove the outlier or not? Fortunately, there is a simple solution to this problem which is another virtue of verification resampling as presented later in section 8. By the definition of an outlier, its frequency must be low. The probability of observing a rare event twice in a row in a downgradient well, even if it is real and not an error, is remote. Note that no verification resampling is or should be allowed on the upgradient or background data; therefore excluding outliers is a good practice as long as new downgradient measurements that exceeds background limits can be verified on or between the next scheduled sampling event.

6. **Normality Test Methods:**

The original data must be tested for normality using the Shapiro - Wilk Test of Normality (either single group or multiple group version) for sample size up to 50 and the Shapiro - Francia Test of Normality for sample size more that 50. The following are used for decisions:

(a) If the original data shows that the data are not normally distributed, then the data must be log-transformed and tested for normality using the above methods.

(b) If the original or the log-transformed data confirm that the data are normally distributed, then a normal distribution test must be applied.

(c) If neither the original or the log-transformed data fit a normal distribution, then a distribution free test must be applied.

7. **Selection of Alternate Statistical Methods:**

(a) In those cases where the background data consist of a minimum of eight (8) independent data values obtained from the upgradient well(s), and when less than or equal to 15% of the background data values are less than the MDL and/or PQL for a given constituent and the original or the log-transformed detects-only data follows a normal distribution, then the nondetected data should be adjusted in accordance with the procedures described in section 3 above.

After the adjustments are made, the downgradient values shall be compared to the parametric tolerance interval at 95% level of confidence with 95% or 99% (depending on number of comparisons) coverage of the population or the prediction interval at 95% level of confidence in accordance with the procedure described by Gibbons (1991A & 1994) and summarized in the EPA guidance documents, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance (April, 1989) and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (April, 1992).

(b) In those cases where the background data consist of a minim of eight (8) independent data values obtained from the upgradient wells, and when more than 15%, but less than or equal to 50% of the background data values are less than the MDL and/or PQL for a given constituent, and the original or the log-transformed detects-only data are normally distributed, then the mean and standard deviation shall be adjusted in accordance with the procedures described in section 3 above and summarized by Gibbons (1994) and in the EPA guidance document, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (April, 1992). Note that the mean and the standard deviation is adjusted directly using these methods, no substitution for the nondetected values are required.

After the adjustments are made, the downgradient values shall be compared to the parametric tolerance interval at 95% level of confidence with 95% or 99% (depending on number of comparisons) coverage of the population or the prediction interval at 95% level of confidence in accordance with the procedure described by Gibbons (1991A and 1994) and summarized in the EPA guidance documents, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance (April, 1989) and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (April, 1992).

(c) In those cases where the background data consist of a minimum of thirteen (13) independent data values obtained from the upgradient wells, and when more than 50% of the background data values are less than the MDL and/or PQL for a given constituent (or when neither the original or the log-transformed data fit a normal distribution), then the downgradient data values shall be compared to the non-parametric prediction interval at 95% level of confidence in accordance with the procedures described by Gibbons (1990, 1991B & 1994) and summarized in the EPA guidance documents, Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance (April, 1989) and Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Addendum to Interim Final Guidance (April, 1992). Note that no adjustment for the nondetected values are needed for this case.

(d) In those cases where 100% of the background data are "non-detects": the downgradient wells data values shall be compared to Practical Quantitation Limits (PQLs) in a non-parametric statistical manner. This only applies for those wells and constituents that have at least thirteen (13) background samples. Thirteen samples provides a 99% confidence nonparametric prediction limit with one verification resample. If less than 13 background samples are available more background data must be collected.

(e) As an alternative to (d), perform a statistical analysis using the Poisson Prediction Limit at 95% level of confidence in accordance with the procedure described by Gibbons (1987A, 1987B & 1994) and Cox and Hinkley (1974). The Poisson Prediction limit can be computed from only 8 background measurements regardless of the detection frequency. Since the mean and variance of the Poisson distribution is the same, the Poisson Prediction limit is defined even there is no variability (e.g., even if the constituent is never detected in background). In this case, the PQLs are used in place of the measurements and the Poisson Prediction limit is computed directly.

(f) If none of the above statistical methods are applicable, then contact Dr. Golam Mustafa at (804)-762-4197 for selection of an appropriate statistical method(s).

8. **Verification Resampling Strategy:**

Verification resampling is an integral part of the statistical methods presented in section 7 above. A statistically significant exceedance is not declared and should not be reported until the results of the verification resample are known. If the initial test 'triggered' in a compliance well for a constituent, then one or two independent verification resample is feasible. To go from one to two verification resample, the effect on the site-wide false positive and false negative rates must be demonstrated by the owner/operator. For two verification resample, failure is indicated only if both exceeds the limit.

The criteria for selecting the best-performing verification resampling strategy are: (1) an approximate 5% facility-wise false positive rate; and (2) power equivalent to or better than the EPA Reference Power Curve. Note that the number of background samples has an important effect on the recommended verification resampling strategy. Therefore, as the number of background samples grows, fewer resamples are needed from each potentially contaminated well to maintain adequate power. If, as is expected, the number of feasible, independent retests is limited, a facility operator may have to collect additional background measurements in order to establish an adequate retesting strategy.

9. **Updating Background Samples:**

Certain states have interpreted the Subtitle C & D regulations as indicating that background be confined to the first four samples collected in a day or a semi-annual monitoring event or a year.

The first approach (i.e., four samples in a day) violates the assumptions of independence and confounds day to day temporal and seasonal variability with potential contamination.

In the second example of restricting background to the first four events taken in 6 months, the measurements may be independent if groundwater flows fast enough, but seasonal variability is confounded with contamination.

In the third example in which background is restricted to the first four quarterly measurements, independence is typically not an issue and background versus point of compliance monitoring well comparisions are not confounded with season.

However, restricting the background to only four measurements dramatically increases the size of the statistical prediction limit thereby increasing the false negative rate of the test (i.e., the prediction limit is over five standard deviation units above the background mean concentration). The reason for this is that the uncertainty in the true mean concentration covers the majority of the normal distribution. As such we could obtain virtually any mean and standard deviation by chance alone. By increasing the background sample size, uncertainty in the sample based mean and standard deviation decrease as does the size of the prediction limit, therefore both false positive and false negative rates are minimized.

Due to the above reasons, the DEQ will allow the facilities to add new data to update the background concentrations, as monitoring continues, provided the new data are in control. Every year or two all new data should be pooled with the initial background samples for the upgradient wells only, and construct future prediction or tolerance limits. The statistical outlier detection procedure presented in section 5 must be applied to remove the possibility of spurious background results falsely inflating the size of the background prediction limit.

10. **Intra-well Comparisons:**

In some cases, significant spatial variability may exist at a facility and upgradient versus downgradient comparisons will not produce meaningful results (i.e., significant upgradient versus downgradient differences will be due to spatial variability and not a site impact). In these cases the best alternative is to perform intra-well comparisons however, it must be demonstrated that the well has not been impacted by the site. To this end, the owner/operator must test the appropriateness of intra-well comparisons by demonstrating (1) the absence of any significant trend in that well and constituent and (2) the absence of any constituents of concern (e.g., volatile organic priority pollutant list compounds or other constituents that characterize the leachate from the facility). Of course, at those facilities for which predisposal data are available, intra-well comparisons are the method of choice. Two good statistical methods for performing intra-well comparisons are (1) combined Shewart-CUSUM control chart and (2) prediction limits (see Gibbons 1994 chapter 8).

It should be noted that when justified, intra-well comparisons are always more powerful than their inter-well counterparts because they completely eliminate the spatial component of variability. Due to the absence of spatial variability, the uncertainty in measured concentrations is decreased making intra-well comparisons more sensitive to real releases (i.e., false negatives) and false positive results due to spatial variability are completely eliminated. Combined Shewart-CUSUM control charts have the added advantage of being sensitive to both gradual and immediate releases.

11. Some Statistical Methods to be Avoided:

The statistical methods that should be avoided are:

a. Cochran's Approximation to the Behrens Fisher (CABF) t-test.

b. Analysis of Variance (ANOVA), both parametric and non-parametric methods.

For technical details, please refer to EPA's publication on Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Addendum to Interim Final Guidance (April, 1992); a text book on 'Statistical Methods for Groundwater Monitoring' by Dr. Robert D. Gibbons (1994) and technical notes on 'Why ANOVA Should Be Avoided' by Dr. Golam Mustafa (1994).

REFERENCES

1. ASTM Designation: E178-75. 1975. Standard Recommended Practice for Dealing with Outlying Observations."

2. ASTM Designation: E178-80. 1980. Standard Practice for Dealing with Outlying Observations."

3. Cox, D.R. and Hinkley, D.V. (1974). Theoretical Statistics. London: Chapman & Hall.

4. EPA (1989). Statistical Analysis of ground-water monitoring data at RCRA facilities. Interim Final Guidance, April 1989.

5. EPA (1992). Statistical Analysis of ground-water monitoring data at RCRA facilities. Addendum to Interim Final Guidance, Office of Solid Waste, July 1992.

6. Gibbons, R. D. (1987A). Statistical prediction intervals for the evaluation of groundwater quality. **Ground Water** 25, 455-465.

7. Gibbons, R. D. (1987B). Statistical methods for the analysis of volatile organic compounds in waste disposal sites. **Ground Water** 25, 572-580.

8. Gibbons, R. D. (1990). A general statistical procedure for groundwater detection monitoring at waste disposal facilities. **Ground Water** 28, 235-243.

9. Gibbons, R. D. (1991A). Statistical tolerance limits for groundwater monitoring. **Ground Water**, 29, 563-570.

10. Gibbons, R. D. (1991B). Some additional nonparametric prediction limits for groundwater detection monitoring at waste disposal facilities. **Ground Water**, 29, 729-736.

11. Gibbons, R. D. (1994). Statistical methods for groundwater monitoring, John Wiley & Sons, New York, N.Y.

12. Mustafa, G. (1994). Why ANOVA Procedures Should Be Avoided, Technical Notes, the Department of Environmental Quality, Richmond, Virginia.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

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Certified Mail
Return Receipt Requested

March 9, 1998

C.A. Jake
Alliant Techsystems Inc.
Environmental Manager
Radford Army Ammunition Plant
P.O. Box 1
Radford, VA 24141-0100

RE: **Radford Army Ammunition Plant (RAAP)**
EPA ID# VA1210020730
Equalization Basin Closure Plan Amendment

Dear Ms. Jake:

Your letter requesting an amendment to the approved closure plan for RAAP's Equalization Basin was submitted to the Department of Environmental Quality (DEQ) on December 17, 1997. This amendment will allow RAAP to pursue closure to risk-based standards for the referenced hazardous waste management unit.

Based on the information submitted, the amendment requested is approved. An update to the closure plan's pages are attached and will need to be added to the closure plan. Please update your closure plan, as needed.

As provided in Rule 2A:2 of the Supreme Court of Virginia, you have 30 days from the date of service of this decision to initiate an appeal by filing a notice of appeal with:

Thomas L. Hopkins, Director
Virginia Department of Environmental Quality
629 East Main Street
P.O. Box 10009
Richmond, Virginia 23240-0009

In the event that this decision is served to you by mail, the date of service will be calculated as three days after the postmark date. Please refer to Part Two A of the Rules of the Supreme Court of Virginia, which describes the required content of the Notice of Appeal, including specifications of the Circuit Court to which the appeal is taken, and additional requirements concerning appeals from decisions of administrative agents.

If you should have any questions, concerning this matter, please contact Debra Miller, Environmental Engineer Senior, of my staff at (804) 698-4206.

Sincerely,

Leslie A. Romanchik

for Thomas L. Hopkins

Attachment

cc: Jerry Redder, Alliant Techsystems-RAAP
Robert Greaves, EPA Region III
Debra Miller, DEQ
Glenn VonGonten, DEQ
Claire Ballard, DEQ (w/out Attachment)
Aziz Farahmand, DEQ/RRO-Compliance
Melissa Porterfield, DEQ (w/out Attachment)
CENTRAL HW FILES

The plan described below was developed in accordance with sound standard statistical methods. All data obtained will be reviewed, summarized, and analyzed according to the methods described in this section. Statistical techniques used throughout the analysis will be clearly explained and will be supported by citing appropriate references. Full citations can be found in the References. The closure plan consists of the following aspects:

* Background characterization
* Initial random sampling of the subsoils
* Possible excavation and repeated sampling, or initiation of risk-based closure or contingent closure
* Repeat excavation and sampling or, initiation of risk-based closure or contingent closure
* "Hot spot" sampling of subsoils, if random sampling indicates hot spots exit.

The initial random sampling will be conducted to determine if clean closure can be achieved and whether soil removal will be required to achieve clean closure. A "hot spot" sampling approach may be used to better delineate contaminated areas for excavation and subsequent disposal, depending on the results from the random sampling. The samples will be discrete samples. Radford Army Ammunition Plan reserves the option, at any point during the EQ Basin subsoils assessment, to abandon attempts to demonstrate clean closure and immediately implement one of the following options:

- Continue with removal activities and sampling of soil layers, as detailed above;
- Perform closure to risk-based standards as detailed in Section 3.8.5 and Appendix A of this closure plan; or
- Implement contingent closure and post-closure procedures of this plan.

The subsoils will be evaluated by collecting a minimum of seven soil borings, randomly distributed across the grid nodes. Samples will be collected at the surface (0-3 inches, 6 inches, 12 inches, 18 inches, and

3. If the background critical value (X_{cv}) is equal to or greater than the individual EQ Basin node sample value, that particular node is considered "clean" with respect to the closure parameter being evaluated. If, on the other hand, the background critical value (X_{cv}) is less than the node sample, then:

4. Based on the results from surrounding sample location nodes, hot spot area(s) within the defined areal extent of the EQ Basin will be delineated for subsequent soil removal efforts.

5. Additional subgrid sampling may be performed to further refine delineation of identified "hot spots" for soil excavation.

   a. After excavation of the existing surface soil (0-6 inch) layer within defined hot spot(s), resampling will be performed at all established grid nodes, within the "hot spot" area(s). Samples will be analyzed for all clean closure parameters (HCOCs) for which clean closure has not been demonstrated.

   b. Following resampling, comparison to background[1] along with additional 6-inch soil layer excavation (if required) will be performed in accordance with the protocols previously outlined.

If upon following the protocols detailed in Section 3.8 in an attempt to achieve clean closure, the basin subsoils sampling results still remain above the background values of one or more constituents, Radford Army Ammunition Plant (RAAP) will:

- Continue with removal activities and sampling of soil layers, as detailed above;
- Perform closure to risk-based standards as detailed in Section 3.8.5 and Appendix A of this closure plan; or
- Implement contingent closure and post-closure procedures of this plan.

As previously stated, the facility reserves the option, at any point during EQ Basin subsoils assessment, to abandon attempts to demonstrate clean closure to either background or risk-based standards and immediately implement contingent closure and post-closure.

[1](Optional) The background critical value described thus far will have been computed from the top layer (0-6 inches) of the background area. It may be necessary to sample background at lower intervals (6-12 inches, 12-24 inches) for comparison at lower intervals to avoid bias. The option should be implemented, if, for example, distinctly different soil types are encountered at depth, thereby necessitating re-establishment of background.

3.8.5 Risk Assessment for Closure

As discussed in Section 3.2, an alternative to the clean closure to background standards or in conjunction with clean closure to background standards for some, but not all, constituents, RAAP may demonstrate that the concentrations of hazardous constituents, which were shown to be statistically above background, do not pose an unacceptable level of risk to human health or the environment. RAAP may propose this to the DEQ following the requirements as outlined in this section and as detailed in Appendix A.

In order to estimate the risk for HCOCs, a risk assessment will be conducted according to the DEQ document titled "Guidance for development of health based cleanup goals using decision tree/REAMS program (herein after "Virginia Risk Guidance"), November 1, 1994, prepared by Old Dominion University and the approved closure plan. The risk goals/performance standards will be a hazard index of 1.0 for non-carcinogens and an individual carcinogenic risk of $1x10^{-06}$ and cumulative carcinogenic risk of $1x10^{-04}$. This risk assessment will be conducted assuming a future residential use of the property.

The Department will review the risk assessment report to determine that it conforms to risk assessment requirements for residential risk-based protocols. If acceptable, attainment of the closure standards may then be demonstrated using the residential risk-based assessment in lieu of the clean closure to background standards established under Section 3.8.1 Background Soil Sampling and Section 3.7.6 Subsoil Investigation.

Note, if the EQ Basin cannot meet the residential risk closure standards, then RAAP may propose to modify this closure plan for industrial risk-based closure. Modification will require notification of the DEQ and the submittal of a closure amendment, in accordance with 9 VAC 20-60-580.C.

For the remaining sections of the closure plan, any discussions of "clean" closure of the EQ Basin's unsaturated subsoils, will signify either clean closure to background levels and/or closure to risk based closure standards, as described in this section.

3.9 Field Quality Control

To ensure the collection of representative samples, the following field quality control procedures will be utilized during the closure operations.

Equipment blanks will be collected after every 20th sample. If equipment blanks indicate contamination, then resampling will occur only if sample results are above cleanup levels. Samples will be analyzed for the hazardous constituents of concern identified in this document. Laboratory quality control will be according to the methods detailed in SW-846, Chapter 1, (as updated).

3.9.1 Sample Preservations and Maximum Holding Times

Soil samples usually require no preservation other than storing at 4°C until analyzed. The maximum holding times vary for different measurements. Table 3-2 provides the maximum holding times for certain inorganic and organic analyses. Although these criteria were specifically designed and tested for water samples, they are also applicable for soil sampling studies (Barth and Mason, 1984).

Appendix A

RISK-BASED CLOSURE

1. Introduction

This document discusses the protocol for conducting a risk assessment to implement closure of a hazardous waste management unit (HWMU) in accordance with the Virginia Hazardous Waste Management Regulations (VHWMR) as codified in Title 9 of the Virginia Administrative Code, Agency 20, Chapter 20 (9 VAC 20-60-10 et seq).

2. Risk-Based Evaluation

In order to estimate the risk for hazardous constituents of concern (HCOC) associated with the materials remaining in a HWMU, a risk assessment will be conducted according to the Virginia DEQ document titled "Guidance for Development of Health Based Cleanup Goals Using Decision Tree/REAMS Program (herein after "Virginia Risk Guidance") (November 1, 1994) prepared by Old Dominion University and the approved closure plan. The risk assessment report will contain the following sections:

- site evaluation,
- development of a site conceptual model,
- identification of contaminants of concern,
- identification of media and exposure pathways,
- toxicity assessment,
- estimation of contaminant concentration at the point of exposure, and
- summary of health risk.

The submission instructions contained in Appendix IX of the Virginia Risk Guidance will be reviewed prior to submitting the report to confirm that all necessary risk issues have been addressed. The risk goals associated with the closure performance standards (risk goals) will include:

i. a hazard index of 1.0 or less for non-carcinogens;

ii. a risk of 1E-06 or less for individual carcinogens;

iii. cumulative risk of 1E-04 or less for all carcinogens; and

iv. the concentrations of HCOC remaining in the HWMU will not result in contamination of other environmental media of concern, including the groundwater underneath the unit.

Compliance with the closure standard shall be verified by comparing the calculated individual and cumulative risk/hazard for all HCOC that failed the background statistical comparison (if such comparison is preformed) to the risk goals.

The risk assessment will be conducted assuming a future residential/industrial use of the property. The methodology and equations for estimating the exposure concentration are presented in subsequent sections.

The initial step in the risk assessment will be to develop a site conceptual exposure model (SCEM) which depicts all potential exposure routes and media for the site and the receptors which may be exposed. Then HCOC for the risk assessment are identified (See Section 3 of this document).

In the next step, the exposure assumptions outlined in the Virginia Risk Guidance will be employed to estimate the risk. Information will also be taken as needed from U.S. EPA documents and databases (e.g., the Risk Assessment Guidance for Superfund (RAGS), and the Integrated Risk Information System (IRIS)). The chemical intake equations and exposure parameter assumptions

used to estimate risk (obtained from the Virginia Risk Guidance) are shown in Tables 1 through 4. Additional details on the approach and assumptions used for each potential exposure pathway are provided below.

As a part of the Risk Exposure and Analysis Modeling System (REAMS) evaluation, fate and transport modeling is conducted to demonstrate that the residual soil concentrations of contaminants of concern would not result in contamination of other environmental media of concern including the groundwater underneath the closure unit. For this purpose, representative soil sample(s) will be collected around the unit (subjected to closure) for analysis of the properties listed on page 62 of the REAMS document. In certain situations, groundwater sampling is preferable.

3. Identification of Hazardous Constituents of Concern for Risk Assessment

For the purpose of REAMS evaluation associated with a HWMU, HCOC are those closure constituents present at concentrations statistically exceeding the background levels. If the concentrations of a closure constituent did not statistically exceed the background levels, no further risk-based evaluation for such constituent is required.

4. Exposure Assessment

The exposure assessment will identify transport mechanisms for the contaminants of concern that may potentially impact human receptors. The results of this assessment will be used to document the current and potential exposure posed by the HWMU.

With regard to the soil, a residential exposure will be assumed to document unrestricted closure of the soil. If the risk for potential residential exposure does not exceed the performance standards, unrestricted closure of soil will be accepted. If the site cannot be clean closed for residential use, then the option to pursue restricted closure (commercial/industrial) will be exercised. Closure to commercial/industrial scenario will require the facility to enact a deed restriction that eliminates the possibility of future residential use of the site. The requirements

for establishing such a deed restriction are detailed in VDEQ's Guidelines for Developing Health-Based Cleanup Goals Using Risk Assessment at A Hazardous Waste Site Facility for Restricted Industrial Use, dated June 1995. (A copy of this document is attached.)

Exposure routes will include ingestion, dermal absorption, and inhalation of vapors and dust particles.

With regard to impact to the groundwater underneath the HWMU, REAMS fate and transport modeling[2] will be required to assess impact from residual soil contamination to the groundwater. If the groundwater does not qualify for clean closure, the scope of future groundwater monitoring will be discussed with VDEQ. The groundwater exposure routes to be evaluated include ingestion, dermal absorption, and inhalation of volatiles emitted from the contaminated groundwater.

The exposure assumptions presented in the following sections are based on residential exposure. These constitute a reasonable maximum exposure scenario (RME), an exposure which is unlikely to occur but is reasonably possible. The exposure pathways for residential exposure include ingestion of soil, dermal contact with soil, inhalation of resuspended soil particulates, and inhalation of volatile organic compounds.

4.1 Ingestion of Soil

The equation for potential chemical intake by soil ingestion on-site is included in Table 1. This scenario also assumes that weather or other conditions (e.g., frozen ground/ snow

[2]REAMS includes the unsaturated zone fate and transport model SESOIL. The purpose of running the model is two fold: a) determine whether the contaminants will reach the groundwater table in next 30 years. b) calculate the risk associated with the estimated concentration in the groundwater. For constituents with a promulgated MCL, the estimated concentration will be directly compared against the MCL. However, prior to running the SESOIL model the facility should obtain all the information identified on page 62, of the Virginia Risk Guidance. The closure report must include evaluation of model results (concentrations reaching the groundwater) and a copy of SESOIL output file.

/other cover) do not affect exposure and that all soil ingested is from contaminated areas of the site. These assumptions are protective of human health and the environment.

4.2 Dermal Contact with Soil

The equation for calculating the potential absorbed chemical dose by dermal contact with contaminated soil is provided in Table 1. This scenario assumes that weather or other conditions (e.g., frozen ground/ snow or other cover) do not affect exposure, that contaminated soil remains on the skin long enough for the HCOC to be absorbed and that all soil adhering to the skin is from contaminated areas of the site.

The skin surface areas (SA) used in the dermal pathway have been identified in Virginia Risk Guidance as 4,860 cm^2 for adults, which is the 50th percentile value for the arms, hands and lower legs (U.S. EPA, 1989b - See Attachment A).

A skin-soil adherence factor of 1.45 mg/cm^2 will be used in the dermal intake calculations. The U.S. EPA guidance for dermal exposure assessment (*Dermal Exposure Assessment: Principles and Applications*, EPA/600/8-91/011B) states that a range of values from 0.1 mg/cm^2 to 1.5 mg/cm^2 per event appear possible for dermal adherence factors (AF). In order to estimate the amount of a particular HCOC which may potentially be absorbed through the skin, chemical-specific dermal absorption factors (ABS_{derm}) are used.

4.3 Inhalation of Resuspended Soil

The equation for potential chemical intake by inhalation of resuspended contaminated soil is included in Table 1. An inhalation rate of 0.83 m^3/hr will be used as specified in the Virginia Risk Guidance. This scenario assumes that the concentration of HCOC in indoor dust will be equal to that in outdoor soil and that weather or other conditions, (e.g., frozen ground/snow or other cover) do not affect resuspension or exposure.

However, an appropriate model or equations in Table 1 will be used to estimate the potential amount of respirable particulate matter generated by wind erosion. The estimated generation rate for eroded particulate matter will then be used to derive an ambient air particulate concentration. Justification for and documentation of the model(s) used will be submitted to the Department as part of the risk assessment.

4.4 Inhalation of Volatilized HCOC in Soil

Since the HCOC have appreciable vapor pressures, they are expected to volatilize from soil. Inhalation of HCOC as volatilized vapors is considered for this risk assessment. The equations in Table 1 will be considered for estimating the intake for this condition.

5. Toxicity Assessment

The two principle indices of toxicity used in risk assessment are the reference dose (RfD) and the cancer slope factor (SF). An RfD is the intake or dose per unit of body weight (mg/kg-day) that is unlikely to result in toxic (non-carcinogenic) effects to human populations, including sensitive subgroups (e.g., the very young or elderly). The RfD allows for the existence of a threshold dose below which no adverse effects occur.

The SF is used to express the cancer risk attributable to a discrete unit of intake; that is, the cancer risk per milligram ingested per kilogram of bodyweight per day ($[mg/kg\text{-}day]^{-1}$). The SF is an estimate of the upper-bound probability of an individual developing cancer as a result of exposure to a particular carcinogen. Unlike the RfD, the SF assumes that there is no threshold dose below which the probability of developing cancer is zero. Note that SFs are only developed for those chemicals which have been shown to be carcinogens in man or in at least several animal species. A carcinogenic weight of evidence rating is used to describe the strength of the experimental evidence for carcinogenicity. The U.S. EPA has developed SFs for most chemicals

with weight of evidence ratings of "A" (known human carcinogen) or "B" (probable human carcinogen).

RfDs and SFs are derived by the U.S. EPA for the most toxic chemicals generally associated with chemical releases to the environment for which adequate toxicological data are available. If both the carcinogenic and non-carcinogenic effects of a particular compound are significant, both values may be established. However, in most cases only one value is available.

5.1 Inhalation and oral RfDs and SFs

RfDs and SFs pertinent to the oral and inhalation exposure pathways will be obtained from U.S. EPA's IRIS database. The IRIS (Integrated Risk Information System) on-line database was established by the U.S. EPA to provide risk assessors with peer reviewed toxicological data on chemicals commonly encountered at environmental sites of contamination. If data is not available from IRIS, it will be obtained from the Health Effects Assessment Summary Tables (HEAST), a compilation of toxicity values produced by the USEPA on a quarterly basis. The hierarchy presented in Appendix III of Virginia Risk Guidance will be followed for using these sources.

5.2 Dermal RfDs and SFs

Chemical specific oral-route absorption values (ABS_{oral}) are used to adjust the oral RfD or SF, which is computed from an administered dose, for use in the dermal exposure pathway. This correction is necessary due to the differences in absorption between the skin and the gastrointestinal tract. By correcting the administered-dose oral RfD or SF for the fraction expected to be absorbed in the gut, a dermal absorption factor can be used to estimate the correct dose received through the skin.

6. Evaluation of Risk

Using the toxicity criteria and identified exposure pathways discussed above, and the procedures described in the Virginia Risk Guidance, the risk presented by the HCOC will be estimated. The estimated risk will consider the effects from multiple constituents and all routes of exposure. The risk goals will be a total cumulative hazard index of 1.0, for multiple noncarcinogens and a total cumulative carcinogenic risk of 1E-04 for multiple carcinogens. However, the risk from each individual carcinogen shall not exceed 1E-06 (i.e., one case of cancer per 1,000,000 population).

6.1 Estimation of exposure concentration

For the contaminants detected at the site, an exposure point concentration (EPC) for each exposure pathway will be calculated for each contaminant by estimating the 95th upper confidence limit (UCL) on the arithmetic mean of the concentrations. If the calculated 95th UCL is greater than the maximum detected concentration, then the maximum detected concentration will be used as the EPC. The risk for contaminants will be calculated as per the equations and assumptions described in Tables 1 through 4. If for a contaminant both carcinogenic and noncarcinogenic risk-based cleanup goal exists, the lower of the two will be used as a pathway specific to estimate the risk.

6.2. Risk Estimation

Health risk assessments are based on the relationship involving intake, contaminant concentration, risk, and toxicity. Chronic daily intake (CDI), a product of intake and contaminant concentration, are estimated using the exposure equations and assumptions associated with each route of exposure. CDIs are then combined with the RfDs or SFs to determine the resulting risk. For carcinogen(s), cumulative potential risk ($RISK_c$) can be calculated as follows:

$$RISK_c = CDI_{ingestion} * SF_{ingestion} + CDI_{dermal} * SF_{dermal} + CDI_{inhalation\text{-}VOCs} * Sf_{inhalation\text{-}VOCs} + CDI_{inhalation\text{-}particles} * SF_{inhalation\text{-}particles}$$

For noncarcinogen(s), cumulative hazard index (HI_c) can be calculated as follows:

$$Hi_c = CDI_{ingestion} / RfD_{ingestion} + CDI_{dermal} / RfD_{dermal} + CDI_{inhalation\text{-}VOCs} / RfD_{inhalation\text{-}VOCs} + CDI_{inhalation\text{-}particles} / RfD_{inhalation\text{-}particles}$$

where, taking into account all HCOC and relevant exposure pathways, the excess cancer risk is 10^{-6} or the hazard index is 1.0.

Table 1

Risk Assessment Algorithm for Carcinogenic Exposure

Exposure Route	Chronic Daily Intake (CDI), mg/L-day	
	Residential Exposure	Occupational/Industrial Exposure
Ground Water		
Ingestion	$\frac{CW \times IRW_{adj} \times EF}{AT_c}$	$\frac{CW \times IRW_a \times EF_o \times ED_o}{BW_a \times AT_c}$
Inhalation	$\frac{CW \times IRA_{adj} \times EF \times K}{AT_c}$	$\frac{CW \times IRA_a \times EF_o \times ED_o \times K}{BW_a \times AT_c}$
Dermal	$\frac{CW \times SAW_{adj} \times PC \times ET \times EF \times CF}{AT_c}$	$\frac{CW \times SAW_a \times PC \times ET \times EF_o \times ED_o \times CF}{BW_a \times AT_c}$
Soil		
Ingestion	$\frac{CS \times IRS_{adj} \times CF \times FI \times EF}{AT_c}$	$\frac{CS \times IR \times CF \times FI \times EF_o \times ED_o}{BW_a \times AT_c}$
Dermal	$\frac{CS \times CF \times SAS_{adj} \times AF \times ABS \times EF}{AT_c}$	$\frac{CS \times CF \times SAS_a \times AF \times ABS \times EF_o \times ED_o}{BW_a \times AT_c}$

Inhalation of vaporizing VOCs from soil	$\frac{VF \times IRA_{adj} \times ET \times EF}{At_c}$	$\frac{VF \times IRA_a \times ET \times EF_o \times ED_o}{BW_a \times AT_c}$
Inhalation of emitting particles from soil	$\frac{PEF \times IRA_{adj} \times ET \times EF}{AT_c}$	$\frac{PEF \times IRA_a \times ET \times EF_o \times ED_o}{BW_a \times AT_c}$

Table 2

Risk Assessment Algorithm for Non-carcinogenic Exposure

Exposure Route	Chronic Daily Intake (CDI), mg/L-day	
	Residential Exposure	Occupational/Industrial Exposure
Ground Water		
Ingestion	$\frac{CW \times IRW_c \times EF \times ED_c}{BW_c \times AT_n}$	$\frac{CW \times IRW_a \times EF_o \times ED_o}{BW_a \times AT_n}$
Inhalation	$\frac{CW \times IRA_c \times EF \times ED_c \times K}{BW_c \times AT_n}$	$\frac{CW \times IRA_a \times EF_o \times ED_o \times K}{BW_a \times AT_n}$
Dermal	$\frac{CW \times SAW_c \times PC \times ET \times EF \times ED_c \times CF}{BW_c \times AT_n}$	$\frac{CW \times SAW_a \times PC \times ET \times EF_o \times ED_o \times CF}{BW_a \times AT_n}$
Soil		
Ingestion	$\frac{CS \times IRS_c \times CF \times FI \times EF \times ED_c}{BW_c \times AT_n}$	$\frac{CS \times IRS_a \times CF \times FI \times EF_o \times ED_o}{BW_a \times AT_n}$
Dermal	$\frac{CS \times CF \times SA_c \times AF \times ABS \times EF \times ED_c}{BW_c \times AT_n}$	$\frac{CS \times CF \times SA \times AF \times ABS \times EF_o \times ED_o}{BW_a \times AT_n}$

Inhalation of vaporizing VOCs from soil	$\frac{VF \times IRA_c \times ET \times EF \times ED_c}{BW_c \times AT_n}$	$\frac{VF \times IRA_a \times ET \times EF_o \times ED_o}{BW_a \times AT_n}$
Inhalation of emitting particles from soil	$\frac{PEF \times IRA_c \times ET \times EF \times ED_c}{BW_c \times AT_n}$	$\frac{PEF \times IRA_a \times ET \times EF_o \times ED_o}{BW_a \times AT_n}$

Note: Occupational noncarcinogenic risk assessment is based on adult exposure

Table 3

Age Adjusted Factors

$$IRA_{adj} = \frac{ED_c \times IRA_c}{Bw_c} + \frac{(ED_{tot} - ED_c) \times IRA_a}{BW_a}$$

$$IRW_{adj} = \frac{ED_c \times IRW_c}{Bw_c} + \frac{(ED_{tot} - ED_c) \times IRW_a}{BW_a}$$

$$SAW_{adj} = \frac{ED_c \times SAW_c}{Bw_c} + \frac{(ED_{tot} - ED_c) \times SAW_a}{BW_a}$$

$$IRS_{adj} = \frac{ED_c \times IRS_c}{Bw_c} + \frac{(ED_{tot} - ED_c) \times IRS_a}{BW_a}$$

$$SAS_{adj} = \frac{ED_c \times Sa_c}{Bw_c} + \frac{(ED_{tot} - ED_c) \times SA_a}{BW_a}$$

Note regarding age adjusted factor:

Because contact rate with tap water, ambient air, and residential soil are different for children and adults, carcinogenic risk during the first 30 years of life were calculated using age adjusted factor. These factors approximate the integrated exposure from birth until age 30 by combining contact rates, body weights, and exposure durations for two age groups - small children and adults.

Table 4

Exposure Variables Included in Tables 1, 2, and 3

Symbol	Term	Unit	Value	Reference
ABS	Absorption factor	-	User specified	
AF	Adherence factor	-	1.45	a, c
AT_c	Averaging time carcinogens	days	25550	
AT_n	Averaging time non-carcinogens	days	ED x 365	
BW_a	Body weight adult	kg	70	c
BW_c	Body weight child	kg	15	c
CF	Conversion factor	-	0.000001	-
CS	Chemical concentration in soil	mg/Kg-day	User specified	
CW	Chemical concentration in water	mg/L	User specified	
ED_C	Exposure duration child	years	6	c
ED_{total} ED	Exposure duration for carcinogen total or Residential	years	30	c
ED_O	Exposure duration occupational	years	25	c
EF	Exposure frequency residential	days	350	c
ET	Exposure Time General/Occupational Groundwater Surface Water - ingestion Surface water - dermal Air -inhalation	hrs/day	 8.0 0.2 2.6 2.6 24.0	 c, d
FI	Fraction ingested Residential Occupational	-	 1.0 0.5	 b
IRA_a	Inhalation rate air adult	m^3/day	20	b

IRA_{adj}	Inhalation rate - air adjusted	-	11.66	
IRA_c	Inhalation rate child	m^3/day	12	b
IRA_a	Inhalation rate adult	m^3/day	20	b
IR	Ingestion rate food Fruit/veggies Fish	kg/day	0.28 0.122 0.054	c,d
IRS_a	Ingestion rate soil adult	mg/day	100	b
IRS_c	Ingestion rate soil child	mg/day	200	b
IRS_{adj}	Ingestion - soil adjusted	-	114.29	
IRS_c	Ingestion rate soil child	mg/day	200	b
IRW_a	Ingestion rate water adult	L/day	2	b
IRW_{adj}	Ingestion -water adjusted	L-y/kg-d	1.09	
IRW_c	Ingestion rate water child	L/day	1	b
K	Volatilization factor, water to air	-	0.5	
PC	Permeability constant	cm/hr	User specified	b
PEF	Particulate emission factor	kg/m^3	6.789926E08	f
SAW_c	Surface area child groundwater dermal surface water dermal	cm^2	7500	b,e
SAS_a SAS_c	Surface area soil occupational - adult child	cm^2/event	4500 1875	e
SAS_{adj}	Surface area soil ajusted	cm^2/event	2290	
SAW_a	Surface area for water contact adult	cm^2	820	b
SAW_{adj}	Surface area for water contact	cm^2/event	9200	
VF	Volatilazation factor, soil to air	kg/m^3	User specified	-

use inverse to get m^3/kg = 1.47227...E-9

References:

a. Risk Assessment Guidance for Superfund, Volume I, EPA/540/1-89/002, December 1989.

b. Region III values

c. Exposure Factors handbook, EPA/600/8-89/043, July 1989

d. Human health evaluation manual supplemental guidance, OSWER Directive 9285.6-03, March 25, 1991.

e. Dermal exposure Assessment, Principles and Applications, Interim Report, EPA/600/8-91/011b, January 1992.

f. Technical Background Document for Draft Soil Screening Level Guidance. Office of Solid Waste and Emergency Response. EPA/540/R-94/101. December 1994.

Attachment 2
Landfill Disposal Report

Permitted Landfill
No. 581

COUNTRY SOUTH, LLC
7390 Merriman Road, S.W.
Roanoke, Virginia 24018
Phone (540) 772-0010

Mailing Address — P.O. Box 4132
Roanoke, Virginia 24015

№ 4503

MATERIAL DUMPED

- ☐ Stumps, Brush, Yard Waste
- ☐ Soils, Fill Dirt
- ☐ Concrete, Asphalt, Rock
- ☐ OTHER
- ☐ Total Loads: 1
- ☐ Total Price: 66.00
- County:

Customer Signature

TRUCK PRICE

☐ Pick-up or Small Trailer	$ 7.50
☐ Single Axle — 1 Ton	$ 25.00
☐ Single Axle — 2 Ton	$ 50.00
☐ Tandem Axle	$ 75.00
☐ Trailer up to 24 ft.	$135.00
☐ Trailer up to 30 ft.	$150.00
☐ Trailer 30 ft. & up	$155.00
☐ Other	$

Date: 3/12/98 4:2
Truck No.: 16565
Customer: Cimarelli Sand Co
Address: 170 Cooper Ave
Tonawanda N.Y.
Phone: 74115
P.O.:
Job #: E. Sullivan
C.O.D ☐ Open Check #
Charge ☑ Other ☐

Permitted Landfill
No. 581

COUNTRY SOUTH, LLC
7390 Merriman Road, S.W.
Roanoke, Virginia 24018
Phone (540) 772-0010

Mailing Address — P.O. Box 4132
Roanoke, Virginia 24015

№ 4492

MATERIAL DUMPED

- ☐ Stumps, Brush, Yard Waste
- ☐ Soils, Fill Dirt
- ☐ Concrete, Asphalt, Rock
- ☐ OTHER
- ☐ Total Loads: 1
- ☐ Total Price: 66.00
- County:

Customer Signature

TRUCK PRICE

☐ Pick-up or Small Trailer	$ 7.50
☐ Single Axle — 1 Ton	$ 25.00
☐ Single Axle — 2 Ton	$ 50.00
☐ Tandem Axle	$ 75.00
☐ Trailer up to 24 ft.	$135.00
☐ Trailer up to 30 ft.	$150.00
☐ Trailer 30 ft. & up	$155.00
☐ Other	$

Date: 3/12/98 4:2
Truck No.: Dodge
Customer: Cimarelli Sand Co
Address: 170 Cooper Ave
Tonawanda N.Y.
Phone: 74115
P.O.:
Job #: E. Sullivan
C.O.D ☐ Open Check #
Charge ☐ Other ☐

Permitted Landfill
No. 581

COUNTRY SOUTH, LLC
7390 Merriman Road, S.W.
Roanoke, Virginia 24018
Phone (540) 772-0010

Mailing Address — P.O. Box 4132
Roanoke, Virginia 24015

№ 4490

MATERIAL DUMPED

- ☐ Stumps, Brush, Yard Waste
- ☐ Soils, Fill Dirt
- ☐ Concrete, Asphalt, Rock
- ☐ OTHER
- ☐ Total Loads: 1
- ☐ Total Price: 66.00
- County:

TRUCK PRICE

☐ Pick-up or Small Trailer	$ 7.50
☐ Single Axle — 1 Ton	$ 25.00
☐ Single Axle — 2 Ton	$ 50.00
☐ Tandem Axle	$ 75.00
☐ Trailer up to 24 ft.	$135.00
☐ Trailer up to 30 ft.	$150.00
☐ Trailer 30 ft. & up	$155.00
☐ Other	$

Date: 3/12/98 1:55
Truck No.: Ledged
Customer: Cimarelli Sand Co
Address: 170 Cooper Ave
Tonawanda, N.Y.
Phone:
P.O.:
Job #: E Sullivan
C.O.D ☐ Open Check #

Attachment 3
Closure Construction Solicitation and Specifications

IFB No. DACA65-97-B-0056

US Army Corps
of Engineers
Norfolk District

Bio Plant Equalization Basin Closure

Radford Army Ammunition Plant

Radford, Virginia

Construction Solicitation and Specifications

Fill in SF-1442, Schedule, Section 600 and Return w/Bond

8 September 1997

SUBMITTAL REGIS
(ER 415 1-10)

CONTRACT

TITLE AND LOCATI
Bio Plant Old Equalization Basin Closure

CONTRACTOR

SPECIFICATI ION
01560

ACTIVITY NO a.	TRANS-MITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	CLASSIFICATION: INFORMATION ONLY o.	CLASSIFICATION: GOVERNMENT APPROVED p.	REVIEWER q.	CONTRACTOR SCHEDULE DATES: SUBMIT r.	APPROVAL NEEDED BY s.	MATERIAL NEEDED BY t.	CONTRACTOR ACTION: CODE u.	DATE v.	SUBMIT TO GOVERN-MENT w.	GOVERNMENT ACTION: CODE x.	DATE y.	REMARKS z.
			1.3	Preconstruction Survey	X										X										
			1.3	Environmental Protection Plan	X										X										
			1.3	Erosion Control Plan	X										X										
			1.3	Hazardous Waste Disposal Permit	X									X											
			1.3	VR 680-14-19 Permit	X									X											

SUBMITTAL REGIS.

(ER 415 1-10)

CONTRACT

TITLE AND LOCATIO..

Bio Plant Old Equalization Basin Closure

CONTRACTOR

SPECIFICATIO.. SECTION

02050

ACTIVITY NO a.	TRANSMITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	CLASSIFICATION: INFORMATION ONLY o.	GOVERNMENT APPROVED p.	REVIEWER q.	CONTRACTOR SCHEDULE DATES: SUBMIT r.	APPROVAL NEEDED BY s.	MATERIAL NEEDED BY t.	CONTRACTOR ACTION: CODE u.	DATE v.	SUBMIT TO GOVERNMENT w.	GOVERNMENT ACTION: CODE x.	DATE y.	REMARKS z.
			1.3	Work Plan	X										X										

SUBMITTAL REGIS
(ER 415 1-10)

CONTRACT

TITLE AND LOCATION
Bio Plant Old Equalization Basin Closure

CONTRACTOR

SPECIFICATION
02072

ACTIVITY NO a.	TRANSMITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	CLASSIFICATION: INFORMATION ONLY o.	CLASSIFICATION: GOVERNMENT APPROVED p.	REVIEWER q.	CONTRACTOR SCHEDULE DATES: SUBMIT r.	CONTRACTOR SCHEDULE DATES: APPROVAL NEEDED BY s.	CONTRACTOR SCHEDULE DATES: MATERIAL NEEDED BY t.	CONTRACTOR ACTION: CODE u.	CONTRACTOR ACTION: DATE v.	CONTRACTOR ACTION: SUBMIT TO GOVERNMENT w.	GOVERNMENT ACTION: CODE x.	GOVERNMENT ACTION: DATE y.	REMARKS z.
			1.3	Work Plan	X										X										
			1.3	Qualifications					X						X										
			1.3	Shipping Manifest									X	X											
			1.3	Site Safety and Health Plan									X		X										

SUBMITTAL REGIST
(ER 415 1-10)

CONTRACT

TITLE AND LOCATIO..
Bio Plant Old Equalization Basin Closure

CONTRACTOR

SPECIFICATIO.. SECTION
02210

ACTIVITY NO a.	TRANSMITTAL NO. b.	ITEM NO c.	SPECIFICATION PARAGRAPH NUMBER d.	DESCRIPTION OF ITEM SUBMITTED e.	TYPE OF SUBMITTAL: DATA f.	DRAWINGS g.	INSTRUCTIONS h.	SCHEDULES i.	STATEMENTS j.	REPORTS k.	CERTIFICATES l.	SAMPLES m.	RECORDS n.	CLASSIFICATION: INFORMATION ONLY o.	GOVERNMENT APPROVED p.	REVIEWER q.	CONTRACTOR SCHEDULE DATES: SUBMIT r.	APPROVAL NEEDED BY s.	MATERIAL NEEDED BY t.	CONTRACTOR ACTION: CODE u.	DATE v.	SUBMIT TO GOVERNMENT w.	GOVERNMENT ACTION: CODE x.	DATE y.	REMARKS z.
			3.13	Soils Tests						X					X										

ENG FORM 4288, Oct 94

EDITION OF MAY 91 IS OBSOLETE

SECTION 01440
CONTRACTOR QUALITY CONTROL

10/94
MOD 3/96

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 3740	(1994a) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E 329	(1993b) Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction

1.2 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated therewith shall be included in the applicable unit prices or lump-sum prices contained in the Bidding Schedule.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Clause entitled "Inspection of Construction." The quality control system shall consist of plans, procedures, and organization necessary to produce an end product which complies with the contract requirements. The system shall cover all construction operations, both onsite and offsite, and shall be keyed to the proposed construction sequence. The Contractor's highest ranking manager on site shall be held responsible for the quality of work on the job and is subject to removal by the Contracting Officer for non-compliance with quality requirements specified in the contract. This individual shall be the person with the responsibility for the overall management of the project including quality and production.

3.2 QUALITY CONTROL PLAN

3.2.1 General

The Contractor shall furnish for review by the Government, not later than 30 days after receipt of notice to proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of the Contract Clause entitled "Inspection of Construction." The plan shall identify personnel, procedures, control, instructions, test, records, and forms to be used. The Government will consider an interim plan for the first 30 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work to be started.

3.2.2 Content of the CQC Plan

The CQC Plan shall include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, and purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff shall implement the three phase control system for all aspects of the work specified. The staff shall include a CQC System Manager.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the contract. The CQC System Manager shall issue letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities. Copies of these letters will also be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures shall be in accordance with Section 01300 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Laboratory facilities will be approved by the Contracting Officer.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified by different trades or disciplines, or it could be work by the same trade in a different environment. Although each section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable feature under a particular section. This list will be agreed upon during the coordination meeting.

j. For each definable feature of work, the preparatory and initial controls planned for that feature shall be identified in the form of a list. The list shall be in the same order as the technical specification section. The planned preparatory and initial meetings will be reviewed and agreed upon by both the Government and Contractor at the coordination meeting, although revisions may be required.

3.2.3 Acceptance of Plan

Acceptance of the Contractor's plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in his CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.4 Notification of Changes

After acceptance of the CQC Plan, the Contractor shall notify the Contracting Officer in writing of any proposed change. Proposed changes are subject to acceptance by the Contracting Officer.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction, and prior to acceptance by the Government of the CQC Plan, the Contractor shall meet with the Contracting Officer or Authorized Representative and discuss the Contractor's quality control system. The CQC Plan shall be submitted for review a minimum of 14 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details shall be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management and control with the Government's Quality Assurance. Minutes of the meeting shall be prepared by the Government and signed by both the Contractor and the Contracting Officer. The minutes shall become a part of the contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings and/or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 General

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure contract compliance. The Contractor shall provide a CQC organization which shall be at the site at all times during progress of the work and with complete authority to take any action necessary to ensure compliance with the contract. All CQC staff members shall be subject to acceptance by the Contracting Officer.

3.4.2 CQC System Manager

The Contractor shall identify as CQC System Manager an individual within his organization at the site of the work who shall be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. The CQC System Manager shall be a graduate engineer, graduate architect, or a graduate of construction management, each with a minimum of 3 years construction experience on construction similar to this contract or a construction person with a minimum of 5 years in related work. This CQC System Manager shall be on the site at all times during construction and will be employed by the prime Contractor. The CQC System Manager shall be assigned no other duties except he/she may act as the C-sAM. An alternate for the CQC System Manager will be identified in the plan to serve in the event of the System Manager's absence. The requirements for the alternate will be the same as for the designated CQC System Manager, except for completion of the course.

3.4.3 CQC Personnel

The Contractor shall maintain sufficient staff to ensure adequate coverage of all work. Any additional staff shall be at no additional expense to the Government.

In addition to CQC personnel specified elsewhere in the contract, the Contractor shall provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the environmental area.

3.4.4 Additional Requirement

In addition to the above experience and education requirements the CQC System Manager shall have completed the course entitled "Construction Quality Management For Contractors" no later than 60 days after the Contractors receipt of the Notice To Proceed. This course is periodically offered by the Corps of Engineers. Specific times and locations are available from the Contracting Officer.

3.4.5 Interview

All CQC personnel are subject to interview prior to acceptance by the Contracting Officer.

3.4.6 Organizational Changes

The Contractor shall maintain his CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff the Contractor shall revise the CQC Plan to reflect the changes and submit the changes to the Contracting Officer for acceptance.

3.5 SUBMITTALS

Submittals shall be made as specified in Section 01300 SUBMITTAL PROCEDURES. The CQC organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

3.6 CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the contract. At least three phases of control shall be conducted by the CQC System Manager for each definable feature of work as follows:

3.6.1 Preparatory Phase

This phase shall be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase shall include:

a. A review of each paragraph of applicable specifications.

b. A review of the contract drawings.

c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the contract.

f. A physical examination of required materials, equipment, and

sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. A review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. A check to ensure that the portion of the plan for the work to be performed has been accepted by the Contracting Officer.

j. Discussion of the initial control phase.

k. The Government shall be notified at least [48] hours in advance of beginning the preparatory control phase. This phase shall include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions shall be documented by separate minutes prepared by the CQC System Manager and attached to the daily CQC report. The Contractor shall instruct applicable workers as to the acceptable level of workmanship required in order to meet contract specifications.

3.6.2 Initial Phase

This phase shall be accomplished at the beginning of a definable feature of work. The following shall be accomplished:

a. A check of work to ensure that it is in full compliance with contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. The Government shall be notified at least 48 hours in advance of beginning the initial phase. Separate minutes of this phase shall be prepared by the CQC System Manager and attached to the daily CQC report. Exact location of initial phase shall be indicated for future reference and comparison with follow-up phases.

g. The initial phase should be repeated for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.6.3 Follow-up Phase

Daily checks shall be performed to assure control activities, including control testing, are providing continued compliance with contract requirements, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC documentation. Final follow-up checks shall be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by the deficient work. The Contractor shall not build upon or conceal non-conforming work.

3.6.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases shall be conducted on the same definable features of work if the quality of on-going work is unacceptable, if there are changes in the applicable CQC staff, onsite production supervision or work crew, if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

3.7 TESTS

3.7.1 Testing Procedure

The Contractor shall perform specified or required tests to verify that control measures are adequate to provide a product which conforms to contract requirements. Upon request, the Contractor shall furnish to the Government duplicate samples of test specimens for possible testing by the Government. Testing includes operation and/or acceptance tests when specified. The Contractor shall procure the services of a Corps of Engineers approved testing laboratory or establish an approved testing laboratory at the project site. The Contractor shall perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Results of all tests taken, both passing and failing tests, will be recorded on the CQC report for the date taken. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the Contracting Officer, actual test reports may be submitted later with a reference to the test number and date taken. An information copy of tests performed by an offsite or commercial test facility will be provided directly to the Contracting Officer. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this contract.

3.7.2 Testing Laboratories

3.7.2.1 Capability Check

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the contract specifications and to check the laboratory technician's testing procedures and techniques. Laboratories utilized for testing soils, concrete, asphalt, and steel shall meet criteria detailed in ASTM D 3740 and ASTM E 329.

3.7.2.2 Capability Recheck

If the selected laboratory fails the capability check, the Contractor will be assessed a charge of the cost of the recheck to reimburse the Government for each succeeding recheck of the laboratory or the checking of a subsequently selected laboratory. Such costs will be deducted from the contract amount due the Contractor.

3.7.3 On-Site Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.7.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials will be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government shall be delivered to the Corps of Engineers Division Laboratory, f.o.b., at an address to be identified for each type of test. Coordination for each specific test, exact delivery location, and dates will be made through the Contracting Officer at the Area Office.

3.8 COMPLETION INSPECTION

3.8.1 Punch-Out Inspection

Near the completion of all work or any increment thereof established by a completion time stated in the Special Clause entitled "Commencement, Prosecution, and Completion of Work," or stated elsewhere in the specifications, the CQC System Manager shall conduct an inspection of the work and develop a "punch list" of items which do not conform to the approved drawings and specifications. Such a list of deficiencies shall be included in the CQC documentation, as required by paragraph DOCUMENTATION below, and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff shall make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished the Contractor shall notify the Government that the facility is ready for the Government "Pre-Final" inspection.

3.8.2 Pre-Final Inspection

The Government will perform this inspection to verify that the facility is complete and ready to be occupied. A Government "Pre-Final Punch List" may be developed as a result of this inspection. The Contractor's CQC System Manager shall ensure that all items on this list have been corrected and so notify the Government so that a "Final" inspection with the customer can be scheduled. Any items noted on the "Pre-Final" inspection shall be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.8.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, his superintendent or other primary management person and the contracting Officer's representative will be in attendance at this inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups, and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the Contracting Officer based upon results of the Pre-Final inspection. Notice will be given to the Contracting Officer at least 14 days prior to the final acceptance inspection and must include the Contractor's assurance that all specific items previously identified to the Contractor as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all contract work acceptably complete for this inspection will be cause for the Contracting Officer to bill the Contractor for the Government's additional inspection cost in accordance with the contract clause entitled "Inspection of Construction".

3.9 DOCUMENTATION

The Contractor shall maintain current records providing factual evidence that required quality control activities and/or tests have been performed. These records shall include the work of subcontractors and suppliers and shall be on an acceptable form that includes, as a minimum, the following information:

a. Contractor/subcontractor and their area of responsibility.

b. Operating plant/equipment with hours worked, idle, or down for repair.

c. Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

d. Test and/or control activities performed with results and references to specifications/drawings requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.

e. Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications/drawings requirements.

f. Submittals reviewed, with contract reference, by whom, and action taken.

g. Off-site surveillance activities, including actions taken.

h. Job safety evaluations stating what was checked, results, and instructions or corrective actions.

i. Instructions given/received and conflicts in plans and/or specifications.

j. Contractor's verification statement.

These records shall indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The original and one copy of these records in report form shall be furnished to the Government daily within [24] hours after the date(s) covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days shall be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. The report from the CQC System Manager shall include copies of test reports and copies of reports prepared by all subordinate quality control personnel.

3.9.1 Deficiency Tracking Log

The Contractor shall establish and maintain, a daily formal deficiency tracking log that shall be kept at the job site. The log shall include, as a minimum, the following:

a. Contract title and number.

b. Date reported.

c. Reported by.

d. Deficient work (By an identification number).

e. Type of Deficiency (Construction = C, Safety = A).

f. Description of corrective action(s).

g. Date corrected.

h. Verified by.

3.10 SAMPLE FORMS - ATTACHMENTS

Sample forms enclosed at the end of this section include:

a. Attachment No. 1 - Sample of a Listing for the Definable Features of Construction Work.

b. Attachment No. 2 - Preparatory Phase Checklist.

c. Attachment No. 3 - Initial Phase Checklist.

d. Attachment No. 4 - Construction Quality Control Reports.

e. Attachment No. 5 - Test Report.

f. Attachment No. 6 - Deficiency Tracking Log.

3.11 NOTIFICATION OF NONCOMPLIANCE

The Contracting Officer will notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor shall take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the worksite, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

SECTION 01440 ATTACHMENT NO.1
GUIDE FOR LISTING DEFINABLE FEATURES OF CONSTRUCTION WORK

****** Contractor shall modify this guide to accommodate the project *****

DIVISION 1 - GENERAL REQUIREMENTS

(a) Special Project procedures to include coordination of work, Project meetings, Submittals and Quality Control
(b) Administrative Requirements
(c) Environmental Protection
(d) Historic Preservation
(e) Job Conditions

DIVISION 2 - SITE WORK

(a) Demolition
(b) Removal and Disposal of Asbestos Materials
(c) Excavation, Trenching and Backfilling for Utilities Systems to include sewer gravity drainage and water lines
(d) Clearing and Grubbing, Backfilling for Buildings
(e) Grading
(f) Fence, Chain-Link
(g) Concrete for sidewalks and Curbs
(h) Drilled Pile Foundation
(i) Bituminous Paving
(j) Underground Sprinkler Systems

DIVISION 3 - CONCRETE

(a) Concrete Materials, Concrete Procedures, Concrete Formwork, Forms, Form Ties and Accessories, Concrete Reinforcement, Concrete Accessories to Include Cast-in-Place Concrete, Specially Placed Concrete, Concrete Finishing, Concrete Curing and Grouting
(b) Concrete Restoration and Cleaning
(c) Precast Concrete
(d) Electrical and Mechanical Inserts
(e) Testing
(f) Approval of Samples

DIVISION 4 - MASONRY

(a) Masonry Procedures, Mortar, Mortar Accessories, Unit Masonry, Cavity Wall Construction to Include Bringing Inner and Outer Wythes Up Simultaneously, Reinforcement, Wall Ties, Flashing, Masonry Restoration and Cleaning
(b) Acceptance of Sample Panel for Cavity Wall Construction
(c) Composite Wall Construction
(d) Acceptance of Sample Panel for Composite Wall Construction
(e) CMU Partition Wall Construction to Include Prepared Openings for Ducts, Fire Dampers, Door Frames, Lintels and Bond Beams
(f) Acceptance of CMU Partition Wall Sample Panel
(g) Insulation and Waterproofing
(h) Testing

ATTACHMENT NO.1 (continued)
DIVISION 5 - METALS

(a) Structural Steel Framing To Include Metal Materials and Methods, Metal Fastening, Metal Joints, Welding, Expansion Control and Miscellaneous Metals
(b) Steel Roof Decking
(c) High Strength Bolts

DIVISION 6 - WOODS AND PLASTICS

(a) Rough Carpentry To Include Framing, Prefabricated Structural Wood, Fasteners and Supports, Roof Sheeting, Siding and Sub-Flooring, Insulation and Flashing (b) Finish Carpentry To Include Wood Treatment, Finish Flooring, Cabinets and Closets

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

(a) Damproofing and Waterproofing
(b) Fireproofing
(c) Insulation, Flashing and Sheet Metal, Roof Accessories, Sealants, Shingles, Roof Tiles and Membrane Roofing (Built-Up and EPDM)

DIVISION 8 - DOORS AND WINDOWS

(a) Metal Doors and Frames, Wood and Plastic Doors, Special Doors, Door Opening Assemblies, Metal Windows, Wood and Plastic Windows, Special Windows, Glazing and Miscellaneous Hardware, Caulking

DIVISION 9 - FINISHES

(a) Ceramic Tile
(b) Gypsum Wallboard To Include Special Framing, Shaft Wall Framing System, Ceiling and Wall Opening
(c) Acoustical Treatment to include Metal Suspension System for Acoustical Tile and Lay-In-Panel Ceiling
(d) Wall Covering
(e) Carpeting
(f) Resilient Flooring
(g) Painting
(h) Furring (Metal)
(i) Plastering

DIVISION 10 - SPECIALTIES

(a) Metal Toilet Partitions
(b) Raised Floor System
(c) Movable Partitions
(d) Wardrobe
(e) Fire Extinguisher Cabinets
(f) Toilet Accessories

ATTACHMENT NO.1 (continued)
DIVISION 11 - EQUIPMENT

(a) Fueling System for Motor Vehicles
(b) Adjustable Loading Ramps
(c) Incinerator, Packaged Controlled Air
(d) Incinerator, Medical Waste, General Purpose, Field Erected
(e) Food Service Equipment
(f) Government Furnished Equipment

DIVISION 12 - FURNISHINGS

(a) Theater Chairs
(b) Blinds
(c) Drapes
(d) Lockers
(e) Training Equipment
(f) Furniture and Accessories
(g) Rugs and Mats
(h) Fabrics

DIVISION 13 - SPECIAL CONSTRUCTION

(a) RF Shielding
(b) Sky Lights
(c) Swimming Pool
(d) Energy Monitoring and Control System (EMCS)
(e) Pre-Engineered Structures
(f) Liquid and Gas Storage Tanks
(g) Vaults

DIVISION 14 - CONVEYING SYSTEMS

(a) Shaft Construction To Include Guides and Guide Rails
(b) Car Assembly
(c) Machine Room Layout
(d) Entrances
(e) Operating and Signal Devices
(f) Fire/Emergency Power Operations
(g) Lighting, Power and Wiring
(h) Elevator Power Unit
(i) Acceptance Testing To Include Communications, Safety, Weights, Emergency and Fire Operations, Dispatch System

DIVISION 15 - MECHANICAL

(a) Insulation to Include:
    (1) Pipes
    (2) Ducts
    (3) Equipment
    (4) High Density Inserts, Insulation Protective Shields, Clips or U Bolt Supports for Multiple Pipe Hanger Supports
    (5) Perimeter Insulation

ATTACHMENT NO. 1 (continued)

(b) Plumbing Systems
  (1) Waste/Vent Piping To Include: Underground Soil Piping, Above Ground Soil Piping
  (2) Interior Piping Rough-In To Include: Galvanized Black Iron and Copper Including Drains, Fittings, Valves and Piping Supports
  (3) Plumbing Fixtures To Include Flush Valves, Faucets and Accessories
  (4) Cleaning, Balancing and Operational Testing

(c) Heating systems
  (1) Equipment and System Accessories
  (2) Hot Water/Steam Piping Supports
  (3) Fuel Oil/Gas Piping and Supports
  (4) System Testing and Balancing

(d) Air Distribution Systems
  (1) Equipment and Accessories
  (2) Duct Work To Include Galvanized, Aluminum, Flexible and Fiberglass, Supports, Dampers, Louvers, Diffusers, Duct Line Supports and Fire-Dampers

(e) Refrigeration Systems
  (1) Equipment and Accessories
  (2) Chilled Water/Condenser Water Piping and Supports
  (3) Refrigerant Piping and Supports
  (4) System Testing

(f) Automatic Temperature Control Systems
  (1) Equipment and Materials
  (2) Installation of Materials and Equipment
  (3) System Testing

(g) Underground Heat Distribution Systems
  (1) Manholes
  (2) Piping and Supports
  (3) Cathodic Protection

(h) Sprinkler Systems
  (1) Equipment
  (2) Piping and Supports
  (3) Accessories

(i) Water Treatment Systems

(j) Welding - Piping Systems

DIVISION 16 - ELECTRICAL

(a) Exterior Electrical Distribution, Aerial
  (1) Pole Setting
  (2) Placement of Crossarms, Pins, Insulators, Pole Line Hardware and Conductors
  (3) Placement of Fuse Cutouts, Surge Arresters, Reclosers, Potheads, Pole Mounted Transformers to Include Grounding Conductors, Testing and Cable Terminations

(b) Exterior Electrical Distribution, Underground
  (1) Duct Line Excavation, Placement of Ducts and Misc. Materials
  (2) Placement of In Ground Junction or Pull Boxes and Manholes
  (3) Placement of Duct Bank Concrete Encasement
  (4) Transformer Pad Placement
  (5) Mounting of Pad Mounted Transformers

ATTACHMENT NO.1 (continued)

(6) Cable Placement to Include Splicing, Fire-Proofing and Cable Terminations
(7) Grounding Conductors and Testing

(c) Electrical Distribution, Interior
(1) Wiring Methods to Include Conduit Rough-in, Raceway Boxes, Outlet Boxes, Panelboard Cabinets, Placement of Conductors and Conduit Placement Below the Slab for Slab-On-Grade Construction
(2) Wiring Devices, Panelboards, Switch-Boards and Lighting Fixtures
(3) Motors and Transformers
(4) Testing

(d) Fire Detection and Alarm System
(1) Wiring Methods to Include Conduit, Ground Rods, Detectors, Control Panels, Power Supply, Door Holders, Audible Fire Alarm and Annunciator Panel
(2) Testing

---End of Attachment No.1---

SECTION 01440 ATTACHMENT NO.2
PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME (Address)

Contract No.:_____ Date Preparatory Held:_____

Title: _____ Spec Section:_____

_____ Drawing No(s):_____

Definable Feature of Work:_____

_____

A. PERSONNEL PRESENT:

Name	Position	Company
1._____	_____	_____
2._____	_____	_____
3._____	_____	_____
4._____	_____	_____
5._____	_____	_____
6._____	_____	_____
7._____	_____	_____
8._____	_____	_____

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES _____ NO _____

II. Do all parties have up-to-date drawings and specifications? YES _____ NO_____

C. SHOP DRAWINGS INVOLVED:

Transmittal/Item	Code	Contractor or Gov't Approval
1. _____	_____	_____
2. _____	_____	_____
3. _____	_____	_____
4. _____	_____	_____

ATTACHMENT NO.2 (continued)
D. MATERIALS:

I. Are all materials on hand? YES _____ NO _____

II. Have all materials been checked for contract compliance against approved shop drawings? YES _____ NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. _____

2. _____

3. _____

4. _____

E. TESTS required in accordance with contract requirements:

Test/Paragraph	Frequency
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES _____ NO _____
If yes, attach a copy, if no, explain:

_____

_____

_____

_____

_____

ATTACHMENT NO.2 (continued)

G. EQUIPMENT Requiring Operational Check:

1. _____

2. _____

3. _____

4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES _____ NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES _____ NO _____

Explain any problems: _____

_____

_____

_____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

_____

_____

_____

_____
Quality Control Representative
Signature

SECTION 01440 ATTACHMENT NO.3
INITIAL PHASE CHECKLIST

CONTRACTOR'S NAME (Address)

Contract No.:_____ Date Initial Held: _____

Title:_____ Spec Section:_____

Drawing No(s).:_____

Definable Feature of Work:_____

_____

_____

A. PERSONNEL PRESENT:

Name Position Company

1._____

2._____

3._____

4._____

5._____

6._____

B. MATERIALS being used are in strict accordance with the contract plans and
specifications? YES _____ NO _____

If not, explain:_____

_____

_____

_____

ATTACHMENT NO.3 (continued)

C. WORKMANSHIP:

I. Procedures and/or work methods witnessed are in strict compliance with the requirement of the contract specifications? YES _____ NO _____

If not, explain: _____

_____

_____

II. Workmanship is acceptable? YES _____ NO _____

State area where improvement is needed: _____

_____

_____

D. SAFETY violations and corrective action taken: _____

_____

_____

E. COMMENTS: _____

_____

_____

_____

_____

_____

Quality Control Representative
Signature

SECTION 01440 ATTACHMENT NO.4
DAILY CONSTRUCTION QUALITY CONTROL REPORT
(Sample of Typical Contractor Daily Quality Control Report)

CONTRACTORS NAME (Address)

Date _____ Report No. _____ Contract No. DAC( )
65-__-C-_____ Project Name and Location of work:
_____
_____

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp.____min.____max.] Other Weather Conditions
_____

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )
_____ b. (
) _____ c.
( ) _____
d. ( )
_____ e. (
) _____

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):
_____
_____
_____
_____

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:
_____
_____
_____
_____

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory
Phase:_____
_____
_____
_____

b. Initial
Phase:_____
_____
_____
_____

c. Follow-up
Phase:_____
_____
_____
_____

DAILY CONSTRUCTION QUALITY CONTROL REPORT (Continued)

5. Tests performed as required by plans and specifications and the results:

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

7. Job Safety (Include deficiencies and corrective action taken:

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

_____ CONTRACTOR'S QC SYSTEM MANAGER

SECTION 01440 ATTACHMENT NO.5
TEST REPORT

CONTRACTOR'S NAME (Address)

STRUCTURE OR
BUILDING_____ CONTRACT
NO._____

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM
TESTED:_____
_____
_____
_____
_____

DESCRIPTION OF
TEST:_____
_____
_____
_____
_____

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME_____

TITLE_____

SIGNATURE_____

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

_____

DATE_____

REMARKS:_____
_____
_____
_____
_____

SECTION 01440 ATTACHMENT NO. 6
DEFICIENCY TRACKING LOG

_____ Construction Deficiency Contract No.

_____ Safety Deficiency Project Title

Date Reported	Reported By	Deficient Work	Description of Corrective Actions Taken	Date Corrected	Verified By

-- End of Section --

SECTION 01500
TEMPORARY CONSTRUCTION FACILITIES

09/93
MOD 3/96

PART 1 GENERAL

1.1 GENERAL REQUIREMENTS

1.1.1 Site Plan

The Contractor shall prepare a site plan indicating the proposed location and dimensions of any area to be fenced and used by the Contractor, the number of trailers to be used, entrance(s), utilities, and details of the fence installation. Any areas which may have to be graveled to prevent the tracking of mud shall also be identified. The Contractor shall also indicate any supplemental or other staging area.

1.1.2 Identification of Employees

The Contractor shall be responsible for furnishing to each employee and for requiring each employee engaged on the work to display identification as approved and directed by the Contracting Officer. Prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon release of any employee. When required, the Contractor shall obtain and provide fingerprints of persons employed on the project. Contractor and subcontractor personnel shall wear identifying markings on hard hats clearly identifying the company for whom the employee works.

1.1.3 Employee Parking

Contractor employees shall park privately owned vehicles in an area designated by the Contracting Officer. This area will not necessarily be within reasonable walking distance of the construction site. The Contractor shall provide transportation between the parking area and the construction site. Contractor employee parking shall not interfere with existing and established parking requirements of the facility.

1.2 SUBMITTALS (Not Applicable)

1.3 AVAILABILITY AND USE OF UTILITY SERVICES

1.3.1 Payment for Utility Services

The Government will make all reasonably required utilities available to the Contractor from existing outlets and supplies, as specified in the contract. Unless otherwise provided in the contract, the amount of each utility service consumed shall be charged to or paid for by the Contractor at prevailing rates charged to the Government or, where the utility is produced by the Government, at reasonable rates determined by the Contracting Officer. The Contractor shall carefully conserve any utilities furnished without charge.

1.3.2 Meters and Temporary Connections

The Contractor, at its expense and in a workmanlike manner satisfactory to the Contracting Officer, shall provide and maintain all necessary temporary connections, distribution lines, and meter bases (Government will provide meters) required to measure the amount of each utility used for the purpose of determining charges. The Contractor shall notify the Contracting Officer, in writing, 5 working days before final electrical connection is desired so that a utilities contract can be established. The Government will provide a meter after inspection and approval of the Contractor's

temporary wiring installation. The Contracting Officer will then inform the Facility to make the final hot connection and install the meter(s). Under no circumstance shall the Contractor make the final electrical connection. Other utility connections shall be made by the Contractor as directed by the Contracting Officer.

1.3.3 Advance Deposit

An advance deposit for utilities consisting of an estimated month's usage or a minimum of $50.00 will be required. The last monthly bills for the Federal fiscal year (01 Oct through 30 Sep of the following year) will normally be offset by the deposit and adjustments will be billed or returned as appropriate. Services to be rendered for the next Federal fiscal year, beginning 1 October, will require a new deposit. Notification of the due date for this deposit will be mailed to the Contractor prior to the end of the current Federal fiscal year.

1.3.4 Final Meter Reading

Before completion of the project work and final acceptance of the work by the Government, the Contractor shall notify the Contracting Officer, in writing, 5 working days before termination is desired. The Government will take a final meter reading, disconnect service, remove the meter(s) and notify the Contractor of the final amount due, if any. The Contractor shall then remove all the temporary distribution lines, meter base(s), and associated paraphernalia, and restore all disturbed areas to original condition or better prior to final acceptance of the work by the Government.. The Contractor shall pay all outstanding utility bills before final acceptance of the work by the Government.

1.3.5 Sanitation

The Contractor shall provide and maintain within the construction area minimum field-type sanitary facilities approved by the Contracting Officer. Government toilet facilities will not be available to Contractor's personnel.

1.3.6 Telephone

The Contractor shall make arrangements and pay all costs for telephone facilities desired.

1.4 BULLETIN BOARD, PROJECT SIGN, AND PROJECT SAFETY SIGN

1.4.1 Bulletin Board

Within fifteen days after receipt of the Notice To Proceed, the Contractor shall provide a weatherproof bulletin board not less than 36 by 48 inches in size for displaying the Equal Employment Opportunity poster, a copy of the wage decision contained in the contract documents, Wage Rate Information poster, and other information required or approved by the Contracting Officer. The bulletin board shall be located at the project site in a conspicuous place ,on the outside adjacent to the entrance of the job-site trailer(office), easily accessible to all employees, as approved by the Contracting Officer. Legible copies of the aforementioned data shall be displayed until work under this contract is completed. Upon completion of work the bulletin board shall be removed by and remain the property of the Contractor.

1.4.2 Project and Safety Signs

The requirements for the signs, their content, and location shall be provided at a location designated by the Contracting Officer. The signs shall be erected within 15 days after receipt of the Notice to Proceed. The data required by the safety sign shall be corrected daily, with light

colored metallic or non-metallic numerals. Upon completion of the project, the signs shall be removed and disposed of by the Contractor.

1.4.2.1 Project Sign:

The project sign shall conform to the requirements as indicated on Attachment No.1, attached hereto.

1.4.2.2 Safety Sign:

The safety sign shall conform to the requirements as indicated on Attachment No.2, attached hereto. The data required by the sign shall be corrected daily, with light colored metallic or non-metallic numerals. Numerals, including mounting hardware, shall be subject to the approval of the CO.

1.4.2.3 Payment:

No separate payment will be made for the sign work covered under this section of the specifications and all costs in connection therewith will be considered as a subsidiary obligation of the Contractor, covered by the contract prices in this contract.

1.5 PROTECTION AND MAINTENANCE OF TRAFFIC

During construction the Contractor shall provide access and temporary relocated roads as necessary to maintain traffic. The Contractor shall maintain and protect traffic on all affected roads during the construction period except as otherwise specifically directed by the Contracting Officer. Measures for the protection and diversion of traffic, including the provision of watchmen and flagmen, erection of barricades, placing of lights around and in front of equipment and the work, and the erection and maintenance of adequate warning, danger, and direction signs, shall be as required by the State and local authorities having jurisdiction. The traveling public shall be protected from damage to person and property. The Contractor's traffic on roads selected for hauling material to and from the site shall interfere as little as possible with public traffic. The Contractor shall investigate the adequacy of existing roads and the allowable load limit on these roads. The Contractor shall be responsible for the repair of any damage to roads caused by construction operations.

1.5.1 Haul Roads

The Contractor shall, at its own expense, construct access and haul roads necessary for proper prosecution of the work under this contract. Haul roads shall be constructed with suitable grades and widths; sharp curves, blind corners, and dangerous cross traffic shall be avoided. The Contractor shall provide necessary lighting, signs, barricades, and distinctive markings for the safe movement of traffic. The method of dust control shall be adequate to ensure safe operation at all times. Location, grade, width, and alignment of construction and hauling roads shall be subject to approval by the Contracting Officer. Lighting shall be adequate to assure full and clear visibility for full width of haul road and work areas during any night work operations. Upon completion of the work, haul roads designated by the Contracting Officer shall be removed.

1.5.2 Barricades

The Contractor shall erect and maintain temporary barricades to limit public access to hazardous areas. Such barricades shall be required whenever safe public access to paved areas such as roads, parking areas or sidewalks is prevented by construction activities or as otherwise necessary to ensure the safety of both pedestrian and vehicular traffic. Barricades shall be securely placed, clearly visible with adequate illumination to provide sufficient visual warning of the hazard during both day and night.

Barricades and other physical protection shall be in accordance with EM 385-1-1.

1.6 CONTRACTOR'S TEMPORARY FACILITIES

1.6.1 Administrative Field Offices and Storage Areas

The Contracting Officer will designate an area within which the Contractor shall be permitted to place administrative or storage trailers for equipment and limited construction materials other than in trailers. The Contractor shall provide and maintain administrative field office facilities within the construction area at the designated site. Government office and warehouse facilities will not be available to the Contractor's personnel.

1.6.1.2 Storage Area(s):

The Contractor may construct a temporary 6-foot high chain link fence around all trailers and materials. Fence posts may be driven in lieu of concrete bases where soil conditions permit. No trailers, materials, or equipment shall be placed or stored outside the fenced area unless such trailers, materials or equipment are assigned a separate and distinct storage area by the CO away from the vicinity of the construction site but within the boundaries of the Post. At no time shall trailers, equipment or materials be open to public view with the exception of those items which are in support of ongoing work on any given day. Materials shall not be stockpiled outside the fence in preparation for the next day's work. At the end of each work day, mobile equipment such as tractors, wheeled lifting equipment, cranes, trucks and like equipment shall be parked within the fenced area.

1.6.1.3 Supplemental Storage Area(s):

Upon request of the Contractor, the CO will designate another or supplemental area for the Contractor's use and storage of trailers, equipment and materials. This area may not be in close proximity to the construction site, but shall be within the boundaries of the Post. Fencing of materials or equipment [will] [will not] be required at this site; however, the Contractor shall be responsible for cleanliness and orderliness of the storage area used. The Contractor shall be responsible for the security of any materials or equipment stored in this area. No utilities will be provided to this area by the Government.

1.6.1.4 Appearance of Trailers:

Trailers utilized by the Contractor, whether for the purpose of administrative use or materials storage, shall present a clean and neat exterior appearance and be in a state of good repair. Trailers which, in the opinion of the CO, are not in good repair shall not be allowed on the Post.

1.6.1.5 Equipment:

Any item of construction equipment, with the exception of hand tools, which becomes inoperable shall be repaired within five (5) working days or removed from the construction site.

1.6.1.6 Maintenance of Storage Area(s):

It shall be the responsibility of the Contractor to keep all fencing in a state of good repair and proper alignment. Should the Contractor elect to traverse grassed or other areas without paving that are not established roadways, with construction equipment or other vehicles, such grassed or other areas shall be covered with a layer of gravel as necessary to prevent rutting and to prevent the tracking of mud onto paved or established

roadways. Gradation of the gravel shall be at the discretion of the Contractor. The Contractor shall be responsible for the cutting of grass located within the boundaries of the construction site for the duration of the project. Grass and vegetation along fences, buildings, under trailers and in areas not accessible to mowers shall be edged or trimmed neatly.

1.6.1.7 Sanitation:

It shall be the responsibility of the Contractor to provide and maintain minimum field-type sanitary facilities, approved by the CO, within the construction area. Present Government toilet facilities will not be available to the Contractor's personnel.

1.6 Telephone:

The Contractor shall be responsible for making all arrangements and paying all cost for telephone facilities he may require.

1.6.2 NOT USED

1.6.3 Security Provisions

Adequate outside security lighting shall be provided at the Contractor's temporary facilities. The Contractor shall be responsible for the security of its own equipment; in addition, the Contractor shall notify the appropriate law enforcement agency requesting periodic security checks of the temporary project field office.

1.7 NOT USED

1.10 CLEANUP

Construction debris, waste materials, packaging material and the like shall be removed from the work site daily. Any dirt or mud which is tracked onto paved or surfaced roadways shall be cleaned away. Materials resulting from demolition activities which are salvageable shall be stored within the fenced area described above or at the supplemental storage area. Stored material not in trailers, whether new or salvaged, shall be neatly stacked when stored.

1.11 RESTORATION OF STORAGE AREA

Upon completion of the project and after removal of trailers, materials, and equipment from within the fenced area, the fence shall be removed and will become the property of the Contractor. Areas used by the Contractor for the storage of equipment or material, or other use, shall be restored to the original or better condition. Gravel used to traverse grassed areas shall be removed and the area restored to its original condition, including top soil and seeding as necessary.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 01560
ENVIRONMENTAL PROTECTION (PROJECT SITE)

03/96

PART 1 GENERAL

1.1 DEFINITIONS

For the purpose of this specification environmental pollution is defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare, unfavorably alter ecological balances of importance to human life, and may affect other species and natural resources of importance to man.

1.2 REFERENCES:

The publications listed below form a part of this specification to the extent referenced. The publications are listed in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR 1910.94-SUBPART G	Occupational Health and Environmental Control
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Generators of Hazardous Waste
40 CFR 263	Transporters of Hazardous Waste
40 CFR 264	Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
49 CFR 178	Shipping Container Specifications

CORPS OF ENGINEERS (COE)

EP-1165-2-304	Perspective on Flood Plain Regulations for Flood Plain Management (1976)
ER-1165-2-26	Implementation of Executive Order 11988 on Flood Plain Management (March 1984)
EM 385-1-1	Safety and Health Requirements Manual (September 1996)

VIRGINIA SOIL AND WATER CONSERVATION COMMISSION (VSWCC)

VESCH	Virginia Erosion and Sediment Control Handbook (1992)

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

VR 680-14-19	Virginia Pollutant Discharge Elimination System
VR 680-14-19 Permit	(VPDES) General Permit For Storm Water Discharges From Construction Sites

1.3 SUBMITTALS

The contractor shall submit the following in accordance with Section 01300 SUBMITTAL PROCEDURES.

SD-01 Data

Preconstruction Survey; GA

Prior to commencement of work the Contractor shall perform a preconstruction survey of the project site with the Contracting Officer and take photographs showing existing environmental conditions in and adjacent to the site. A brief report of the results of this survey shall be prepared by the contractor and copies furnished to the Contracting Officer. The contractor shall certify that he has read and understands regulations 29 CFR 1910.94-SUBPART G, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 49 CFR 178, EP-1165-2-304, ER-1165-2-26, VR 680-14-19, and VESCH, and provide proof that he has performed work in accordance with these regulations.

Environmental Protection Plan; GA

The Contractor shall submit for approval within 10 days after Notice to Proceed, and prior to any work on the site, his written Environmental Protection Plan.The Contractor shall meet with the Contracting Officer, to discuss the proposed Environmental Protection Plan and to develop mutual understanding relative to the details of environmental protection, including measures for protecting natural resources, required reports, and other measures to be taken. The plan shall demonstrate compliance with 29 CFR 1910.94-SUBPART G, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, 49 CFR 178, EM 385-1-1, EP-1165-2-304, ER-1165-2-26, VR 680-14-19, and VESCH.

Erosion Control Plan; GA

The contractor shall, within 10 days after the Notice to Proceed, submit an Erosion Control Plan in accordance with VESCH and as otherwise specified for approval of the Contracting Officer, showing the Contractor's scheme for controlling erosion and disposing of wastes. The Erosion Control Plan shall include as a minimum the following items indicating adequate measures to:

a. Reduce by the greatest extent practicable the area and duration of exposure of readily erodible soils.

b. Protect the soils by use of temporary vegetation, or seeding and mulch, or by accelerating the establishment of permanent vegetation. Complete and protect segments of work as rapidly as is consistent with construction schedules.

c. Retard the rate of runoff from the construction site and control disposal of runoff.

d. Sprinkle or apply dust suppressors, or otherwise keep dust within tolerable limits on haul roads and at the site.

e. Borrow areas furnished by the contractor shall be at a location where pollution from the operation can be minimized. Locations should be avoided where pollution would be inevitable.

f. Provide temporary measures for the control of erosion in the event construction operations are suspended for any appreciable length of time.

g. Provide protection against discharge of pollutants such as chemicals, fuel, lubricants, or sewage into any stream.

h. Locate sanitary facilities away from streams, wells, or springs.

Hazardous Waste Disposal Permit; FIO

Submit copies of state and local permit or license showing such agencies' approval of the disposal plan.

VR 680-14-19 Permit; FIO

The Contractor shall provide a copy of his application for the VR 680-14-19 Permit at least five days prior to submittal to appropriate office of the Commonwealth of Virginia. The Contractor shall obtain the VR 680-14-19 Permit in accordance with Virginia Pollutant Discharge Elimination System (VPDES) General Permit For Storm Water Discharges From Construction Sites and provide a copy to the Contracting Officer prior to any work on the site.

1.4 GENERAL REQUIREMENTS

1.4.1 General

The work covered by this section consists of furnishing all labor, materials and equipment and performing all work required for the prevention of environmental pollution during and as the result of construction operations under this contract. In the event the measures set forth in other Technical Provisions of these specifications and this Section conflict, the most stringent standard shall apply. The control of environmental pollution requires consideration of air, water, and land.

1.4.2 Provisions

Provide and maintain, during the life of the contract, environmental protection.
Plan for and provide environmental protective measures to control pollution that develops during normal construction practice. Plan for and provide environmental protective measures required to correct conditions that develop during the construction of permanent or temporary environmental features associated with the project.

1.4.3 Compliance

The contractor shall comply with Federal, state, and local regulations pertaining to the environmental pollution control and abatement, including but not limited to water, air, land, and noise pollution. All applicable provisions of the Corps of Engineers Manual, EM 385-1-1, entitled "Safety and Health Requirements Manual" in effect on the date of solicitation, as well as the specific requirements stated elsewhere in the contract specifications shall be strictly observed and enforced.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 NOTIFICATION

The Contracting Officer will notify the contractor in writing of any non-compliance with the foregoing provisions and the action to be taken. The contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the contractor or his authorized representative at the site of the work, shall be deemed sufficient for the purpose. If the contractor fails or refuses to comply promptly, the Contracting Officer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the contractor unless it was later determined that the contractor was in compliance.

3.2 SUBCONTRACTORS

Compliance with the provisions of this section by subcontractors will be the responsibility of the contractor.

3.3 PROTECTION OF WATER RESOURCES:

The contractor shall not pollute streams, lakes or reservoirs with fuels, oils, bitumens, calcium chloride, acid construction wastes or other harmful materials. It is the responsibility of the contractor to investigate and comply with all applicable Federal, State, County and Municipal laws concerning pollution of rivers and streams. All work under this contract shall be performed in such a manner that objectionable conditions will not be created in streams through or adjacent to the project areas.

3.4 INDUSTRIAL POLLUTION HAZARDS

Hazardous substances as defined in 40 CFR 261 or as defined by applicable state and local regulations, and dust which poses air pollution hazards shall be controlled as approved to comply with all applicable laws which govern the work.

3.4.1 DUST CONTROL

The contractor shall maintain all work areas free from dust which would contribute to air pollution. Approved temporary methods of stabilization consisting of sprinkling, chemical treatment, light bituminous treatment or similar methods will be permitted to control dust. Sprinkling, to be approved, must be repeated at such intervals as to keep all parts of the disturbed area at least damp at all times, and the contractor must have sufficient competent equipment on the job to accomplish this if sprinkling is used. Dust control shall be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

3.5 MAINTENANCE OF POLLUTION CONTROL FACILITIES DURING CONSTRUCTION:

During the life of this contract the contractor shall maintain all facilities constructed for pollution control under this contract as long as the operations creating the particular pollutant are being carried out or until the material concerned has become stabilized to the extent that pollution is no longer being created.

3.6 MAINTENANCE OF PERMITS

The Contractor shall immediately provide to the Contracting Officer two copies of any modification, revocation or reissuance of any applicable permit required to complete the work. The Contractor shall provide two copies of all correspondence with Federal, State or Local Government offices regarding any applicable permit within 5 days. The Contractor shall notify the Contracting Officer in writing at least 5 days prior to any visit to the site by any Federal, State or Local Government office, other than those scheduled by the Contracting Officer, scheduled to observe compliance with applicable permits provided the Contractor receives at least 5 days notice. Otherwise the Contractor shall immediately provide the Contracting Officer written notice of the date, time, office(s) participating and features to be observed by the most expeditious means available.

-- End of Section --

SECTION 01700
AS-BUILT RECORD DRAWINGS AND SHOP DRAWINGS

03/96

PART 1 GENERAL

1.1 GENERAL:

The Contractor shall, upon completion of each facility under this contract, provide the Contracting Officer as-built record contract drawings and as-built reproducible shop drawings.

1.2 AS-BUILT CONTRACT DRAWINGS:

1.2.1 Record of Job Progress Changes and Corrections

During the progress of the job, the Contractor shall keep a careful record at the job site of all construction changes and corrections from the layouts and details and conditions shown on the drawings. These as-built contract drawings shall be a record of the construction as installed and completed by the Contractor. They shall include all the information shown on the contract set of drawings, and all deviations, modifications, or changes from those drawings, however minor, which were incorporated in the work, including all additional work not appearing on the contract drawings, and all changes which are made after any final inspection of the contract work. The as-built drawings changes shall be annotated in a single color (RED) and shall indicate in addition to all changes and corrections, the actual location, kinds and sizes of all subsurface utility lines. In order that the location of these lines and appurtenances may be determined in the event the surface openings or indicators become covered over or obscured, the as-built drawings shall show, by offset dimensions to two permanently fixed surface features, the end of each run including each change in direction. Valves, splice boxes and similar appurtenances shall be located by dimensioning along the utility run from a reference point. The depth below the surface of each run shall also be recorded at each high and low point.

1.2.2 Additional Work:

In the event the Contractor accomplished additional work which changes the as-built conditions of the facility after submission of the final as-built drawings, the Contractor shall furnish revised and/or additional drawings as required to depict final as-built conditions. The requirements for these additional drawings will be the same as for the as-built drawings specified in this paragraph.

1.2.3 Daily Record of As-Built Conditions:

The Contractor shall maintain a full-size set of contract drawings for depicting the record of as-built conditions. These as-built drawings shall be maintained in a current condition at all times during the entire contract period and shall be readily available for review by the CO at all times. All changes from the contract plans which are made in the work, or additional information which might be uncovered in the course of construction, shall be recorded on the prints accurately and neatly by means of details and notes using clearly contrasting single colored (RED) pen to permit ready identification of the change to the print. The as-built drawings shall reflect correctly scaled drawings of the construction as actually performed, and include but not be limited to as-built features showing:

a. Complete and accurate scaled drawings of as-built conditions that are changed from the contract drawings.

b. Layout and schematic drawings of electrical circuits, pole lines, and piping, etc.

c. Correct dimensions and details transferred from shop drawings and contract changes.

d. Correction of alignment, cross section, and layout of earthwork, roadways, etc.

e. Actual location of anchors, embedded items, construction and control joints, depth of footings, etc., for concrete and masonry work.

f. Changes in location of equipment and architectural features.

g. Deletion of phrases such as "optional requirement," or "or equal,", etc., with a listing of the specific items of material or equipment provided.

h. Unusual or uncharted obstructions encountered in the contract work area during construction.

i. Location, extent, thickness, and size of stone protection, particularly where it will be covered by water.

j. Actual invert locations and elevations, where different from those shown on the contract drawings, for utility and process pipelines.

k. The Contractor shall complete the AS-BUILT DRAWING CHECKLIST, attached hereto, and submit it with the as-built drawings.

1.2.4 Submittal to the Contracting Officer for Review and Approval:

Two sets of the as-built marked-up drawings shall be delivered to the CO, at the time of beneficial occupancy of each structure or facility involved under this contract, for review and approval. This submittal shall include a copy of the AS-BUILT DRAWING CHECKLIST signed by the CQC Manager. If, upon review of the as-built drawings, errors and/or omissions are found, the as-built marked-up prints will be returned to the Contractor for correction. The Contractor shall complete the corrections and return the drawings to the CO upon transfer of the facility.

1.3 AS-BUILT SHOP DRAWINGS:

Upon completion of each separate facility or phase of work under this contract, the Contractor shall provide a complete reproducible set of all shop drawings as finally approved and one set of prints. These shop drawings shall show all changes made up to the time the equipment, materials or general construction was completed and accepted. This requirement applies only to those features that are extensions of design (including but not limited to pre-engineered metal buildings and similar), designs provided by the contractor (including but not limited to sprinkler systems and similar), and approved deviations from the contract drawings. Reproducible drawings shall be on Mylar drafting media or approved equal.

1.4 PAYMENT FOR AS-BUILTS CONTRACT/SHOP DRAWINGS:

No separate payment shall be made to the Contractor for preparation of either As-Built Contract Drawings or As-Built Shop Drawings. If the Contractor fails to maintain the in-progress as-built contract/shop drawings as required herein, the CO will deduct from the monthly progress payment, an amount representing the estimated monthly cost of maintaining the record drawings, and will continue deduction of the 10% retainage even after 50% completion of the contract. In addition, final payment with

respect to separately priced facilities or the contract as a whole, will be withheld until proper as-built contract/shop drawings have been provided to the CO.

AS-BUILT DRAWINGS CHECKLIST

Project	Contract #
Contractor	Date

Check one of the following:	YES	NO	N/A
1. Revisions to site layout plans indicated.	___	___	___
2. Site Grading Plan:	___	___	___
a. Finish grade change indicated.	___	___	___
b. Manhole location & invert elevations shown correct.	___	___	___
c. Finish floor elevations of building(s) shown correct.	___	___	___
d. Road locations with turn outs, drainage, etc.	___	___	___
3. Exterior utility lines, locations (actual routing), type of material and heat tracing, size & type of valves, drain cocks, air rents, etc., all shown correct for the following:			
a. Gas	___	___	___
b. Water	___	___	___
c. Steam	___	___	___
d. Condensate	___	___	___
e. Sanitary Sewer	___	___	___
f. Electrical Power	___	___	___
g. Communications, Fire alarms, etc.	___	___	___
4. All road layouts & detail revisions noted.	___	___	___
5. Record temporary water, power, or any other utility or structural appurtenance abandoned in place.	___	___	___

Check one of the following:	YES	NO	N/A
6. Architectural:			
a. Floor plans dimensional changes noted.	___	___	___
b. Door locations size & swing revisions indicated.	___	___	___
c. Interior finish schedule changes noted.	___	___	___
d. All wall section and detail changes noted.	___	___	___
e. Roof plan drain locations, scuppers, roof mounted equipment and slope shown correct.	___	___	___
f. All Equipment Schedules corrected to reflect actual equipment installed or furnished.	___	___	___
g. Reflected ceiling plan shows actual mechanical and electrical access panels, grill opening locations.	___	___	___
7. Structural:			
a. Footing plan revisions noted. Elevation of bottom of footings and type of material (soil).	___	___	___
b. All schedules for footings columns, beams and girders shown as actually constructed.	___	___	___
c. Concrete equipment pads shown in correct location, size and reinforcement.	___	___	___
d. Floor framing plan dimensions, section cuts, expansion joints, construction joints, and floor openings shown correct.	___	___	___
e. Concrete structural details indicate actual steel reinforcement provided.	___	___	___
f. All miscellaneous structural supports for architectural, mechanical & electrical items shown as erected.	___	___	___

Check one of the following:	YES	NO	N/A
8. Mechanical:			
a. Plumbing layout correct as shown.	___	___	___
b. Riser diagrams correct as shown.	___	___	___
c. Interior roof drain shown in correct locations.	___	___	___
d. Fire sprinkler system installed as shown.	___	___	___
e. Heating and air conditioning layout correct as shown.	___	___	___
f. Equipment connections shown in actual locations.	___	___	___
g. Equipment sizes & data shown on schedules are as installed.	___	___	___
h. Sequence of operations, controls, etc, revised to reflect system installed.	___	___	___
9. Electrical:			
a. Conduit layout for receptacles.	___	___	___
b. All changes to riser and one line diagrams noted.	___	___	___
c. Panel board configuration shown correct.	___	___	___
d. Changes in equipment control circuits.	___	___	___
e. Relocations of telephone outlets (paging outlets) and fire detectors shown on plans.	___	___	___
f. Panel board circuit diagrams & schedules revision noted on drawings.	___	___	___
g. Distribution system changes (wire sizes, type & routing) indicated on drawings.	___	___	___
h. Street lighting layout shown as installed.	___	___	___
i. Switchgear configuration changes reflected on drawings.	___	___	___

Check one of the following:	YES	NO	N/A
10. Cross out such work as "optional requirement", "or equal", etc. and list specifically the items of material provided	___	___	___
11. When catalog cuts, schematic drawings, parts lists, etc. are necessary to supplement marked-up contract drawings, clearly delineate what is actually installed if more than one size or model is illustrated. If more than one size or model is used on the job, indicate locations where each model is used.	___	___	___
12. All executed contract modifications have been incorporated as appropriate.	___	___	___
13. In some cases as-built shop drawings will be required. If required by the contract, the same procedure should be followed for as-built drawings. Note that a complete set of shop drawings are submitted to the user, therefore, shop drawing data must also reflect as-built conditions.	___	___	___

CERTIFICATION OF AS-BUILT CHECKLIST

------ ----------
Date Contractor Quality Control Manager Signature

PART 2 PRODUCTS (This Part Not Used)

PART 3 EXECUTION (This Part Not Used)

END>

SECTION 01850

CONTRACT DRAWINGS
03/96

NORFOLK DISTRICT

FILE NUMBER	REVISION	TITLE
RAD 256-1.1	-	T-1 TITLE SHEET
RAD 256-1.2	-	T-2 ORIENTATION AND ACCESS MAP
RAD 256-1.3	-	C-1 EXISTING SITE PLAN
RAD 256-1.4	-	C-2 DEMOLITION AND SALVAGE PLAN
RAD 256-1.5	-	C-3 FINAL GRADING PLAN
RAD 256-1.6	-	C-4 EROSION/SEDIMENT CONTROL AND FENCE NOTES AND DETAILS

PART 2 (Not Applicable)

PART 3 (Not Applicable)

-- End of Section --

Specification No. 2955
ENDM-

Project No. 5952941

SPECIFICATIONS
FOR
BIO PLANT EQUALIZATION BASIN CLOSURE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

PREPARED BY
U.S. ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
NORFOLK, VIRGINIA

ISSUED BY
DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
NORFOLK DISTRICT
803 FRONT STREET
NORFOLK, VIRGINIA 23510-1096

JULY 1997

PROJECT TABLE OF CONTENTS

-- End of Project Table of Contents --

SECTION 01006

SPECIAL WORK RESTRICTIONS AND REQUIREMENTS for RAAP
Feb 94

PART 1 GENERAL

1.1 SUMMARY All project phasing and sequencing shall be coordinated with the Contracting Officer and the Operating Contractor.

1.2 DEFINITIONS:
The following definitions apply to the sections within this project:

a. Facility: Radford Army Ammunition Plant, Radford, Virginia.

b. CO: Contracting Officer or his designated representative.

c. Operating Contractor: Alliant TechSystems Inc.

d. Earth-disturbing activity: Any activity which has the potential to disturb the soil on the project site, including but not limited to clearing, grubbing, excavation, backfilling, grading, drilling, boring, and vehicle movement (either wheeled, tracked, skidded, or dragged).

1.3 SUBMITTALS (Not Applicable)

1.4 COOPERATION WITH USING AGENCY AND OTHER CONTRACTORS

Note that Operating Contractor, formerly Hercules Inc., is now Alliant TechSystem. During the period of this contract, other contracts may be in force for the construction of other features of work on or adjacent to the site of work being accomplished under this contract. It shall be the responsibility of the Contractor on this contract to be fully informed of the extent of the limits of work to be performed by other contractors. Should there be any conflict between these limits, it shall be brought to the attention of the CO and the CO's decision shall be final. Also, prior to completion of work under this contract, members of the Using Agency may be performing work or occupying facilities on or adjacent to the area. The Contractor shall arrange his plant and shall schedule and perform this work so as to effectively cooperate with all other Contractors and Government agencies.

1.5 COORDINATION BETWEEN CONTRACTORS

It shall be the responsibility of the Contractor on this contract to be fully informed of the extent of the limits of work to be performed by other Contractors. Should there be any conflict between these limits, it shall be brought to the attention of the Contracting Officer and the Contracting Officer's decision shall be final

1.6 PERSONNEL RESTRICTIONS

Personnel are limited to the immediate site areas and shall not enter buildings or facilities not involved in the work. All employees of the Contractor will be subject to all rules and regulations of Alliant TechSystem and which pertain to personnel. The Contractor shall erect fences and signs as specified. The Contractor's plans for restricting personnel access to the project site shall be submitted for approval as a part of the Job Hazard Analysis. This will include restrictions put in

place by the Contractor-supplied Archaeological Monitor (C-sAM) if such restrictions have to be put in place due to archaelogical investigations.

1.7 TRANSPORTATION FACILITIES

The facility is served by an all weather surfaced road network. Road(s) within the military reservation proposed to be used by the Contractor shall be subject to prior approval of the Post authorities and such roads, if used, shall be maintained throughout construction and shall be restored to as good condition as existed prior to their use. The Contractor shall also construct, subject to approval, such temporary haul roads and bridges as may be necessary for conducting his work. Any such temporary construction shall be removed and the affected area restored to its original condition. All costs for the use of existing transportation facilities, for the construction of temporary facilities, and for maintenance, repair, removal and restoration shall be borne by the Contractor.

1.7.1 Road Restrictions

The movement of all vehicles within the Post shall be confined to the roads designated and shall comply with traffic regulations within the Post. Other roads may be used only with the approval of the Contracting Officer

1.7.2 Loading Limitations

Load limit for all roads within the boundaries of RAAP is 8 tons. For bidding purposes, the Contractor may exceed these limits to 8 tons per axle.

1.7.3 Cleated Vehicles

Cleated vehicles shall not be moved over surfaced roads except at the immediate site of the area where they are to be used.

1.7.4 Use of Roads

The Contractor shall keep all roads clear of all obstructions and free of mud and other foreign materials resulting from operations. The Contractor's vehicles shall at no time follow a vehicle closer than 50 feet, and all vehicles shall pull off the road and come to a complete stop when meeting emergency vehicles and vehicles with flashing lights. Post speed limits and traffic controls will be observed.

1.7.5 Bridge Limitations

The New River bridge in the Plant has an H-20 live load limit as designated by the American Association of State Highway Officials, and this limit shall not be exceeded. Loads wider than 10-1/2 feet or higher than 16 feet shall not be moved over the bridge without prior approval of the Contracting Officer.

1.7.6 Personnel Transportation Within the Plant

Contractor owned vehicles shall be used to transport workers from the entrance gates to the work sites, be equipped with approved fire extinguisher and first aid kits, and meet all laws and regulations for transporting person(s) on state of Virginia highways. Private owned vehicles will not be allowed in the Plant area within the security fence. Buses and other approved vehicles used for transport of workers only may be parked overnight inside the gate in the area to be designated at the time of construction.

1.7.7 Vehicle Passes

Only official Contractors' vehicles which are used in the performance of the work will be permitted within the Plant. Each Contractor vehicle utilized within the Plant shall be equipped with an approved fire extinguisher and first aid kit. A vehicle pass will be issued to approved vehicles upon request to the Plant Security Officer. No vehicles will be allowed to enter the Plant until such permits have been issued.

1.7.8 Use of Roads Within the Plant

Hard-surfaced roads from U.S. Highways 11 and 460 serve the plant.The movement of all vehicles within the Facility shall be confined to the roads designated and shall comply with traffic regulations within the Facility. Other roads may be used only with the approval of the CO. The Contractor shall keep all roads clear of all obstructions and free of mud and other foreign materials resulting from operations. The Contractor's vehicles shall at no time follow a vehicle closer than 50 feet, and all vehicles shall pull off the road and come to a complete stop when meeting emergency vehicles, vehicles with flashing lights, vehicles escorting heavy equipment. When approaching jeep tractor-trailers from the rear, vehicles shall not pass. Facility speed limits and traffic controls shall be observed.

1.7.9 Catalytic Converters

The use of catalytic converter equipped vehicles is restricted to limited areas of the plant, and must be approved for specific use and in specific locations by the Operating Contractor.

1.7.9.1 Operation

Catalytic converter equipped vehicles may be operated within explosives areas, but will not be permitted to stand or park within 50 feet of any structure containing explosives.

1.7.9.2 Transportation of Explosives

Vehicles equipped with catalytic converters will not be used for transporting explosives.

1.7.9.3 Parking of Vehicles with Catalytic Converters

Vehicles equipped with catalytic converters will not be permitted to stand or park in areas where vegetation or other combustible materials beneath the vehicle may catch fire from converter heat. Fire fighting and security vehicles may leave hardstands or paved roads during an actual emergency, but this will be held to a minimum.

1.7.9.4 Flammable Hazards

Catalytic converter equipped vehicles may not stand or park within 50 feet of any fuel or other flammable materials, or dispensing unit, except for servicing of such vehicles with fuels at motor pools or service stations.

1.7.10 Roadways and Rail Service

Railroad shipments may be made by Norfolk Southern Railway directly into Radford Army Ammunition Plant. Such shipments shall be made to Pepper, Virginia. Hard-surfaced roads from U.S. Highways 11 and 460 serve the plant

1.8 COORDINATION AND WORK PHASING

1.8.1 Work in Unoccupied Area(s)

The area where the Contractor is scheduled to perform the work will not be occupied during the work, however, the Contractor's work activities may affect other area(s) that are occupied. All work shall be in accordance with the Contractor's approved work plan.

1.8.1.1 Work Location:

Refer to Drawing No. T-2, Orientation and Access Map, Norfolk District File No. RAD 256-1.2.

1.8.1.2 Coordination with Government Using Service

Prior to beginning operations at the site of the work, the Contractor shall contact the appropriate representative of the Government Using Service to receive information concerning more specific details and instructions with respect to Radford AAP regulations and procedures.

1.8.2 Nature of The Work

1.8.2.1 The work to be performed by the Contractor shall include but not be limited to the following items. Refer to the drawings and technical specifications for a detailed description of the work required.

1.8.2.2 Demolition of concrete floodwall, Inlet Channel, Effluent Pump Station, (including overhead pipe system from pump station to main building and all pertinent electrical demolition), and concrete trench. Removal of rip-rap along the north side of the basin and hauling material to the on-site Rip-Rap Storage Area and cleaning and removal of 20" steel pipe along south end of the basin.

1.8.2.3 Excavation, removal, and disposal of basin's soil/cement liner. Note that soil/cement liner was originally constructed from a mixture of asphaltic emulsion and soil. Note that should the Contractor be required by the receiving Landfill Owner to show that the demolition debris is not hazardous the Contractor will first attempt to demonstate this proof using the results of the TCLP analysis from Table 3-3 of the February 1997 Site Investigation/Evaluation Study (Contractor may review this document from the Norfolk District, POC, Marc Gutterman). Should these results not satisfy the Landfill Owner's Permit and further testing is required, the Contracting Officer shall be immediately notified and a sampling protocol agreed upon for further testing. Should the Contractor's initial test results show contamination in the demolition debris then the government shall require verification testing. If verification testing is positive for contamination, then all work will cease until a Change Order is approved for removing and disposing the contaminated demolition debris. All negative tests results shall be paid by the Contractor and all positive test results shall be paid by the Government.

1.8.2.4 Backfilling and grading of Equalization Basin to original grades as shown on drawings.

1.8.2.5 The Contractor shall provide a properly trained archaeologist (referred to herein as Contractor-supplied Archaeological Monitor or C-sAM) to monitor the earth-disturbing work within the area identified on the drawings. This individual shall meet the Secretary of Interior's Standards for Professional Archaeologists (Appendix A to 36CFR61), and be subject to approval by RFAAP, Norfolk District, and the Virginia State

Historic Preservation Officer (SHPO). A resume or vita for the C-sAM shall be submitted for review and approval prior to the final hire of this individual.

1.8.2.5.1 This project will take place next to the prehistoric archaeological site 44My7, which is eligible for listing on the National Register of Historic Places. It is likely that this site extends into the project area, under the berm which is to be removed, and that it might be damaged by this action. The C-sAM will observe and monitor all earth-disturbing activities connected with the project and will direct that all earth disturbing activities cease if significant archaeological remains associated with this site are encountered during the work. The Contracting Officer will be notified immediately and a plan will be formulated to retrieve significant data if this is feasible and to ensure the protection of archaeological remains. The exact procedures to be followed will depend on the nature of the remains encountered, but will include, at a minimum, the following:

1. The contractor will supply additional trained personnel to assist the on-site project C-sAM in recovering significant data.

2. All exposed prehistoric features, such as post holes, pit features, burials and midden will be mapped and photographed under the supervision of the C-sAM.

3. Archaeological remains will be excavated only as necessary to comply with debris removal provisions of the contract documents. A plan to carry out protective measures to safeguard discovered archaeological remains shall be as mutually agreed by the C-sAM and the Contracting Officer and will be submitted to the SHPO by RAAP for approval.

4. If a plan for site burial is approved by the SHPO, it will include the following measures: The portions of the site exposed during the SWMU 10 project will be covered with geotextile fabric installed and secured to the exposed site surface with six-to eight-inch steel staples. The geo-textile material will conform to the VDOT Road and Bridge Specifications, January, 1991 (245.02.B). Any overlaps will be a minimum of four feet in width. Fill material will be placed on top of the geo-textile fabric by dumped successive loads that will be spread from the perimeter of the sites to their interior following specification 303.04. Fill material will then be compacted ensuring a minimum depth of one foot. Construction machinery will operate only on the deposited fill material. Under no circumstances will construction equipment drive on the exposed ground surfaces of the site or on the geo-textile fabric. This work will be conducted under the supervision of the C-sAM.

5. Perimeter fencing will be installed around the site 44MY7 after closure.

6. If Native American burials and/or associated funerary objects are encountered the requirements of the Native American Graves Protection and Repatriation Act will be observed, work which may affect the subject area must cease, and an emergency permit must be obtained from the Virginia Department of Historic Resources by RAAP. It should be noted that this will trigger an automatic waiting period of at least 30 days, during which time no work may be done on portions of the site which may affect the discovered Native American cultural items.

7. If the soil in which archaeological remains are encountered is so badly contaminated that traditional archaeological data recovery cannot be safely completed, then the maximum practical data recovery will be carried out in the form of photography and other remote recording.

8. A report on all monitoring activity and data recovery meeting the standards for such reports as dictated by the Virginia Department of Historic Resources will be prepared by the C-sAM, on behalf of RAAP. This report will be prepared even if no significant archaeological resources are encountered, to document this negative finding. A report of negative finding shall be considered the baseline report.

9. The C-sAM, in agreement with RFAAP, the Norfolk District and the SHPO, will arrange for the curation of discovered archaeological remains as required and will prepare curation agreement documents as appropriate.

10. Should the SHPO object within 30 days to any plans or proposed actions pursuant to this agreement, RFAAP shall consult with the SHPO to resolve the objection. If the RFAAP determines the objection cannot be resolved, the RFAAP shall request the further comments of the Advisory Council pursuant to 36 CFR 800.6(b). Any Council comment provided in response to such a request will be taken into account by the RFAAP in accordance with 36 CFR 800.6(c)(2) with reference only to the subject of the dispute; the RFAAP's responsibility to carry out all actions under this agreement not the subject of the dispute will remain unchanged.

11. Time extensions for Contractor's archaeological staff and archaeological downtime will be in accordance with paragraph 1.13 of this Section.

1.8.2.6 The Corps of Engineers, Installation Operating Contractor and the construction Contractor will establish a schedule for demolition and backfilling at the site during the Preconstruction Conference.

1.8.2.6.1 Begin demolition of concrete floodwall and removal of the 12" soil/cement liner. Note that liner material was originally constructed from a mixture of asphaltic emulsion and soil. Liner material shall be excavated, removed, and disposed of properly offsite.

1.8.2.6.2 All equipment shall be washed down prior to leaving RAAP.

1.8.3 Maintenance of Utilities

Any active utilities, including but not limited to electricity, gas, water, sewer, heating, air conditioning, or any like service, that will require interruption or replacement in any occupied area affected as a result of the Contractors scheduled work activities, shall be temporarily provided by the Contractor at his own expense until the affected service is fully and permanently restored. All temporary method(s) of service replacement the Contractor proposes for use on this contract shall be approved by the Contracting Officer prior to commencing the work. No process lines will be disconnected by the Contractor unless approval has been granted by Alliant Techsystems.

1.8.4 Hours of Work

The normal work day for construction shall be from 7:30 a.m. to 4:00 p.m., Monday through Friday of each week. Any request to change these hours shall be made in writing to the Contracting Officer at least two calendar days prior to the desired day on which the change is to go into effect. The changed hours shall not go into effect until written permission has been received from the Contracting Officer.

1.9 SPECIAL RADFORD AAP REQUIREMENTS

1.9.1 Hot Work Permit

Heat or spark producing devices such as welding machines, power actuated anchoring devices, drills, and flashlights shall not be used either inside or outside working areas until a hot work permit has been issued by the Operating Contractor. Request for hot work permits shall be made in writing to the Contracting Officer not less than five working days prior to the request of the permit. All heat producing devices shall be attended at all times. Contractor and his Subs are responsible to assure that the area is wet with water while all work is being performed.

1.9.2 Blasting

Blasting will not be permitted on this project.

1.9.3 Mobile Radio Equipment

The Contractor shall obtain approval for certain frequencies while using any mobile radio equipment within the fenced area of the Plant

1.9.4 Contaminated Areas

Notice is hereby given that some of the areas in which the work is to be performed may have been used for the processing of explosive materials. The Government does not in any way warrant that the areas are entirely free of all explosives and no representation of any kind whatsoever is made that all explosives have been removed, nor will the Government be liable for any damage to persons or property should any damage be occasioned as a result of any explosive material that may not have been removed. The Contractor will be held responsible for making these facts known to all personnel during the performance of this work.

1.9.5 Security

1.9.5.1 Property Passes Property passes for the entry and removal of property will be issued by the Contracting Officer. All materials and tools, including hand tools, must be itemized on the property pass for entry into the Plant, and property to be removed from the Plant must be itemized on a pass signed by a Government representative. Any property to be removed that is not on the pass will not be allowed to be removed.

1.9.5.2 Area Entry Permit

The Contractor shall sign Form RA-603 before Contractor employees will be allowed to enter the Plant area within the security fence. This form will be completed by the Operating Contractor and a copy of the signed form furnished to the Contracting Officer.

1.9.5.3 Notification Letter

Within 5 calendar days of receipt of his Notice to Proceed the Contractor shall forward a letter through the Area Engineer, Southwestern Virginia Area Office, Norfolk District, Corps of Engineers, Radford, Virginia 24141, to the plant security officer (Commander, Radford Army Ammunition Plant, ATTN: SARRA-SS, Radford, Virginia 24141) providing general data about the project. Required information is shown in the following "INITIAL CONTRACTOR REPORT". Significant changes will be reported as they occur and documented as a part of the Daily Report.

INITIAL CONTRACTOR REPORT

- ON SITE SUPERINTENDENT

- * LOCAL ADDRESS
- * LOCAL TELEPHONE NUMBER
- * WORK AREA/BUILDING
- * BRIEF DESCRIPTION OF WORK
- * NUMBER OF PERSONNEL EMPLOYED ON PROJECT (approx.)
- * LENGTH OF CONTRACT
- * SUBCONTRACTORS
- * NORMAL WORKING HOURS
- * LOCATION OF OFFICE TRAILER(S) ON PLANT (if any)
- * Changes in this information will be reported in the Daily Report of operations as they occur.

1.9.5.4 Daily Report

A daily report shall be provided by the Contractor which shall indicate which employees are working that day and what area/building they will be working in. This report shall be provided to Alliant Tech Systems Security Department, Badge and Decal Section (Building 229), not later than 8:00 a.m. daily. Contractors shall document in the Daily Report and notify Alliant Tech Systems Security Department whenever they have personnel working in an area before or after their regularly established working hours. Any request to work at other than regularly established hours may require using a gate not normally open at that time. The request shall be in writing and will be processed through the plant security office at least 24 hours prior to performance of the work. A copy of the approved request shall be furnished to the Contracting Officer and noted in the Daily Report of operations. Alliant Tech Systems, the operating Contractor, will have their security department check work sites periodically to verify the accuracy of the daily reports provided by the Contractor.

1.10 INTERRUPTIONS OF UTILITIES

1.10.1 Approval

Utility services shall not be interrupted by the Contractor to relocate, make connections, or interrupt for any purpose, without written approval of the Contracting Officer.

1.10.2 Request

Request for permission to shut down services shall be submitted in writing to the Contracting Officer not less than 10 calendar days prior to date of proposed interruption. The request shall give the following information:

(a) Nature of Utility (Gas, L.P. or H.P., Water, Elec.)

(b) Size of line and location of shutoff.

(c) Buildings and services affected.

(d) Hours and date of shutoff.

(e) Estimated length of time service will be interrupted.

1.10.3 Service Interruptions

Services shall not be shut off until receipt of approval of the proposed hours and date from the Contracting Officer.

1.10.4 Timely Disconnections

Shutoffs which will cause interruption of Government work operations as determined by the Contracting Officer shall be accomplished during regular non-work hours or non-work days of the Using Agency without any additional cost to the Government.

1.10.5 Utilities Operation

Operation of valves on water mains will be by Government personnel. Where shutoff of water lines interrupts service to fire hydrants or fire sprinkler systems, the Post Fire Department shall be notified by the Contractor in writing 72 hours prior to the proposed interruption. The Contractor shall arrange his operations and have sufficient material and personnel available to complete the work without undue delay and shall restore service without delay in event of emergency.

1.10.6 Gas

Flow in gas mains which have been shut off shall not be restored until the Government inspector has determined that all items serviced by the gas line have been shut off.

1.11 PHYSICAL DATA

The physical conditions indicated on the drawings and in the specifications are the result of site investigations.

1.12 TIME EXTENSIONS FOR UNUSUALLY SEVERE WEATHER

This provision specifies the procedure for the determination of time extensions for unusually severe weather in accordance with the Contract Clause entitled "Default: (Fixed Price Construction)". In order for the Contracting Officer to award a time extension under this clause, the following conditions must be satisfied:

(a) The weather experienced at the project site during the contract period must be found to be unusually severe, that is, more severe than the adverse weather anticipated for the project location during any given month.

(b) The unusually severe weather must actually cause a delay to the completion of the project. The delay must be beyond the control and without the fault or negligence of the contractor.

1.12.1 Schedule

The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project location and will constitute the base line for monthly weather time evaluations. The contractor's progress schedule must reflect

these anticipated adverse weather delays in all weather dependent activities.

MONTHLY ANTICIPATED ADVERSE WEATHER DELAY
WORK DAYS BASED ON (5) DAY WORK WEEK

JAN	FEB	MAR	APR	MAY	JUNE	JUL	AUG	SEP	OCT	NOV	DEC	RFAAP
11	9	9	6	8	8	9	7	6	5	6	10	

1.12.2 Records

Upon acknowledgement of the Notice to Proceed and continuing throughout the contract, the contractor will record on the daily CQC report, the occurrence of adverse weather and resultant impact to normally scheduled work. Actual adverse weather delay days must prevent work on critical activities for 50 percent or more of the contractor's scheduled work day.

1.12.3 Impacted Days

The number of actual adverse weather days shall include days impacted by actual adverse weather (even if adverse weather occurred in previous month), be calculated chronologically from the first to the last day in each month, and be recorded as full days. If the number of actual adverse weather delay days exceeds the number of days anticipated in the schedule of monthly anticipated adverse weather delays, above, the contracting officer will convert any qualifying delays to calendar days, giving full consideration for equivalent fair weather work days, and issue a modification in accordance with the Contract Clauses entitled "Default (Fixed Price Construction)".

1.13 TIME EXTENSIONS FOR ARCHEOLOGICAL DELAY

1.13.1 This provision specifies the procedure for the determination of time extensions for archeological delay in accordance with the contract clause entitled "Default (Fixed Price Construction)". The schedule below defines the anticipated archeological delay for the contract period. The contract completion time includes 60 days for archeological delays.

1.13.2 The above schedule of anticipated archeological delay will constitute the base line for archeological delay evaluations. Upon acknowledgement of the Notice to Proceed and continuing throughout the contract on a monthly basis, actual archeological delay days will be recorded on a work day basis and compared to the anticipated archeological delay in the schedule above. The term actual archeological delay days shall include days impacted by actual archeological delay.

1.13.3 The number of actual archeological delay days shall be calculated chronologically. Once the number of actual archeological delay days anticipated in the schedule above have been incurred, the Contracting Officer will examine any subsequently occurring archeological delay days to determine whether a contractor is entitled to a time extension. All archeological delay days must prevent work for 50 percent or more of the contractor's work day and delay work critical to the timely completion of the project. The Contracting Officer will issue a modification in accordance with the contract clause entitled "Default (Fixed Price Construction)".

1.13.4 The maximum shut down period for the Archaeological Investigation shall be 60 working days. The first day of the shutdown will be such date when the C-sAM discovers a significant find. The Contracting Officer shall have the final authority for ordering a shutdown. The reason for shut down is to accommodate the archaeological investigation to determine the historical significance of the Native American cultural items unearthed.

1.14 SCHEDULING AND DETERMINATION OF PROGRESS

In accordance with the Contract Clauses, the Contractor shall within five calendar days after date of commencement of work or as otherwise determined by the Contracting Officer, submit for approval a practicable progress schedule. The progress schedule shall be in the form of a chart graphically indicating the sequence proposed to accomplish each work feature or operation. The chart shall be prepared to show the starting and completion dates of all work features on a linear horizontal time scale beginning with date of Notice to Proceed and indicating calendar days to completion. Each activity in the construction shall be represented by an arrow. The head to tail arrangement of arrows shall flow from left to right and shall show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the Contractor. Each arrow representing an activity shall be annotated to show the activity description and duration. Contractor shall indicate on the chart the important work features or operations that are critical to the timely overall completion of the project. Key dates for such important work features and portions of work features are milestone dates and shall be so indicated on the chart. This schedule will be the medium through which the timeliness of the Contractor's construction efforts is appraised.

When changes are authorized that result in contract time extensions, Contractor shall submit a modified chart for approval by the Contracting Officer. The Contract Clause entitled "SCHEDULE FOR CONSTRUCTION CONTRACTS" with reference to overtime, extra shifts, etc., may be invoked when the Contractor fails to start or complete work features or portions of same by the time indicated by the milestone dates of the approved progress chart, or when it is apparent to the Contracting Officer from the Contractor's actual progress that these dates will not be met. Neither on this chart nor on the periodic chart which the Contractor is required to prepare and submit, as described in "SCHEDULE FOR CONSTRUCTION CONTRACTS" of the Contract Clauses, shall the actual progress to be entered include or reflect any materials which may be on the site, but are not yet installed or incorporated in the work. For payment purposes only, an allowance will be made by the Contracting Officer of 100 percent of the invoiced cost of materials or equipment delivered to the site but not incorporated into the construction, pursuant to Contract Clause "PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS". The Contractor's progress schedule shall include a chart of the scheduled work activities plotting scheduled completion percentage based on dollar value on one axis and time on the other axis. The actual progress shall be plotted on the required periodic chart submittals to indicate the percentage of work scheduled and actually completed.

1.15 PURCHASE ORDERS

To ensure proper expediting of orders the Contractor and his subcontractors shall furnish to the Contracting Officer, one copy of each purchase order covering supplies or services required for performance of the work. Each purchase order shall clearly indicate the date of placement, the date delivery is required in order to avoid delay in the scheduled progress of the work, and the date delivery is promised by the supplier or producer. Copies of purchase orders shall be forwarded on the date issued.

1.19 SALVAGE MATERIALS AND EQUIPMENT

The Contractor shall maintain adequate property control records for all materials or equipment specified to be salvaged. These records may be in accordance with the Contractor's system of property control, if approved by the Contracting Officer. The Contractor shall be responsible for the

adequate storage and protection of all salvaged materials and equipment and shall replace, at no cost to the Government, all salvage materials and equipment which are broken or damaged during salvage operations as the result of his negligence, or while in his care. Salvage material to include lift station pumps

1.20 HISTORICAL AND ARCHEOLOGICAL FINDS

All articles of historical or archeological value, including, but not limited to, coins, fossils, and articles of antiquity which may be uncovered by the Contractor during the progress of the work, shall remain the property of the Government. Such findings shall be reported immediately to the Contracting Officer who will determine, in consultation with the C-sAM, the method of removal, where necessary, and the final disposition thereof.

1.20.1 GENERAL ARCHEOLOGICAL REQUIRMENTS

Construction of this project will take place in areas where significant archeological features may exist. Close coordination between the contractor and the Contracting Officer will be necessary to insure compliance with state and federal historical preservation regulations. Several steps have been taken to minimize the impact of archeological finds on progress of this contract

1.20.2 Based on archeological surveys, locations of possible archeological sites are identified on the plans and in the specifications. The contractor shall provide the Contracting Officer a minimum of 48 hours advance notice prior to starting work in these areas.

1.20.3 The Contractor is advised that archaeological features may be discovered at the project location and that he must provide an archaeologist to monitor all earth-disturbing activities as indicated in Paragraph 1.8.2.5 above. If significant archaeological remains are observed by the C-sAM, then the Contracting Officer must be notified. If the Contracting Officer, in consultation with the C-sAM, determines that archeological finds require review and preservation to the extent that a significant work stoppage at that site is necessary, the Contractor shall, at no additional cost to the Government, move his operations to another portion of the contract. If, in the opinion of the Contracting Officer it is impractical for the Contractor to move his operations to another portion of the contract and archeological conditions prevent work for 50 percent of more of the Contractor's work day and delay work critical to the timely completion of the project, the delay will be evaluated in accordance with paragraph "Time Extensions for Archeological Delays".

1.20.4 The Contractor may occasionally encounter minor archeological features which will require 5 to 60 minutes for the Contracting Officer's authorized representative to inspect. To the extent possible, these inspections will be conducted during the contractor's scheduled breaks; however, the contractor can expect occasional brief work stoppages to allow necessary examination of unearthed features.

1.20.5 At the direction of the Contracting Officer, after consultation with the C-sAM, the Contractor shall provide additional archeological support services as specified. The archeological support personnel shall have previously received and completed the necessary training and on-site experience requirements as established in 29 CFR 1926.65(e), the OSHA standard for hazardous waste operations and emergency response (HazWOpER). Services shall be provided within 24 hours of notification. Any contract delays due to slow response of contractor shall be the contractor's responsibility. Payment will be determined by the actual hours of each

service provided and hourly unit prices bid by the contractor are subject to the approval of the Contracting Officer and shall be under the supervision of the Contracting Officer or his authorized representative.

Job Description are as follows:

1. Archeological Crew Chief, Education, Experience: Completion of an Undergraduate degree in Anthropology, History, Museum Sciences or a related field, AND 6 months experience supervising archeological technicians on an excavation site; OR at least 1 year's experience supervising archeological technicians on an excavation site. Graduate training in anthropology, history, etc. is preferred but not required.
2. Archeological Technician, Education: No special qualifications. Must be able to read and write. Experience: At least 6 weeks previous experience in archeological excavation under the supervision of a professional archaeologist is preferred. This can include employment, high-school or college field training courses, or some combination. Participation in training and certification programs sponsored by amateur societies may be an acceptable substitute in individual cases.
3. Common labor - no specialized experience required.
4. Night Watchmen - private security guard (subject to approval of Contracting Officer) or off-duty policeman.

1.20.6 Monitoring of excavations will be by the C-sAM.

1.21 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

1.21.1 Allowable Costs

Allowable cost for construction and marine plant equipment in sound workable condition owned or controlled and furnished by a Contractor or subcontractor at any tier shall be based on actual cost data when the Government can determine both ownership and operating costs for each piece of equipment or equipment groups of similar serial and series from the Contractor's accounting records. When both ownership and operating costs cannot be determined from the Contractor's accounting records, equipment costs shall be based upon the applicable provisions of EP 1110-1-8, "Construction Equipment Ownership and Operating Expense Schedule," Region II. Work conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the Contracting Officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retrospective pricing, the schedule in effect at the time the work was performed shall apply.

1.21.2 Rental Costs

Equipment rental costs are allowable, subject to the applicable provisions of the Federal Acquisition Regulations, and shall be substantiated by certified copies of paid invoices. Rates for equipment rented from an organization under common control, lease-purchase or sale-leaseback arrangements will be determined using the schedule except that rental costs leased form an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees are allowable. Costs for major repairs and overhaul are unallowable.

1.21.3 Equipment Costs

When actual equipment costs are proposed and the total amount of the pricing action is over $25,000, cost or pricing data shall be submitted on the

Standard Form 1411, "Contract Pricing Proposal Cover Sheet". By submitting cost or pricing data, the Contractor grants to the Contracting Officer or an authorizing representative the right to examine those books, records, documents and other supporting data that will permit evaluation of the proposed equipment costs. After price agreement the Contractor shall certify that the equipment costs or pricing data submitted are accurate, complete and current.

1.22 SUBCONTRACTS AND WORK COORDINATION

Contract Clauses "SUBCONTRACTS", "PERMITS AND RESPONSIBILITIES", and "MATERIAL AND WORKMANSHIP" are supplemented as follows:

(a) Divisions or sections of specifications are not intended to control the Contractor in dividing the work among subcontractors, or to limit work performed by any trade.
(b) Contractor shall be responsible for coordination of the work of the trades, subcontractors, and materials.
(c) The Government or its representative will not undertake to settle any difference between the Contractor and Contractor's subcontractors, or between subcontractors.
(d) The Government reserves the right to refuse to permit employment on the work or require dismissal from the work of any subcontractor who, by reason of previous unsatisfactory work on Corps of Engineers projects, or for any other reason is considered by the Contracting Officer to be incompetent or otherwise objectionable.

1.23 CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

The Contractor shall submit executed CENAO Form 987, Construction Manpower and Equipment Report daily. The report shall include manpower and equipment for the general and subcontractors. Forms are available from the Contracting Officer's Representative.

1.24 SITE CONTAMINATION

1.24.1 Category III

This site is designated a Category III site. A Category III site is defined as a site which is located in an area known or suspected to be contaminated.

1.24.2 Compliance Requirements

The Contractor shall comply with applicable Federal, state and local laws, codes, ordinances and regulations (including the obtaining of licenses and permits) in connection with hazardous material.

1.24.3 Requirements

The requirements of this clause and any act or failure to act by the Government shall not relieve the Contractor of any responsibility or liability for the safety of Government, Contractor or subcontractor personnel or property.

1.24.4 Contamination

In the event that contamination is encountered, the Contracting Officer shall be advised immediately. The contamination shall either be removed as directed and replaced with satisfactory material. Payment therefor will be made in conformance with the CHANGES clause of the CONTRACT CLAUSES.

1.24.5 WORK IN QUARANTINED AREA

The work called for by this contract involves activities in counties quarantined by the Department of Agriculture to prevent the spread of certain plant pests which may be present in the soil. The Contractor agrees that all construction equipment and tools to be moved from such counties shall be thoroughly cleaned of all soil residues at the construction site with water under pressure and that hand tools shall be thoroughly cleaned by brushing or other means to remove all soil. In addition, if this contract involves the identification, shipping, storage, testing, or disposal of soils from such a quarantined area, the Contractor agrees to comply with the provisions of ER 1110-1-5 and attachments, a copy of which will be made available by the Contracting Officer upon request. The Contractor agrees to assure compliance with this obligation by all subcontractors.

1.24.6 Specific Site Contamination

The U.S. Army Corps of Engineers (USACE), Norfolk District has recently completed construction of a new equalization concrete basin system during the expansion project to the Biological Treatment Plant (Bio-Plant). The new basin system replaced the old basin which is to be backfilled and closed under this project. An Environmental Site Investigation/Evaluation has recently been completed (February 1997) which determined that contaminants of concern were below background and/or health based criteria levels, thereby rendering the basin clean for closure.

1.24.6.1 OSHA Monitoring Advisement

The Contractor is advised that because the proposed construction activities at the Equalization Basin are associated with or proximate to the Bio-Plant treatment facility which results in the production of a listed hazardous waste (K044), characterization of soil in and around the area was previously performed. The K044 sediment and sludge from the old equalization basin has been removed and disposed of as of July, 1995. For the surrounding soils the characterization results previously performed indicated that the arsenic concentrations appeared to be more indicative of background concentrations due to general natural sources than site-related. Otherwise, the area does not appear to be impacted by site activities and no remedial action appears warranted for these areas. Because total concentrations of arsenic detected in soils in the area exceed U.S. EPA HBNs as outlined in the RAAP Permit, special considerations may be necessary during construction activities. To ensure that field workers are properly protected against inhalation hazards associated with arsenic contaminated dust, action levels to be used in conjunction with real time monitors were developed and are provided as an example. It shall be the responsipility of the Contractor to develop the air monitoring protocols and site-specific action levels for arsenic. Arsenic is covered by a specific standard by OSHA (29 CFR 1910.1018), and has specifically established exposure monitoring requirements. The Contractor's competent person shall determine if the standard applies and monitor employee's exposures as required.

1.24.6.2 Nuisance Dust Levels

Monitoring of fugitive dust levels during excavation and backfilling is recommended to determine the level of personal protection required because the OSHA permissible exposure limit (PEL) for respirable dust (5 mg/m3) is less than the calculated inhalation exposure limit for workers performing construction activities for arsenic (530 mg/m3). If fugitive dust levels are not exceeded, arsenic should not be of concern to worker health and safety. However, it is recommended that the contractor provide a minimum Level D protection to all employees involved in the proximity of soil

disturbing activities. The OSHA protective measures for nuisance dust levels which will be protective for a maximum arsenic concentrations detected in soils are listed below. Increased levels of protection beyond Level D will be required if particulates exceed action levels as listed in the following table.

HAZARD	MONITORING METHOD	ACTION LEVEL	MONITORING SCHEDULE	PROTECTIVE MEASURES
Arsenic	Particulate	Up to 2.5 mg/m3 above background in the breathing zone	Periodically (every 30 minutes during invasive/ construction activities)	Level D
		2.5 - 25 mg/m3 (every 30 minutes during invasive/ construction activities)	Periodically	Level C*

- • Level C personal protective equipment (PPE) includes a minimum 1/2 facepiece respirator with high efficiency particulate air (HEPA) cartridges. Although skin protection is not necessary in this situation, workers may wish to wear protective garments to afford protection against nuisance particulates.

1.25 PROFIT

1.25.1 Weighted Guidelines

Weighted guidelines method of determining profit shall be used on any equitable adjustment change order or modification issued under this contract. The profit factors shall be as follows:

Factor	Rate	Weight	Value
Degree of Risk	20		
Relative difficulty of work	15		
Size of Job	15		
Period of performance	15		
Contractor's investment	05		
Assistance by Government	05		
Subcontracting	25		
	100		

1.25.2 Value

Based on the circumstances of each procurement action, each of the above factors shall be weighted from .03 to .12 as indicated below. The value shall be obtained by multiplying the rate by the weight. The value column when totalled indicates the fair and reasonable profit percentage under the circumstances of the particular procurement.

1.25.3 Degree of Risk

Where the work involves no risk or the degree of risk is very small, the weighting should be .03; as the degree of risk increases, the weighting should be increased up to a maximum of .12. Lump sum items will have, generally, a higher weighted value than the unit price items for which quantities are provided. Other things to consider: the portion of the work

to be done by subcontractors, nature of work, where work is to be performed, reasonableness of negotiated costs, amount of labor included in costs, and whether the negotiation is before or after performance of work.

1.25.4 Relative Difficulty of Work

It the work is most difficult and complex, the weighting should be .12 and should be proportionately reduced to .03 on the simplest of jobs. This factor is tied in to some extent with the degree of risk. Some things to consider: the nature of the work, by whom it is to be done, where, and what is the time schedule.

1.25.5 Size of Job

All work not in excess of $100,000 shall be weighted at .12. Work estimated between $100,000 and $5,000,000 shall be proportionately weighted from .12 to .05.

1.25.6 Periods of Performance

Jobs in excess of 24 months are to be weighted at .12. Jobs of lesser duration are to be proportionately weighted to a minimum of .03 for jobs not to exceed 30 days. No weight where additional time not required.

1.25.7 Contractor's Investment

To be weighted from .03 to .12 on the basis of below average, average, and above average. Things to consider: amount of subcontracting, mobilization payment item, Government furnished property, equipment and facilities, and expediting assistance.

1.25.8 Assistance by Government

To be weighted from .12 to .03 on the basis of average to above average. Things to consider: use of Government owned property, equipment and facilities, and expediting assistance.

1.25.9 Subcontracting

To be weighted inversely proportional to the amount of subcontracting. Where 80 percent or more of the work is to be subcontracted, the weighting is to be .03 and such weighting proportionately increased to .12 where all the work is performed by the Contractor's own forces.

PART 2 Not Used

PART 3 Not Used

-End of Section-

SECTION 01090

SOURCES FOR REFERENCE PUBLICATIONS
12/96

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the sponsoring organization, e.g. UL 1 (1993; Rev thru Jan 1995) Flexible Metal Conduit. However, when the sponsoring organization has not assigned a number to a document, an identifying number has been assigned for convenience, e.g. UL's unnumbered 1995 edition of their Building Materials Directory is identified as UL-01 (1995) Building Materials Directory. The sponsoring organization number (UL 1) can be distinguished from an assigned identifying number (UL-1) by the dash mark (-).

1.2 ORDERING INFORMATION

The addresses of the organizations whose publications are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided. Documents listed in the specifications with numbers which were not assigned by the sponsoring organization should be ordered from the source by title rather than by number.

ACI INTERNATIONAL (ACI)

P.O. Box 9094
Farmington Hills, MI 48331
Ph: 810-848-3700
Fax: 810-848-3766

AGRICULTURAL MARKETING SERVICE (AMS)

Seed Regulatory and Testing Branch
USDA, AMS, LS Div.
Bldg. 506, BARC-East
Soil Conservation Rd.
Beltsville, MD 20705
Ph: 301-504-9430

AMERICAN ASSOCIATION OF NURSERYMEN (AAN)

1250 I St., NW, Suite 500
Washington, DC 20005
Ph: 202-789-2900
FAX: 202-789-1893

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

1330 Kemper Meadow Dr.
Cincinnati, OH 45240
Ph: 513-742-2020
Fax: 513-742-3355

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

11 West 42nd St
New York, NY 10036
Ph: 212-642-4900
Fax: 212-302-1286
Internet: http://www.ansi.org/

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
Internet: http://www.astm.org

CODE OF FEDERAL REGULATIONS (CFR)

Order from:
Government Printing Office
Washington, DC 20402
Ph: 202-512-1800
Fax: 202-275-7703
Internet: http://www.pls.com:8001/his/cfr.html

COMMERCIAL ITEM DESCRIPTIONS (CID)

Order from:
General Services Administration
Federal Supply Service Bureau
470 E L'Enfant Plaza, S.W.
Washington, DC 20407
Ph: 202-619-8925
Internet: http://pub.fss.gsa.gov/h1-pub.html

CORPS OF ENGINEERS (COE)

Order from:
U.S. Army Engineer Waterways Experiment Station
ATTN: Technical Report Distribution Section, Services Branch, TIC
3909 Halls Ferry Rd.
Vicksburg, MS 39180-6199
Ph: 601-634-2355
Fax: 601-634-2506

ENGINEERING MANUALS (EM)

USACE Publications Depot
Attn: CEIM-SP-D
2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081

ENGINEERING PAMPHLETS

USACE Publications Depot
Attn: CEIM-SP-D

2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081

ENGINEERING REGULATIONS (ER)

USACE Publications Depot
Attn: CEIM-SP-D 2803 52nd Avenue
Hyattsville, MD 20781-1102
Ph: 301-394-0081

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Public Information Center
401 M St., SW
Washington, DC 20460
Ph: 202-260-7751
FAX: 202-260-6257
Internet: http://www.epa.gov
NOTE: Some documents are available only from National Technical Information Services (NTIS)
5285 Port Royal Rd.
Springfield, VA 22161
Ph: 703-487-4600
Fax: 703-321-8547
Internet: http://www.gov/ntis.gov

FEDERAL SPECIFICATIONS (FS)

Order from:
General Services Administration
Federal Supply Service Bureau
470 L'Enfant Plaza, S.W.
Washington, DC 20407
Ph: 202-619-8925
Internet: http://pub.fss.gsa.gov/h1-pub.html

FEDERAL STANDARDS (FED-STD)

Order from:
General Services Administration
Federal Supply Service Bureau
470 E L'Enfant Plaza, S.W.
Washington, DC 20407
Ph: 202-619-8925
Internet: http://pub.fss.gsa.gov/hi-pub.html

FEDERAL TEST METHOD STANDARDS (FTM-STD)

Order from:
Standardization Documents Order Desk
Bldg 4D
700 Robbins Av
Philadelphia, PA 19111-5094
Ph: 215-697-2179
Fax: 215-697-2978

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

Mail Stop C-13

4676 Columbia Parkway
Cincinnati, OH 45226-1998
Ph: 800-356-4676
Internet: http://www.cdc.gov/niosh/homepage.html
To order pubs for which a fee is charged, order from:
Superintendent of Documents
Government Printing Office
Washington, DC 20402-9325
Ph: 202-783-3238
Fax: 202-275-7703
Internet: http://www.osha-slc.gov

-- End of Section --

SECTION 01110

SAFETY, HEALTH, AND EMERGENCY RESPONSE (HTRW/UST)
04/94
MOD 3/96

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-02	(1993) 1993-1994 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z358.1	(1990) Emergency Eyewash and Shower Equipment

CODE OF FEDERAL REGULATIONS (CFR)

10 CFR 20	Standards for Protection Against Radiation
29 CFR 1904	Recording and Reporting Occupational Injuries and Illnesses
29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1926	Safety and Health Regulations for Construction
49 CFR 171	Gen Info, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements

ENGINEERING MANUALS

EM 385-1-1	(1996) US Army Corps of Engineers Safety and Health Requirements Manual

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH Pub No. 85-115	(1985) Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities
NIOSH Pub No. 94-113	(1994) NIOSH Manual of Analytical Methods, 4th Ed

1.2 DESCRIPTION OF WORK

This section provides additional requirements for implementing the accident prevention provisions of EM 385-1-1, and specifies a Site Safety and Health Plan (SSHP) which shall satisfy the requirements for submission of a separate Accident Prevention Plan (APP) as required by EM 385-1-1. The requirements shall apply to work performed within the Limits of Construction as shown on the drawings. See Section 02072, DEMOLITION DEBRIS DISPOSAL for further specifics.

1.4 REGULATORY REQUIREMENTS

Work performed under this contract shall comply with EM 385-1-1, applicable Federal, state, and local safety and occupational health laws and regulations. This includes, but is not limited to, Occupational Safety and Health Administration (OSHA) standards, 29 CFR 1910, especially Section .120, "Hazardous Waste Site Operations and Emergency Response" and 29 CFR 1926, especially Section .65, "Hazardous Waste Site Operations and Emergency Response". Matters of interpretation of standards shall be submitted to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements shall apply.

1.5 PRECONSTRUCTION SAFETY CONFERENCE

The Preconstruction Safety Conference shall be a part of the Preconstruction Meeting as specified in SECTION 01200.

1.6 SAFETY AND HEALTH PROGRAM

OSHA Standards 29 CFR 1910, Section .120 (b) and 29 CFR 1926, Section .65 (b) require employers to develop and implement a written Safety and Health Program for employees involved in hazardous waste operations. The site-specific program requirements of the OSHA Standards shall be integrated into one site-specific document, the Site Safety and Health Plan (SSHP). The SSHP shall interface with the employer's overall Safety and Health Program. Any portions of the overall Safety and Health Program that are referenced in the SSHP shall be included as appendices to the SSHP.

1.7 SITE SAFETY AND HEALTH PLAN

1.7.1 Preparation and Implementation

A Site Safety and Health Plan (SSHP) shall be prepared covering onsite work to be performed by the Contractor and all subcontractors. The Safety and Health Manager shall be responsible for the development, implementation and oversight of the SSHP. The SSHP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of hazards associated with each task performed. The SSHP shall address site-specific safety and health requirements and procedures based upon site-specific conditions. The level of detail provided in the SSHP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. The SSHP shall incorporate the Contractor's Accident Prevention Plan (APP) and shall, at a minimum, address the APP requirements established in Appendix A, EM 385-1-1. Details about some activities may not be available when the initial SSHP is prepared and submitted. Therefore, the SSHP shall address, in as much detail as possible, anticipated tasks, their related hazards and anticipated control measures. Additional details shall be included in the activity hazard

analyses as described in paragraph ACTIVITY HAZARD ANALYSES.

1.7.2 Acceptance and Modifications

Prior to submittal, the SSHP shall be signed and dated by the Safety and Health Manager and the Site Superintendent. The SSHP shall be submitted for review 14 days prior to the Preconstruction Safety Conference. Deficiencies in the SSHP will be discussed at the preconstruction safety conference, and the SSHP shall be revised to correct the deficiencies and resubmitted for acceptance. Onsite work shall not begin until the plan has been accepted. A copy of the written SSHP shall be maintained onsite. As work proceeds, the SSHP shall be adapted to new situations and new conditions. Changes and modifications to the accepted SSHP shall be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, the Site Safety and Health Officer (SSHO) shall bring such hazard to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, necessary action shall be taken to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted SSHP shall be cause for stopping of work until the matter has been rectified.

1.7.3 Availability

The SSHP shall be made available in accordance with 29 CFR 1910, Section .120 (b)(1)(v) and 29 CFR 1926, Section .65 (b)(1)(v).

1.7.4 Elements

Topics required by 29 CFR 1910, Section .120 (b)(4) 29 CFR 1926, Section .65 (b)(4) and the Accident Prevention Plan as described in Table 1-1 of EM 385-1-1 and those described in this section shall be addressed in the SSHP. Where the use of a specific topic is not applicable to the project, the SSHP shall include a statement to justify its omission or reduced level of detail and establish that adequate consideration was given the topic.

1.8 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

1.8.1 Project/Site Conditions

A Closure Plan and a February 1997 Site Investigation/Evaluation Study was prepared for and approved by DEQ. The Equalization Basin has been determined to be uncontaminated. Contractor may view the contents of both documents at the Norfolk District. The documents contain a history of the site, a record of site contaminants, and a description of the site. The information in both documents may be useful to assist the Contractor in preparing the SSHP.

1.8.1.1 Site Information

The Equalization Basin was used as a holding basin to equalize the wastewater flows from the industrial processes at RAAP. The sludges generated from the biological treatment have been listed as a KO44 hazardous waste. Therefore, the basin was considered a hazardous waste facility, but as a result of site closure activities by the Operating Contractor, and as verified by the recent site investigation study, the

site has been determined to be uncontaminated and has been approved for clean closure by the VA DEQ.

1.8.2 Ordnance and Explosive Waste (OEW)

All wastewater and sludges have been removed and the soil cement liner has been cleaned. However, if explosives, chemical surety and warfare materiels (CSM/CWM), or unexploded ordnance (UXO) are discovered at any time during operations, the Contractor shall immediately stop operations in the affected area, mark the location, notify onsite personnel of the OEW hazard and the area's restrictions, and notify the Contracting Officer. The Government will make appropriate arrangements for evaluation and proper disposal of each device. The SSHP shall specifically address procedures to be followed, if known or potential CSM/CWM, ordnance, or other such items are encountered during any phase of field work.

1.9 HAZARD/RISK ANALYSIS

The SSHP shall include a safety and health hazard/risk analysis for each site task and operation to be performed. The hazard/risk analysis shall provide information necessary for determining safety and health procedures, equipment, and training to protect onsite personnel, the environment, and the public. Available site information shall be reviewed when preparing the "Hazard/Risk Analysis" section of the SSHP. The following elements, at a minimum, shall be addressed.

1.9.1 Site Tasks and Operations

The SSHP shall include a comprehensive section that addresses the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives. The main objective of this project is to "clean close" the basin by removing all demolition debris and then restoring the area to it's original grades. The major site tasks and operations to be performed based on this type of remediation are listed in SECTION 01006- SPECIAL WORK RESTRICTIONS AND REQUIREMENTS. This is not a complete list of site tasks and operations, therefore, it shall be expanded and/or revised, during preparation of the SSHP as necessary.

1.9.2 Hazards

The following potential hazards may be encountered during site work. These are not complete lists, therefore, they shall be expanded and/or revised as necessary during preparation of the SSHP.

1.9.2.1 Safety Hazards

Potential safety hazards would inclide but not be limited to employee exposures to excavations/trenches; slip, trip and fall hazards; electricity or underground utilities; heavy mobile equipment or machinery; possible arsenic contaminated dust, (see Section 01005, Paragraph 1.24.5 etc.

1.9.2.2 Physical Agents

Potential physical hazards would include excessive noise levels, heat and cold stress conditions and excessive vibrations.

1.9.3 Action Levels

1.9.3.1 General

Action levels shall be established for the situations listed below, at a minimum. The action levels and required actions (engineering controls, changes in PPE, etc.) shall be presented in the SSHP in both text and tabular form.

a. Implementation of engineering controls and work practices.

b. Upgrade or downgrade in level of personal protective equipment.

c. Work stoppage and/or emergency evacuation of onsite personnel.

d. Prevention and/or minimization of public exposures to hazards created by site activities.

1.9.3.2 Confined Space Entry

The basin itself is not considered a confined space. Any questionable areas shall be brought to the attention of the CO. Entry into and work in a confined space will not be allowed when oxygen readings are less than 19.5% or greater than 23.5% or if the Lower Flammable Limit (LFL) reading is greater than 10%, unless these conditions are adequately addressed in the confined space entry program. In addition, action levels for toxic atmospheres shall be determined.

1.10 ACTIVITY HAZARD ANALYSES

Prior to beginning each major phase of work, an Activity Hazard Analysis shall be prepared by the Contractor performing that work and submitted for review and acceptance. The format shall be in accordance with EM 385-1-1, figure 1-1. A major phase of work is defined as an operation involving a type of work presenting hazards not experienced in previous operations or where a new subcontractor or work crew is to perform. The analysis shall define the activities to be performed and identify the sequence of work, the specific hazards anticipated, and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level. Work shall not proceed on that phase until the activity hazard analysis has been accepted and a preparatory meeting has been conducted by the Contractor to discuss its contents with everyone engaged in the activities, including the government onsite representatives. The activity hazard analyses shall be continuously reviewed and when appropriate modified to address changing site conditions or operations, with the concurrence of the SSHO, the Site Superintendent, and the Contracting Officer. Activity hazard analyses shall be attached to and become a part of the SSHP.

1.11 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

An organizational structure shall be developed that sets forth lines of authority (chain of command), responsibilities, and communication procedures concerning site safety, health, and emergency response. This organizational structure shall cover management, supervisors and employees of the Contractor and subcontractors. The structure shall include the means for coordinating and controlling work activities of subcontractors and suppliers. The SSHP shall include a description of this organizational structure as well as qualifications and responsibilities of each of the following individuals. The Contractor shall obtain Contracting Officer's

acceptance before replacing any member of the Safety and Health Staff. Requests shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

1.11.1 Site Superintendent

A Site Superintendent, who has responsibility to implement the SSHP, the authority to direct work performed under this contract and verify compliance, shall be designated.

1.11.2 Site Safety and Health Officer (SSHO)

1.11.2.1 Qualifications

An individual and one alternate shall be designated the Site Safety and Health Officer (SSHO). The name, qualifications (education and training summary and documentation), and work experience of the Site Safety and Health Officer and alternate shall be included in the SSHP. The SSHO shall have the following qualifications:

a. A minimum of 2 year experience in implementing safety and health programs at hazardous waste sites.

b. Documented experience in construction techniques and construction safety procedures.

c. Working knowledge of Federal and state occupational safety and health regulations.

d. Specific training in personal and respiratory protective equipment program implementation, confined space program oversight, and in the proper use of air monitoring instruments, and air sampling methods.

1.11.2.2 Responsibilities

The Site Safety and Health Officer shall:

a. Assist and represent the Safety and Health Manager in onsite training and the day to day onsite implementation and enforcement of the accepted SSHP,

b. Be assigned to the site on a full time basis for the duration of field activities. The SSHO shall have no duties other than Safety and Health related duties. If operations are performed during more than one work shift per day, a site Safety and Health Officer shall be present for each shift.

c. Have authority to ensure site compliance with specified safety and health requirements, Federal, state and OSHA regulations and all aspects of the SSHP including, but not limited to, activity hazard analyses, air monitoring, use of PPE, decontamination, site control, standard operating procedures used to minimize hazards, safe use of engineering controls, the emergency response plan, confined space entry procedures, spill containment program, and preparation of records by performing a daily safety and health inspection and documenting results on the Daily Safety Inspection Log.

d. Have authority to stop work if unacceptable health or safety conditions exist, and take necessary action to re-establish and maintain safe working conditions.

e. Consult with and coordinate any modifications to the SSHP with the Safety and Health Manager, the Site Superintendent, and the Contracting Officer.

f. Serve as a member of the Contractor's quality control staff on matters relating to safety and health.

g. Conduct accident investigations and prepare accident reports.

h. Review results of daily quality control inspections and document safety and health findings into the Daily Safety Inspection Log.

i. In coordination with site management and the Safety and Health Manager, recommend corrective actions for identified deficiencies and oversee the corrective actions.

j. Sign and date the SSHP prior to submittal.

k. Conduct initial site-specific training.

l. Be responsible for evaluating air monitoring data and recommending changes to engineering controls, work practices, and PPE

m. Review accident reports and results of daily inspections.

1.12 TRAINING

Personnel shall receive training in accordance with the Contractor's written safety and health training program and 29 CFR 1910 Section .120, 29 CFR 1926 Section .65, and 29 CFR 1926 Section .21. The SSHP shall include a section describing training requirements. Training shall be provided by qualified persons.

1.12.1 Site-specific Training

Site-specific training sessions shall be documented in accordance with Section 01.B.03.b of EM 385-1-1.

1.12.1.1 Initial Session (Preentry Briefing)

Prior to commencement of onsite field activities, all site employees, shall attend a site-specific safety and health training session of at least 4 hours duration. This session shall be conducted by the Site Safety and Health Officer to ensure that all personnel are familiar with requirements and responsibilities for maintaining a safe and healthful work environment. Procedures and contents of the accepted SSHP and Sections 01.B.02 and 28.D.03 of EM 385-1-1 shall be thoroughly discussed. The Contracting Officer shall be notified at least 5 days prior to the initial site-specific training session so government personnel involved in the project may attend.

1.12.1.2 Other Training

The SSHO shall provide training as specified by 29 CFR 1910 Section .146, for employees who are required to supervise, standby, or enter permit-required confined spaces. Persons involved in any aspect of the transportation of hazardous materials shall be trained in accordance with 49 CFR 172 Subpart H.

1.13 PERSONAL PROTECTIVE EQUIPMENT

1.13.1 General

In accordance with 29 CFR 1910 Section .120 (g)(5) and 29 CFR 1926 Section .65 (g)(5), a written Personal Protective Equipment (PPE) program which addresses the elements listed in that regulation, and which complies with respiratory protection program requirements of 29 CFR 1910 Section .134, is to be included in the employer's Safety and Health Program. The Site Safety and Health Plan shall detail the minimum PPE ensembles (including respirators) and specific materials from which the PPE components are constructed for each site-specific task and operation to be performed, based upon the hazard/risk analysis. Components of levels of protection (B, C, D and modifications) must be relevant to site-specific conditions, including heat and cold stress potential and safety hazards. Only respirators approved by NIOSH shall be used. Onsite personnel shall be provided with appropriate personal protective equipment. Protective equipment and clothing shall be kept clean and well maintained. The PPE section of the SSHP shall include site-specific procedures to determine PPE program effectiveness and for onsite fit-testing of respirators, cleaning, maintenance, inspection, and storage of PPE.

1.13.2 Levels of Protection

The Safety and Health Manager shall establish appropriate levels of protection for each work activity based on review of historical site information, existing data, an evaluation of the potential for exposure (inhalation, dermal, ingestion, and injection) during each task, past air monitoring results, and a continuing safety and health monitoring program. The Safety and Health Manager shall also establish action levels for upgrade or downgrade in levels of PPE from the following specified minimum levels of protection. Protocols and the communication network for changing the level of protection shall be described in the SSHP. The PPE reassessment protocol shall address air monitoring results, potential for exposure, changes in site conditions, work phases, job tasks, weather, temperature extremes, individual medical considerations, etc.

1.13.2.1 Components of Levels of Protection

The following items constitute minimum protective clothing and equipment ensembles to be utilized during this project:

Level D
: Hardhats, hearing protection, safety glasses or goggles, and protective footwear (shoes/boots).

Modified Level D
: Hardhats, hearing protection, safety glasses or goggles, and protective footwear (shoes/boots) and HEPA Masks.

Level C

All the components of the Level D ensemble, plus air-purifying respirators, chemical-resistent coveralls, chemical-resistent gloves, and chemical-resistant protective footwear (shoe/boot covers).

Level B
N/A

1.13.2.2 Initial Minimum Levels of PPE by Task

Based on available information, the initial minimum protective equipment requirements for each major task and operation are listed below. Available site information shall be reviewed and the list of tasks and operations and these levels of protection shall be expanded and/or revised during preparation of the SSHP.

TASK/OPERATION	INITIAL LEVEL OF PROTECTION
Excavation	MOD D

1.14 SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

The SSHP shall describe the standard operating safety procedures, engineering controls and safe work practices to be implemented for the work covered. These shall include, but not be limited to, the following:

1.14.1 General Site Rules/Prohibitions

General site rules/prohibitions (buddy system, eating, drinking, and smoking restrictions, etc.): See SECTION 01006 for further restrictions at RAAP.

1.14.2 Work Permit Requirements

Radioactive work, excavation, hot work, confined space, etc.: See SECTION 01006 for further restrictions at RAAP.

1.14.3 Material Handling Procedures

Soils, liquids, radioactive materials: See SECTION 01006 for further restrictions at RAAP.

1.14.5 Confined Space Entry Procedures

All confined space entry (for existing facilities) requirements shall be properly permitted by RAAP.

1.14.6 Hot Work

Hot work shall not be permitted on or within the equalization basin except as outlined herein. Prior to conducting hot work, a hot work permit shall be prepared and submitted. An example format for a hot work permit shall be included in the SSHP and shall adhere to the requirements of RAAP (see Section 01006). Hot work shall not be performed unless monitoring indicates atmospheres within and immediately surrounding the areas are within the required limits for oxygen; continuous monitoring shall continue

until the hot work is completed. The hot work prohibition includes welding, cutting, grinding, sawing, or other similar operations which could be expected to potentially generate combustion-producing temperatures or sparks, or which could produce potentially hazardous fumes or vapors. An individual at each hot work site shall be designated as a fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to the fire extinguisher located at each hot work site. A new permit shall be obtained at the start of each work shift during which hot work will be conducted.

1.15 SITE CONTROL MEASURES

The SSHP shall include procedures for the implementation and enforcement of safety and health rules for all persons on the site, including employers, employees, outside Contractors, government representatives, and visitors.

1.16 EQUIPMENT WASH DOWN

Vehicles and equipment used within the Construction Limits shall be cleaned off prior to leaving the site. The procedures shall be addressed in the SSHP.

1.17 INSPECTIONS

The SSHO shall perform daily inspections of the jobsite and the work in progress to ensure compliance with EM 385-1-1, the Safety and Health Program, the SSHP and other occupational health and safety requirements of the contract, and to determine the effectiveness of the SSHP. Procedures for correcting deficiencies (including actions, timetable and responsibilities) shall be described in the SSHP. Follow-up inspections to ensure correction of deficiencies shall be conducted and documented. Daily safety inspection logs shall be used to document the inspections, noting safety and health deficiencies, deficiencies in the effectiveness of the SSHP, and corrective actions taken. The SSHO's Daily Inspection Logs shall be attached to and submitted with the Daily Quality Control reports. Each entry shall include the following: date, work area checked, employees present in work area, PPE and work equipment being used in each area, special safety and health issues and notes, and signature of preparer. In the event of an accident, the Contracting Officer shall be notified according to EM 385-1-1. Within 2 working days of any reportable accident, an Accident Report shall be completed on ENG Form 3394 and submitted.

1.18 SAFETY AND HEALTH PHASE-OUT REPORT

A Safety and Health Phase-Out Report shall be submitted within 10 working days following completion of the work, prior to final acceptance of the work. The following minimum information shall be included:

a. Summary of the overall performance of safety and health (accidents or incidents including near misses, unusual events, lessons learned, etc.).

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION (NOT APPLICABLE)

-- End of Section --

SECTION 01111
SAFETY AND HEALTH REQUIREMENTS

01/96
MOD 3/96

PART 1 GENERAL

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1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ENGINEERING MANUALS

EM 385-1-1 (1996) Safety and Health Requirements Manual

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

SD-01 SD Data

Accident Prevention Plan; GA.

1.3 SAFETY REQUIREMENTS AND ACCIDENT PREVENTION:

1.3.1 Standards:

The Contractor shall comply with Occupational Safety and Health Act (OSHA) Standards, the Corps of Engineers Manual EM 385-1-1, "Safety and Health Requirements Manual," NFPA 101, and state, local, and facility safety requirements.

1.7 SAFETY AND HEALTH PLAN

1.7.1 Preparation and Implementation

An Accident Prevention Plan (AAP) (SHP) shall be prepared covering onsite work to be performed by the Contractor and all subcontractors. The Safety and Health Manager shall be responsible for the development, implementation and oversight of the APP. The APP shall establish, in detail, the protocols necessary for the anticipation, recognition, evaluation, and control of hazards associated with each task performed. The APP shall address general safety and health requirements and procedures. The level of detail provided in the APP shall be tailored to the type of work, complexity of operations to be performed, and hazards anticipated. Details about some activities may not be available when the initial APP is prepared and submitted. Therefore, the APP shall address, in as much detail as possible, anticipated tasks, their related hazards and anticipated control measures.

1.7.2 Acceptance and Modifications

Prior to submittal, the APP shall be signed and dated by the Contractor's Safety and Health Manager and the Site Superintendent. The APP [including the Site Safety and Health Plan, for HTRW/UST projects, required by Section 01110] shall be submitted for review at least 10 days prior to the Prework Safety Conference. Deficiencies in the APP will be discussed at the Prework Safety Conference, and the APP shall be revised to correct the deficiencies and resubmitted for acceptance. Onsite work shall not begin until the plan

has been accepted. A copy of the written APP shall be maintained onsite. As work proceeds, the APP shall be adapted to new situations and new conditions. Changes and modifications to the accepted APP shall be made with the knowledge and concurrence of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer. Should any unforeseen hazard become evident during the performance of the work, shall bring such hazard to the attention of the Safety and Health Manager, the Site Superintendent, and the Contracting Officer, both verbally and in writing, for resolution as soon as possible. In the interim, necessary action shall be taken to re-establish and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public, and the environment. Disregard for the provisions of this specification or the accepted APP shall be cause for stopping of work until the matter has been rectified to the satisfaction of the Contracting Officer.

1.7.3 Availability

The APP shall be made available in accordance with 29 CFR 1910, Section .120 (b)(1)(v) and 29 CFR 1926, Section .65 (b)(1)(v).

1.3.2 Corps of Engineers Standards:

Corps of Engineers Manual EM 385-1-1, referred to in "ACCIDENT PREVENTION" article of Contract Clauses, is hereby supplemented or revised as follows:

1.3.2.2 Conflicts:

When a conflict exists between the Corps of Engineers Safety and Health Requirements Manual, other safety requirements, or the contract plans and/or specifications, the most stringent requirement shall prevail. (NAOSA 5 FEB 87).

1.3.2.3 Front End Loader - Backhoe Machines:

1.3.2.3.1 Non-compliance Safety Check:

All front end loader-backhoe machines and other machines, such as tractors that utilize a backhoe attachment, shall be checked for:

a. Exposed backhoe boom swing foot pedals.

b. Backhoe boom swing lever which can be reached by a man standing on the ground or on the outrigger support bracket.

1.3.2.3.2 Correction and Fabrication of Non-compliance Safety Items:

Where these conditions exist, guards shall be fabricated to:

a. Cover over exposed foot pedals to prevent someone from accidentally stepping on them.

b. Inclose the swing lever so as to preclude operation from the ground or from the outrigger support bracket.

1.3.2.4 Attendance at Safety Meetings:

In order to allow for maximum attendance at weekly tool box meetings and monthly supervisor meetings by Corps of Engineers personnel, the Contractor shall advise the CO's Office, a minimum of 48 hours before the start of each meeting, of the date, time and location of Safety Meetings.

1.3.2.5 Minutes of Safety Meetings

Minutes shall be prepared by the Contractor and forwarded to the Contracting Officer by close of business the next work day.

1.3.2.5 Protective Footwear:

Protective footwear as defined by American National Standards Institute Z41 shall be worn by all working personnel on site.

1.3.2.6 Ground Fault Circuit Interrupters (GFCI):

GFCI's are required for work on this contract in accordance with EM 385-1-1. GFCI's are also required when using electric power extension cords.

1.3.2.7 Crawler-, Truck-, and Wheel-Mounted Cranes

Implementation of paragraph 16.D.01.e(1) shall include the following:

a. When a crane is performing duty cycle work (such as clamshell, dragline, grapple, or pile driving) it does not require anti-two block equipment. If the crane is required to make a non-duty cycle lift (for example, to lift a piece of equipment, a tool box, or supplies), it will be exempt from the anti-two block equipment requirements if the following procedures are implemented:

(1) an international orange warning device (warning flag, warning tape, or warning ball) is properly secured to the hoist line at a distance of 8 to 10 feet above the hoist rigging;

(2) the signalperson (or an individual designated as the signalperson) acts as a spotter to alert the crane operator with a "STOP" signal when the warning device approaches the boom tip and the crane operator ceases hoisting functions when alerted of this; and

(3) while the non-duty cycle lift is underway, the signal person shall not stand under the load, shall have no duties other than signalperson, and shall comply with the signaling requirements of EM 385-1-1;

b. Anti-two block devices are always required when hoisting personnel by crane or derrick.

1.3.2.8
Safety Indoctrination Certificates

The Contractor shall obtain from each of his employees, prior to his employment at the Radford Army Ammunition Plant, a signed certificate indicating that the employee has read and understands a statement prepared by the Plant Commander setting forth the hazards and restrictions incident to construction operations in buildings used for powder production. The certificates shall be delivered to the CO on the first day the employee is admitted to the Radford Army Ammunition Plant.

PART 2 PRODUCTS (This Part Not Used)

PART 3 EXECUTION (This Part Not Used)

-- End of Section --

MASTER SPECIFICATION FOR MILITARY CONSTRUCTION

SECTION 01200
PROJECT MEETINGS

03/96

PART 1 GENERAL

1.1 SUBMITTALS (Not Applicable)

1.2 PRECONSTRUCTION CONFERENCE

1.2.1 Scheduling

After award of the construction contract and prior to the start of any construction work, the Contracting Officer (CO) will schedule and conduct a preconstruction conference. The Contractor's Project Manager, Superintendent and Quality Control System Manager shall attend this meeting. The Contractor is encouraged to have an officer of his company (Project Manager could be this person) and representation from each of his sub-contractors at the conference. This conference will be held at a location and time as specified by the CO.

1.2.2 Purpose

The purpose of this preconstruction conference is to enable the CO to outline the procedures that will be followed by the Government in its administration of this construction contract and to discuss the performance that will be expected from the Contractor. This conference will allow the Contractor an opportunity to ask questions about the Government's supervision and inspection of contract work, about security requirements, regulations, etc. The CO may invite Using Service personnel and any other Government personnel to attend this conference.

1.2.3 Discussion Items

The following is a list of items for discussion during the preconstruction conference. However, the Contracting Officer may include additional items for discussion as conditions and the work require.

a. Authority of the Area/Resident Engineer and organization of the Area/Resident office.

b. Contractor's Progress Schedule.

c. Correspondence Procedures.

d. Contractor Labor Standards Provisions.

e. Contract Modifications and Administrative Procedures.

f. Contractor's Administrative, Laydown and Storage Areas.

g. Procedures for Processing Submittals.

h. Payment Estimate Data and Procedures.

i. Contractor Utilities.

j. Security Requirements and Other Regulations, if applicable.

k. Government Furnished Equipment, if applicable.

l. Disposition of Salvage Property.

m. Contractor Insurance Requirements.

n. Value Engineering Program.

o. Contractor Performance Evaluation.

p. As-Built Drawings.

q. Single Point of Contact for Warranty of Construction.

r. Turnover of Completed Facilities.

1.3 NOT USED

1.4 OTHER MEETINGS

Other meetings are or may be scheduled to be held after the Preconstruction Conference, and such meetings may include the following:

a. Accident Prevention Safety Plan

b. Quality Control Plan.

c. Environmental Protection Plan.

1.5 FACILITY MEETINGS

The Facility may also schedule meetings with the Contractor through the CO during the progress of construction work.

1.6 MINUTES OF MEETINGS

The Government will prepare minutes of the meeting and will provide the Contractor with a signed original for review and concurrence. The minutes shall include all items discussed at the meeting and the Government will make all corrections provided by the Contractor and resubmit the corrected minutes to the Contractor within seven days.

PART 2 PRODUCTS (This Part Not Used)

PART 3 EXECUTION (This Part Not Used)

-- End of Section --

SECTION 01300
SUBMITTAL PROCEDURES

12/94
MOD 03/96

PART 1 GENERAL

1.1 SUBMITTAL CLASSIFICATION

Submittals are classified as follows:

1.1.1 Government Approved (GA)

Governmental approval (GA) is required for extensions of design, critical materials, deviations and/or departure from the contract documents, items of equipment whose compatibility with the entire system must be checked, and other items as designated by the Contracting Officer. Within the terms of the Contract Clause entitled "Specifications and Drawings for Construction," they are considered to be "shop drawings."

1.1.2 For Information Only (FIO)

All submittals not requiring Government approval will be for information only (FIO). They are not considered to be "shop drawings" within the terms of the Contract Clause referred to above.

1.2 APPROVED SUBMITTALS

The Contracting Officer's approval of submittals shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the CQC requirements of this contract is responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.3 DISAPPROVED SUBMITTALS

The Contractor shall make all corrections required by the Contracting Officer and promptly furnish a corrected submittal in the form and number of copies specified for the initial submittal. If the Contractor considers any correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the Contract Clause "Changes" shall be given promptly to the Contracting Officer.

1.4 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.1 GENERAL

The Contractor shall make submittals as required by the specifications, and as indicated on the Submittal Register (ENG FORM 4288-R), attached hereto. The Contracting Officer may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective sections. Units of weights and measures used on all

submittals shall be the same as those used in the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the CQC representative and each respective transmittal form (ENG FORM 4025-R) shall be stamped, signed, and dated by the CQC representative indicating action taken, and certifying that the accompanying submittal complies with the contract requirements. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals. Submittals requiring Government approval shall be scheduled and approved prior to the acquisition of the material or equipment covered thereby. FIO submittals shall be submitted at least 15 days prior to scheduled installation of the item(s). Samples remaining upon completion of the work shall be picked up and disposed of in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

3.2 SUBMITTAL REGISTER (ENG FORM 4288-R, Mar 95)

At the end of this section is one set of ENG Form 4288-R listing items of equipment and materials for which submittals are required by the specifications; this list may not be all inclusive and additional submittals may be required. The Contractor will also be given the submittal register as a diskette containing the computerized ENG Form 4288 and instructions on the use of the diskette. Columns "d" through "p" have been completed by the Government; column "q" is reserved for use by the government; the Contractor shall complete columns "a", "b", "c", and "r" through "w" and submit the forms (hard copy) plus associated electronic file to the Contracting Officer for approval within thirty calendar days after Notice to Proceed. The Contractor shall keep this diskette up-to-date and shall submit it to the Government together with the monthly payment request. The approved submittal register will become the scheduling document and will be used to control submittals throughout the life of the contract. The submittal register and the progress schedules shall be coordinated. An updated Submittal Register shall be submitted no less than every sixty calendar days.

3.3 SCHEDULING

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of [thirty][ ] calendar days exclusive of mailing time) shall be allowed and shown on the register for review and approval. No delay damages or time extensions will be allowed for time lost in late submittals. [An additional fifteen calendar days (total [forty-five][ ] calendar days) shall be allowed and shown on the register for review and approval of submittals for [food service equipment] [and] [refrigeration and HVAC control systems].]

3.4 TRANSMITTAL FORM (ENG FORM 4025-R, Mar 95)

The transmittal form (ENG Form 4025-R) shall be used for submitting both GA and FIO submittals in accordance with the instructions on the reverse side of the form. These forms will be furnished to the Contractor by the CO after award of the contract. This form shall be properly completed by filling out all the heading blank spaces and identifying each item submitted. Special care shall be exercised to ensure proper listing of the specification paragraph and/or sheet number of the contract drawings pertinent to the data submitted for each item. Submittals pertaining to different specifications sections shall not be submitted on the same transmittal form. A separate form shall be used for each specification

section.

3.5 SUBMITTAL PROCEDURE

Submittal procedures shall be as follows:

3.5.1 Procedures

Procedures shall be incorporated into the Quality Control Plan required in Section 01440.

3.5.5 Procedures for Submittal of Samples

All samples of materials submitted as required by these specifications shall be properly identified and labeled for ready identification, and upon being certified, stored at the site of the work for jobsite use until all work has been completed and accepted by the CO.

3.5.6 Contractor Certification

Certification by the Contractor shall be accomplished by using Action Codes A or B in column "g" of ENG Form 4025-R. The Contractor shall sign and date Section II for Contractor certified submittals as well as sign the certification and Section I. Contractor certified drawings will be subject to quality assurance review by the Government at any time during the duration of the contract. No adjustment for time or money will be allowed for corrections required as a result of non-compliance with the contract documents.

3.5.6 Deviations

For submittals which include proposed deviations requested by the Contractor, the column "variation" of ENG Form 4025 shall be checked. The Contractor shall set forth in writing the reason for any deviations and annotate such deviations on the submittal. The Government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

3.6 CONTROL OF SUBMITTALS

The Contractor shall carefully control his procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register."

3.7 GOVERNMENT APPROVED SUBMITTALS

Upon completion of review of submittals requiring Government approval, the submittals will be identified as having received approval by being so stamped and dated. Four copies of the submittal will be retained by the Contracting Officer and two copies of the submittal will be returned to the Contractor.

3.8 INFORMATION ONLY SUBMITTALS

Normally submittals for information only will not be returned. Provide four copies of FIO submittals. Approval of the CO is not required on FIO submittals. These submittals will be used for information purposes by the Government. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the contract documents. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications and will not prevent the CO from requiring removal and replacement if nonconforming material is incorporated in the work. This does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or check testing

by the Government in those instances where the technical specifications so prescribe.

3.9 STAMPS

Rubber stamps used by the Contractor on the submittal data to certify that the submittal meets contract requirements shall be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved-(A)Certified to comply with the Contract documents.

_____ Approved-(B)Certified to comply with Contract documents with exceptions or corrections as specifically noted on the Submittal data and/or attached sheets.

SIGNATURE: _____

TITLE: _____

DATE: _____

-- End of Section --

SECTION 02050

DEMOLITION
09/91

PART 1 GENERAL

1.2 GENERAL REQUIREMENTS

The work includes demolition or removal of all construction indicated or specified. All materials resulting from demolition work, except as indicated or specified otherwise, shall remain the property of the Government and shall be removed from the limits of Government property as directed by the Contracting Officer. Rubbish and debris shall be taken to the proper disposal site, off of the plant, daily unless otherwise directed so as to not allow accumlation inside or outside the building. Materials that cannot be removed daily shall be stored in areas specified by the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS:

SD-01 Data

Work Plan; GA.

This Work Plan may be incorporated in the Work Plan requirements of Section 02072. This Work Plan shall consist of the procedures proposed for the accomplishment of the work. The procedures shall provide for safe conduct of the work, careful removal and disposition of materials, protection of property which is to remain undisturbed, coordination with other work in progress, and timely disconnection of utility services. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations.

1.4 DUST CONTROL

The amount of dust resulting from demolition shall be controlled to prevent the spread of dust to occupied portions of the construction site and to avoid creation of a nuisance in the surrounding area. Use of water will not be permitted when it will result in, or create, hazardous or objectionable conditions such as ice, flooding and pollution. See Section 01005 Paragraph 1.24.5 for protection of workers from potentially contaminated dust.

1.5 PROTECTION

1.5.1 Protection of Existing Property

Before beginning any demolition work, the Contractor shall carefully survey the site and examine the drawings and specifications to determine the extent of the work. The Contractor shall take all necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Government, and any damaged items shall be repaired or replaced as approved by the Contracting Officer at no additional cost to the Government. The Contractor shall carefully coordinate the work of this section with all other work and shall construct

and maintain shoring, bracing and supports, as required. The Contractor shall ensure that structural elements are not overloaded and shall be responsible for increasing structural supports or adding new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.5.2 Protection of Salvageble Material from the Weather

The salvageable materials and equipment shall be protected from the weather at all times.

1.5.4 Environmental Protection

The work shall comply with the requirements of Section 01560 "Environmental Protection."

1.6 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.7 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.8 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available in accordance with the "Special Clauses" Section.

PART 2 PRODUCTS (NOT APPLICABLE)

PART 3 EXECUTION

3.2 UTILITIES

Disconnections of utility services, are as specified in the "Special Clauses" Section of 01006.

3.4 DISPOSITION OF MATERIAL

Title to pumps, motors, valves to be demolished, is vested in the Government. The Government will not be responsible for the condition, loss or damage to such property after notice to proceed. The Government has the right to maintain all property as needed to maintain plant production. The Contractor shall take Government salvaged items (pumps and motors) to a location within RAAP limits as directed by the Contracting Officer. Contractor shall also unload Government salvage at this specified location.

3.4.1 Material Salvaged for the Contractor
Material salvaged for the Contractor shall be stored as approved by the Contracting Officer and shall be removed from Government property before completion of the contract. Material salvaged for the Contractor shall not be sold on the site. All material removed from RAAP shall be checked through Receiving during normal work hours. Bagged trash shall be removed from the plant in clear plastic bags.

3.4.2 Unsalvageable Materials

Large non-hazardous items of concrete and masonry shall be disposed of

offsite.

3.5 CLEAN-UP

Debris and rubbish shall be removed from all work areas daily. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Local regulations regarding hauling and disposal shall apply. Vehicles for hauling debris shall be covered.

-- End of Section --

SECTION 02072
DEMOLITION DEBRIS DISPOSAL

12/94

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referenced in the text by basic designation only.

CODE OF FEDERAL REGULATIONS (CFR)

CFR 29 Part 1910.120	Hazardous Waste Operations and Emergency Response
CFR 40 Part 261	Identification and Listing of Hazardous Waste
CFR 40 Part 262	Standards Applicable to Generators of Hazardous Waste
CFR 40 Part 263	Standards Applicable to Transporters of Hazardous Waste
CFR 40 Part 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
CFR 40 Part 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage , and Disposal Facilities
CFR 40 Part 266	Standards for the Management of Specific Hazardous Waste and Specific Types of Hazardous Waste Management Facilities
40 CFR 401	Effluent Guidelines and Standards
40 CFR 403	General Pretreatment Regulations for Existing and New sources of Pollution
CFR 49 Part 172	Hazardous Materials Tables
49 CFR 178	Specifications for Packaging
CFR 49 Part 302	List of Hazardous Substances and Reportable Quantities

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA SW-846	(Nov 1986, 3rd Ed) Test Methods for Evaluating Solid Waste (Vol IA, IB, IC, and II)

U.S. ARMY CORPS OF ENGINEERS (COE)

ER 1110-1-263	(1 Apr 1996) Chemical Data Quality Management for Hazardous Waste Remedial Activities
EM 200-1-3	(1 Sept 1994) Requirements for the Preparation of Sampling and Analysis Plans

ER 385-1-92	Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities
EM 385-1-1	(Sept 1996) Safety and Health Requirements Manual

COMMONWEALTH OF VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

VR 672-10-1	Hazardous Waste Management Regulations
VR 672-20-10	Solid Waste Management Regulations
VR 680-21-00	Virginia Water Quality Standards
VR 625-02-00	Virginia Erosion and Sediment Control Regulations, Sept 1990 - VA Erosion and Sediment Control Handbook

1.2 MEASUREMENT AND PAYMENT

1.2.1 Measurement

Disposal of demolition debris (floodwall/miscellaneous concrete and soil/cement liner) shall be measured in lump sum of material delivered to the appropriate disposal facility.

1.2.2 Payment

Compensation for work covered by this section will be in accordance with the bid schedule.

1.3 SUBMITTALS

The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS and Section 01305 SUBMITTAL PROCEDURES.

SD-01 Data

Work Plan; GA

The Contractor shall develop, implement, maintain, and supervise as part of the work, a comprehensive plan for demolition debris removal and disposal, and related operations. The Work Plan shall demonstrate compliance with the contract clauses, referenced standards, this specification, ER 1110-1-263, EM 200-1-3, ER 385-1-92, EM 385-1-1, VR 672-10-1, VR 672-20-10, VR 680-21-00, and CFR 29 Part 1910.120. The Work Plan requirements of Section 02050 DEMOLITION may be incorporated into this plan.

No work at the site, with the exception of site inspections and mobilization, shall be performed until the plan is approved. At a minimum the Work Plan shall include:

a. Scheduling and operational sequencing.

b. Description of the removal and disposal procedures including the "Equipment Washdown Area".

c. If additional analysis is required by the disposal facility, the Contractor shall prepare a Sampling and Analysis Plan (SAP), in accordance with EM 200-1-3, which describes describes sampling procedures and lists analysis parameters, methods, laboratory or laboratories.

d. Identification of applicable regulatory requirements and permits.

e. Methods to be employed for water removal to the on-site Bio Treatment Facility.

f. Identification of transporters, means of transportation and a copy of all State and/or Federal License for hauling .

g. Disposal facilities and a copy of all State and/or Federal Permits indicating the disposal facility is permitted to accept the waste.

h. Borrow source.

i. Spill prevention plan.

j. Spill contingency plan.

k. Methods of measuring volume of demolition debris.

l. A statement of agreement from the transporter and disposal facility operators to accept the specific waste from this work.

SD-08 Statements

Qualifications; GA.

A statement demonstrating that the Contractor meets the requirements in paragraph QUALIFICATIONS. Include owner, owner point of contact with phone number, location of work site, and dates of previous projects.

SD-18 Records

Shipping Manifest; FIO.

Manifest in accordance with all applicable Federal, Stae and local requirements.

Site Safety and Health Plan; GA

Analysis performed on the concrete floodwall and the soil/cement liner indicate the demolition debris is non-hazardous, yet there is potential for workers at the site to be exposed to chemical constituents during excavation and handling. Pursuant to regulations issued by CFR 29 Part 1910.120, the Contractor shall take appropriate measures to safeguard the health of workers at the site. Such measures include appraising workers of the nature of the contaminants at the site, ensuring workers have appropriate training for working at contaminated sites, and preparing and conducting work in accordance with a site specific health and safety plan. The Contractor shall prepare a health and safety plan, in accordance withCFR 29 Part 1910.120, EM 385-1-1, and ER 385-1-92, which addresses all aspects of worker notification, training, exposure, protective equipment, and other protection at the site. See Section 01110 for further details

1.4 QUALIFICATIONS

The Contractor shall have a minimum of two years experience in the removal and disposal of potentially contaminated material.

1.5 NOTIFICATION

The Contractor shall notify the Contracting Officer (CO) immediately upon a an encounter with a suspected contaminant.

1.6 AVAILABLE DATA

An approved Closure Plan of the site and a recent (February 1997) Site Investigation/Evaluation Study as discussed in SECTION 01110 is available

for review at the Norfolk District. These reports provide a history and a soil/sludge and groundwater investigation of the site.

1.7 ENVIRONMENTAL PROTECTION

The Contractor shall take necessary measures specified herein, shown in Section 01560, and otherwise required, to protect the environment.
PART 2 PRODUCTS

2.1 BACKFILL MATERIAL

Backfill material shall be as specified in Section 02210 Grading.

Backfill shall be classified in accordance with ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, MH, CL, or CH and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials.

Soil classification test results shall be approved prior to bringing material onsite. Non-contaminated material removed from the excavation can be used for backfill in accordance with paragraph BACKFILLING.

3 EXECUTION

3.1 SAFETY

Personnel working inside and in the general vicinity of the excavation shall be trained and thoroughly familiar with the safety precautions, procedures, and equipment required for controlling potential hazards associated with this work. Personnel shall use proper protection and safety equipment during work in and around the excavation in accordance with the approved Site Health and Safety Plan, and as otherwise specified.

3.3 EXCAVATION

3.3.2 Open Excavations

Open excavations and stockpile areas shall be secured. The Contractor shall divert surface water around excavations to prevent water from directly entering into the excavation.

3.4 BACKFILLING

The excavation shall be backfilled with the approved available onsite basin berm material and approved offsite fill material only. The excavation shall be dewatered if necessary. Backfilling shall be in accordance with Section 02210 GRADING

3.5 DISPOSAL GUIDELINES

3.5.1 General

Sampling and analysis previously performed in February 1997, on the subsurface soils beneath the basin liner, indicates the material is classified as non-hazardous and does not require removal for clean closure. Analytical results of the samples collected within the subsurface beneath the basin liner can be found in Table 3-2 of the Site Investigation/Evaluation Study, dated February 1997. A copy of the results may be obtained from the Norfolk District Engineering Division, P.O.C., Marc D. Gutterman at 757-441-7669. It is the responsibility of the Contractor to ensure that all removal operations are performed in such a manner as to limit disturbance to the underlying subsurface soils.

3.5.1.1 Rainwater Accumulated Within the Basin

All water and sludge that accumulated within the basin while it was in operation, has been previously removed by Alliant Tech. All rainwater currently accumulated within the basin must be pumped to the on-site

influent pump station, identified on the plans. All grit remaining in the basin, after the rainwater has been pumped out, is the result of the decaying basin liner surface and shall be disposed of with the basin liner material.

3.5.1.2 Concrete Floodwall Disposal

Toxicity Characteristic Leaching Procedure (TCLP) analysis performed in February 1997, on the concrete floodwall, indicates the demolition debris is classified non-hazardous. The Contractor may obtain the TCLP results, found in Table 3-3 of the Site Investigation/Evaluation Study, dated February 1997, from the Norfolk District Engineering Division. The P.O.C. for the study report is Marc D. Gutterman at 757-441-7669. It is the responsibility of the Contractor to ensure that the concrete is disposed as a solid waste to a permitted CDD landfill. This ia a requirement of the state.

3.5.1.3 Soil/Cement Liner Disposal

Toxicity Characteristic Leaching Procedure (TCLP) analysis was performed in February 1997, on one composite sample, made up of seven sampling locations within the basin liner. The results of the TCLP analysis on the basin liner indicates the demolition debris is classified as non-hazardous. The Contractor may obtain the TCLP results, found in Table 3-3 of the Site Investigation/Evaluation Study, dated February 1997, from the Norfolk District Engineering Division. The P.O.C. for the study report is Marc D. Gutterman at 757-441-7669. It is the responsibility of the Contractor to ensure that all disposal is performed in accordance with all Federal, State, and Local regulations at a RCRA D landfill.

3.5.1.4 Equipment to be Salvaged, Equipment to be Disposed, Ancillary Piping, and Effluent Pump Station Demolition Debris Disposal

There is the potential to encounter grit/sludge within the equipment identified on the plans to be salvaged, equipment identified on the plans to be disposed, all piping identified on the plans to be disposed, and the concrete effluent pump station to be demolished and disposed. Prior to salvage or disposal of equipment, piping, and effluent pump station concrete, all grit/sludge must be removed and all items must be washed down thoroughly, with a high pressure spray. All grit/sludge and washdown water must be collected by the Contractor and disposed of on-site in the existing influent pump station. It is the responsibility of the Contractor to ensure that no material (grit/sludge and washdown water) is spilled on the site. As part of the Work Plan requirements (SECTION 02072, Paragraph 1.3.i and 1.3.j) the Contractor is required to provide a spill prevention plan and a spill contingency plan.

For preparation of the Work Plan and the Site Specific Safety and Health Plan, an analysis of the sludge previously removed from the basin, by Alliant Tech., is available from the Norfolk District Engineering Division, P.O.C., Marc D. Gutterman at 757-441-7669. This information should be considered the worst case scenario as to the presence of hazardous constituents of concern in the grit/sludge which may be encountered within the equipment identified on the plans to be salvaged, equipment identified on the plans to be disposed, all piping identified on the plans to be disposed, and the concrete effluent pump station to be demolished and disposed.

It is the responsibility of the Contractor to dispose of all equipment identified for disposal, piping, and effluent pump station concrete in accordance with all Federal, State, and Local regulations.

3.5.2 Transportation of Wastes

Transportation shall comply with all Federal, State, and local regulations.

3.5.3 Records

Records shall be maintained of all waste determinations (if required by the disposal facility), including appropriate results of analyses performed , substances and sample locations, the time of collection, and other pertinent data as required by CFR 40 Part 262 Subpart D. Transportation, disposal methods and dates, the quantities of waste, the names and addresses of each transporter and the disposal facility shall also be recorded and available for inspection, as well as copies or originals of the following documents:

a. Manifests

b. Waste analyses or waste profile sheets (if required by the receiving landfill)

c. Certifications of disposal signed by the responsible disposal facility official

d. Weighing scale receipt corresponding to each manifest

Following contract close out, the records shall become the property of the Government.

3.5.4 Waste Manifests

Should the Contractor be required by the receiving disposal facility Owner to show that the demolition debris is not hazardous waste, the Contractor will first attempt to demonstate this proof using the results of the TCLP analysis from Table 3-3 of the February 1997 Site Investigation/Evaluation Study. Should these results not satisfy the Landfill Owner's Permit and further testing is required, the Contracting Officer shall be immediately notified and a sampling protocol agreed upon for further testing. Should the Contractor's initial test results show contamination in the demolition debris then the government shall require verification testing. If verification testing is positive for contamination, then all work will cease until a Change Order is approved for removing and disposing the contaminated demolition debris. All negative tests results shall be paid by the Contractor and all positive test results shall be paid by the Government.

3.5.5 Documentation of Treatment or Disposal

a. Documentation

The demolition debris shall be taken to an appropriate disposal facility in accordance with all Federal, State and Local regulations. Should the disposal facility Owner require a manifest on the debris and Paragraph 3.5.4 testing results in contamination, then Contractor shall provide documentation of acceptance of special waste or hazardous waste by the original return copy of the hazardous waste manifest, signed by the owner or operator of a facility legally permitted to dispose of those materials. If the Contractor selects a different facility than is identified in the Work Plan, documentation shall be provided for approval to certify that the facility is authorized and meets the standards specified.

b. Payment

There will be no payment for transportation and disposal of demolition debris for which the transportation, disposal, and weight are not documented by the specified material manifest and corresponding weighing scale receipt and other information specified in paragraph RECORDS.

-- End of Section --

SECTION 02210

GRADING
12/88
(MOD NAO APRIL 1995)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 422	(1963; R 1990) Particle Size Analysis of Soils
ASTM D 1556	(1990) Density and Unit Weight of Soil In-Place by the Sand-Cone Method
ASTM D 1557	(1991) Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/cu. ft. (2,700 kN-m/cu.m.))
ASTM D 2216	(1990) Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures
ASTM D 2487	(1990) Classification of Soils for Engineering Purposes
ASTM D 2922	(1991) Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
ASTM D 3017	(1988) Water Content of Soil and Rock In-Place by Nuclear Methods (Shallow Depth)
ASTM D 4318	(1984) Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.3 DEFINITIONS

1.3.1 Satisfactory Materials

Materials classified in ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, CL, CH, ML, and MH are satisfactory as fill for overlot grading and are satisfactory as backfill material.

1.3.2 Unsatisfactory Materials

Materials classified in ASTM D 2487 as Pt, OH, and OL are unsatisfactory as fill. Unsatisfactory materials also include those materials containing roots and other organic matter, trash, debris, frozen materials, and stones larger than six inches in any dimension.

1.3.3 Cohesionless and Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Cohesionless materials include materials classified in ASTM D 2487as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines have a plasticity index of zero.

1.3.4 Degree of Compaction

Degree of compaction is a percentage of the maximum density obtained by the appropriate test procedure presented in ASTM D 1557 abbreviated below as a percent of laboratory maximum density.

1.3.6 Topsoil

Material obtained from off-site areas, suitable for topsoils, is defined in Section 02935 TURF.

1.4 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "F10" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL DESCRIPTIONS and Section 01305:

SD-06 Instructions; GA.

Detailed instructions describing use of a product, system or material, including special notices and material safety data sheets, if any, concerning impedence, hazards, and safety precautions defining the Contractor's provisions for a blasting plan and blasting operations.]

SD-09, Reports.

Soils Tests; GA.

Copies of all laboratory and field test reports shall be submitted to the Contracting Officer within 72 hours of the completion of the test.

1.5 SUBSURFACE DATA

Subsurface soil boring logs are available upon request. These data represent the best subsurface information available; however, variations may exist in the subsurface between these boring locations. Subsurface soils in the area generally consist of medium density silts, sands and clays although dense gravel or bedrock may be encountered as high as elevation 1690 feet NGVD. Groundwater is normally encountered at approximately elevation 1690' NGVD.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

The work conducted under this section shall be coordinated and accomplished in accordance with requirements of Section 02072: DEMOLITION DEBRIS DISPOSAL.

3.1 DRAINAGE AND DEWATERING

3.1.1 Drainage

Surface water shall be directed away from excavation and construction sites so as to prevent erosion. Diversion ditches, dikes, and grading shall be provided and maintained as necessary during construction. Excavated slopes and backfill surfaces shall be protected to prevent erosion and sloughing. Excavation shall be performed so that the site and the area immediately surrounding the site and affecting operations at the site shall be continually and effectively drained.

3.1.2 Dewatering

Groundwater flowing toward or into excavations shall be controlled to

prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. Control measures shall be taken by the time the excavation reaches the water level in order to maintain the integrity of the in situ material. While the excavation is open, the water level shall be maintained continuously below the working level or deeper as required to continue construction.

3.3 EXCAVATION

Excavation of every description, within the grading limits of the project, shall be performed to the lines and grades indicated. Satisfactory excavation material shall be stockpiled or shall be transported to and placed in fill areas within the limits of the work. All unsatisfactory material, including any soil which is disturbed by the Contractor's operations or softened due to exposure to the elements and water, and surplus material shall be disposed of in areas approved for surplus material storage. In the event that it is necessary to remove unsatisfactory material to a depth greater than specified, the Contracting Officer shall be notified and an adjustment in the contract price will be considered in accordance with the CHANGES clause. Unsatisfactory material excavated below the grade shown and replaced with satisfactory material as directed shall be included in the contract unit price for excavation. Excavations carried below the depths indicated, without specific directions, or as required due to the action or inaction of the Contractor during performance of the work, shall, except as otherwise specified, be refilled at the Contractor's expense to the proper grade with satisfactory material as directed. Material required for fills in excess of that produced by excavation within the grading limits shall be obtained from borrow areas.

3.4 CLASSIFICATION OF EXCAVATION

No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

3.5 BORROW MATERIAL

Borrow material shall be selected to meet requirements and conditions of the particular fill for which it is to be used. Borrow materials shall be subject to approval. Necessary clearing, grubbing, disposal of debris, and satisfactory drainage of borrow pits shall be performed by the Contractor as incidental operations to the borrow excavation.

3.5.1 Selection

Borrow materials shall be obtained from off-site sources. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval.

3.5.2 Borrow Pits

The Contractor shall notify the Contracting Officer sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements to be taken of the undisturbed ground surface. Except as otherwise permitted, borrow pits shall be excavated to afford adequate drainage. Overburden and other spoil material shall be disposed of or used for other purposes. Borrow pits shall be neatly trimmed and left in such shape as will facilitate taking accurate measurements after the excavation is completed.

3.6 BACKFILL

Backfill shall be placed and compacted uniformly in 6 inch lifts. Slopes bounding or within areas to be backfilled shall be stepped or serrated to

prevent sliding of the fill. During backfilling operations and in the formation of embankments, equipment that will overload existing underground utilities in passing over and compacting these fills shall not be used. Backfill for storm drains and subdrains, including the bedding and backfill for structures other than culverts and drains, shall conform to the additional requirements in other applicable sections.

3.7 PREPARATION OF GROUND SURFACE FOR FILL

All vegetation, such as roots, brush, heavy sods, heavy growth of grass, and all decayed vegetable matter, rubbish, and other unsatisfactory material within the area upon which fill is to be placed, shall be stripped or otherwise removed before the fill is started. In no case shall unsatisfactory material remain in or under the fill area. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be plowed, stepped, or broken up, as directed, in such manner that the fill material will bond with the existing surface. Prepared surfaces on which compacted fill is to be placed shall be wetted or dried as may be required to obtain the specified compaction.

3.8 FILLS AND EMBANKMENTS

Fills and embankments shall be constructed at the locations and to lines and grades indicated. The completed fill shall conform to the shape of the typical sections indicated or shall meet the requirements of the particular case. Satisfactory material obtained during excavation may be used in forming required fill. Fill shall be satisfactory material and shall be reasonably free from roots, other organic material, and trash and from stones having a maximum diameter greater than 6 inches in any dimension. No frozen material will be permitted in the fill. Stones having a dimension greater than 3 inches shall not be permitted in the upper 6 inches of fill or embankment. The material shall be placed in successive horizontal layers of 8 inches in loose depth for the full width of the cross section and shall be compacted as specified. Each layer shall be compacted before the overlaying lift is placed. Moisture content of the fill or backfill material shall be adjusted by wetting or aerating, as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

3.9 COMPACTION

Each layer of the fill or embankment shall be compacted to at least 90 percent of laboratory maximum density for cohesive and cohesionless materials, respectively.

3.11 FINISHED EXCAVATION, FILLS, AND EMBANKMENTS

All areas covered by the project, including excavated and filled sections and adjacent transition areas, shall be uniformly smooth-graded. The finished surface shall be reasonably smooth, compacted, and free from irregular surface changes. The degree of finish shall be that ordinarily obtainable from blade-grader operations, except as otherwise specified. Ditches and gutters shall be finished to permit adequate drainage. The surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials. Surfaces shall be finished not more than 0.15 foot above or below the established grade or approved cross section.

3.12 PLACING TOPSOIL

Areas indicated on the plans shall be topsoiled. The surface shall be free of materials that would hinder planting or maintenance operations. The subgrade shall be pulverized to a depth of 2 inches by disking or plowing

for the bonding of topsoil with the subsoil. Topsoil shall then be uniformly spread, graded, and compacted to the thickness, elevations, slopes shown, and left free of surface irregularities. Topsoil shall be compacted as specified in Section 02935TURF]. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, or in a condition otherwise detrimental to seeding, planting, or proper grading. Material required for topsoil in excess of that produced by excavation within the grading limits shall be obtained from off Government property.

3.13 SOILS TESTS

Testing shall be the responsibility of the Contractor and shall be performed by an approved commercial testing laboratory or may be performed by the Contractor subject to approval. Laboratory tests for moisture - density relations complete with zero air voids curve, gradation, and Atterberg limits shall be made in accordance with the procedures referenced in ASTM D 1557, ASTM D 422, and ASTM D 4318. Field tests for density and moisture content shall be made in accordance with ASTM D 1556 and ASTM D 2216 except that Method ASTM D 2922 may be used to supplement tests by Method ASTM D 1556. When ASTM D 2922 is used, the calibration curves shall be checked and adjusted using only the sand cone method as described in ASTM D 1556. ASTM D 2922 results in a wet unit weight of soil and when using this method, ASTM D 3017 shall be used to determine the moisture content of the soil. When soil conditions exist, such as the presence of mica, which produces inconsistent results by the nuclear gauge method D 2922, only method D 1556 shall be used. The following tests are required:

a. A minimum of one moisture-density test shall be performed for each classification of fill material, backfill material, and existing subgrade material.

b. One Atterberg limits test and one gradation analysis is required for every six field density tests.

c. A minimum of one sand cone density test is required for every six nuclear gauge field density tests or fraction thereof. Worksheets of sand density and sand cone calibration shall be submitted to the Contracting Officer prior to commencing work and each time a new supply of sand is used.

d. Field density tests shall be performed as follows: a minimum of one test per lift per 650 square yards or fraction thereof is required for fill material and a minimum of one test per lift per 1000 square yards or fraction thereof is required for ground surfaces prior to filling. Locations of all tests shall be at the direction of the Contracting Officer.

3.14 PROTECTION

Newly graded areas shall be protected from traffic and from erosion, and any settlement or washing away that may occur from any cause, prior to acceptance, shall be repaired and grades reestablished to the required elevations and slopes. All work shall be conducted in accordance with the environmental protection requirements of the contract.

-- End of Section --

SECTION 02831

CHAIN LINK FENCE
07/92

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 121	(1992a) Zinc-Coated (Galvanized) Steel Barbed Wire
ASTM A 153	(1996) Zinc-Coated (Hot Dip) on Iron and Steel Hardware
ASTM A 176	(1994) Stainless and Heat-Resisting ChromiumSteel Plate, Sheet, and Strip
ASTM A 392	(1991b) Zinc-Coated Chain-Link Fence Fabric
ASTM A 478	(1995a) Chromium-Nickel Stainless and Heat-Resisting Steel Weaving and Knitting Wire
ASTM A 491	(1994) Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A 585	(1992) Aluminum-Coated Steel Barbed Wire
ASTM A 666	(1994) Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
ASTM A 780	(1993a) Repair of Damaged and Uncoated Areas of Hot-Dipped Galvanized Coatings
ASTM A 824	(1992) Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM C 94	(1994) Ready-Mixed Concrete
ASTM F 626	(1994a) Fence Fittings
ASTM F 668	(1994) Poly(Vinyl Chloride) (PVC) Coated Steel Chain-Link Fence Fabric
ASTM F 883	(1990) Padlocks
ASTM F 900	(1994) Industrial and Commercial Swing Gates
ASTM F 1043	(1995) Strength and Protective Coatings on

	Metal Industrial Chain-Link Fence Framework
ASTM F 1083	(1993) Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F 1184	(1994) Industrial and Commercial Horizontal Slide Gates

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300 SUBMITTAL PROCEDURES:

SD-13 Certificates

Chain Link Fence; [GA].

Statement signed by an official authorized to certify on behalf of the manufacturer attesting that the chain link fence and component materials meet the specified requirements.

PART 2 PRODUCTS

2.1 MATERIALS

Materials shall conform to the following:

2.1.1 Chain Link Fence Fabric

ASTM A 392, Class 2, zinc-coated steel wire with minimum coating weight of 1.2 ounces of zinc per square foot of coated surface, or ASTM A 491, Type I, aluminum-coated steel wire. Fabric shall be fabricated of 9 gauge wire woven in 2 inch mesh. Fabric height shall match existing. Fabric shall be twisted and barbed on the top selvage and knuckled on the bottom selvage.

2.1.2 Gates

ASTM F 900 and/or ASTM F 1184. Gate shall be the type and swing shown. Gate frames shall conform to strength and coating requirements of ASTM F 1083 for Group IA, steel pipe, with external coating Type A, nominal pipe size (NPS) 1-1/2. Gate frames shall conform to strength and coating requirements of ASTM F 1043, for Group IC, steel pipe with external coating Type A or Type B, pipe size (NPS) 1-1/2. Gate fabric shall be as specified for chain-link fabric. Each end member of gate frames shall be extended sufficiently above the top member to carry three strands of barbed wire in horizontal alignment with barbed wire strands on the fence. Gate leaves more than 8 feet wide shall have either intermediate members and diagonal truss rods or shall have tubular members as necessary to provide rigid construction, free from sag or twist. Gate leaves less than 8 feet wide shall have truss rods or intermediate braces. Intermediate braces shall be provided on all gate frames with an electro-mechanical lock. Gate fabric shall be attached to the gate frame by method standard with the manufacturer except that welding will not be permitted. Latches, hinges, stops, keepers, rollers, and other hardware items shall be furnished as required for the operation of the gate. Latches shall be arranged for

padlocking so that the padlock will be accessible from both sides of the gate. Stops shall be provided for holding the gates in the open position.

2.1.3 Posts

ASTM F 1083, zinc-coated. Group IA, with external coating Type A steel pipe. Group IC steel pipe, zinc-coated with external coating Type A or Type B and Group IIA, formed steel sections, shall meet the strength and coating requirements of ASTM F 1043. Group III, ASTM F 1043 steel H-section may be used for line posts in lieu of line post shapes specified for the other classes. Sizes shall be as shown on the drawings. Line posts and terminal (corner, gate, and pull) posts selected shall be of the same designation throughout the fence. Gate post shall be for the gate type specified subject to the limitation specified in ASTM F 900 and/or ASTM F 1184.

2.1.4 Braces and Rails

ASTM F 1083, zinc-coated, Group IA, steel pipe, size NPS 1-1/4. Group IC steel pipe, zinc-coated, shall meet the strength and coating requirements of ASTM F 1043. Group IIA, formed steel sections, size 1.66 inch, conforming to ASTM F 1043, may be used as braces and rails if Group IIA line posts are furnished.

2.1.5 Tension Wire

Tension wire shall be Type I or Type II, Class 2 coating, in accordance with ASTM A 824.

2.1.6 Accessories

ASTM F 626. Ferrous accessories shall be zinc or aluminum coated. Truss rods shall be furnished for each terminal post. Truss rods shall be provided with turnbuckles or other equivalent provisions for adjustment. Barbed wire shall be 2 strand, 12-1/2 gauge wire, zinc-coated, Class 3 in accordance with ASTM A 121 or aluminum coated Type I in accordance with ASTM A 585. Barbed wire shall be four-point barbed type steel wire. Barbed wire support arms shall be the V arm type and of the design required for the post furnished. Tie wire for attaching fabric to rails, braces, and posts shall be 9 gauge steel wire and match the coating of the fence fabric. Miscellaneous hardware coatings shall conform to ASTM A 153 unless modified herein.

2.1.8 Concrete

ASTM C 94, using 3/4 inch maximum size aggregate, and having minimum compressive strength of 3000 psi at 28 days. Grout shall consist of one part portland cement to three parts clean, well-graded sand and the minimum amount of water to produce a workable mix.

2.1.9 Padlocks

ASTM F 883, Type PO1, Grade 2, Size 1-3/4 inch. Padlocks shall be keyed alike and each lock shall be furnished with two keys.

PART 3 EXECUTION

3.1 GENERAL

Fence shall be installed to the lines and grades indicated. The area on

either side of the fence line shall be cleared to the extent indicated. Line posts shall be spaced equidistant at intervals not exceeding 10 feet.

Terminal (corner, gate, and pull) posts shall be set at abrupt changes in vertical and horizontal alignment. Fabric shall be continuous between terminal posts; however, runs between terminal posts shall not exceed 500 feet. Any damage to galvanized surfaces, including welding, shall be repaired with paint containing zinc dust in accordance with ASTM A 780.

3.2 EXCAVATION

Post holes shall be cleared of loose material. Waste material shall be spread where directed. The ground surface irregularities along the fence line shall be eliminated to the extent necessary to maintain a 2 inch clearance between the bottom of the fabric and finish grade.

3.3 POSTS

Posts shall be set plumb and in alignment. Except where solid rock is encountered, posts shall be set in concrete to the depth indicated on the drawings. Where solid rock is encountered with no overburden, posts shall be set to a minimum depth of 18 inches in rock. Where solid rock is covered with an overburden of soil or loose rock, posts shall be set to the minimum depth indicated on the drawing unless a penetration of 18 inches in solid rock is achieved before reaching the indicated depth, in which case depth of penetration shall terminate. All portions of posts set in rock shall be grouted. Portions of posts not set in rock shall be set in concrete from the rock to ground level. Posts set in concrete shall be set in holes not less than the diameter shown on the drawings. Diameters of holes in solid rock shall be at least 1 inch greater than the largest cross section of the post. Concrete and grout shall be thoroughly consolidated around each post, shall be free of voids and finished to form a dome. Concrete and grout shall be allowed to cure for 72 hours prior to attachment of any item to the posts. Class 3 line posts may be mechanically driven, for temporary fence construction only, if rock is not encountered. Driven posts shall be set to a minimum depth of 3 feet and shall be protected with drive caps when being set. Fence post rigidity shall be tested by applying a 50 pound force on the post, perpendicular to the fabric, at 5 feet above ground. Post movement measured at the point where the force is applied shall be less than or equal to 3/4 inch from the relaxed position. Every tenth post shall be tested for rigidity. When a post fails this test, further tests on the next four posts on either side of the failed post shall be made. All failed posts shall be removed, replaced, and retested at the Contractor's expense.

3.4 RAILS

3.4.1 Top Rail

Top rail shall be supported at each post to form a continuous brace between terminal posts. Where required, sections of top rail shall be joined using sleeves or couplings that will allow expansion or contraction of the rail. Bottom rail, if required for high security fence, shall be installed as indicated on the drawings.

3.4.2 Bottom Rail

The bottom rail shall be bolted to double rail ends and double rail ends shall be securely fastened to the posts. Bolts shall be peened to prevent easy removal. Bottom rail shall be installed before chain link fabric.

3.5 BRACES AND TRUSS RODS

Braces and truss rods shall be installed as indicated and in conformance with the standard practice for the fence furnished. Horizontal (compression) braces and diagonal truss (tension) rods shall be installed on fences over 6 feet in height. A center brace or 2 diagonal truss rods shall be installed on 12 foot fences. Braces and truss rods shall extend from terminal posts to line posts. Diagonal braces shall form an angle of approximately 40 to 50 degrees with the horizontal. No bracing is required on fences 6 feet high or less if a top rail is installed.

3.6 TENSION WIRES

Tension wires shall be installed along the [top and] bottom of the fence line and attached to the terminal posts of each stretch of the fence. [Top tension wires shall be installed within the top 4 inches of the installed fabric.] Bottom tension wire shall be installed within the bottom 6 inches of the installed fabric. Tension wire shall be pulled taut and shall be free of sag.

3.7 CHAIN LINK FABRIC

Chain link fabric shall be installed on the side of the post indicated. Fabric shall be attached to terminal posts with stretcher bars and tension bands. Bands shall be spaced at approximately 15 inch intervals. The fabric shall be installed and pulled taut to provide a smooth and uniform appearance free from sag, without permanently distorting the fabric diamond or reducing the fabric height. Fabric shall be fastened to line posts at approximately 15 inch intervals and fastened to all rails and tension wires at approximately 24 inch intervals. Fabric shall be cut by untwisting and removing pickets. Splicing shall be accomplished by weaving a single picket into the ends of the rolls to be joined. The bottom of the installed fabric shall be 2 inches [1 inch](plus or minus above the ground. After the fabric installation is complete, the fabric shall be exercised by applying a 50 pound push-pull force at the center of the fabric between posts. The use of a 30 pound pull at the center of the panel shall cause fabric deflection of not more than 2.5 incheswhen pulling fabric from the post side of the fence. Every second fence panel shall meet this requirement. All failed panels shall be resecured and retested at the Contractor's expense.

3.8 BARBED WIRE SUPPORTING ARMS AND BARBED WIRE

Barbed wire supporting arms and barbed wire shall be installed as indicated and as recommended by the manufacturer. Supporting arms shall be anchored to the posts in a manner to prevent easy removal with hand tools. Supporting arms shall be anchored with 3/8 inchdiameter plain pin rivets or, at the Contractor's option, with studs driven by low-velocity explosive-actuated tools for steel, wrought iron, ductile iron, or malleable iron. Studs driven by an explosive-actuated tool shall not be used with gray iron or other material that can be fractured. A minimum of two studs per support arm shall be used. Barbed wire shall be pulled taut and attached to the arms with clips or other means that will prevent easy removal.

3.9 GATES

Gates shall be installed at the locations shown. Hinged gates shall be mounted to swing as indicated. Latches, stops, and keepers shall be installed as required. Padlocks shall be attached to gates or gate posts

with chains. Hinge pins, and hardware shall be welded or otherwise secured to prevent removal.

-- End of Section --

SECTION 02935
TURF
06/90
MOD 1 JUN 91 NAOEN-DT

PART 1 GENERAL

1.1 SUMMARY (NOT APPLICABLE)

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AGRICULTURAL MARKETING SERVICE (AMS)

AMS-01	(Sep 1977; Amended Oct 29, 1986) Federal Seed Act Regulations (Part 20): Certified Seed Regulations

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 977	(1986) Emulsified Asphalt
ASTM D 2028	(1976; R 1986) Cutback Asphalt (Rapid-Curing Type)

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1909	(Basic) Fertilizer

FEDERAL SPECIFICATIONS (FS)

FS O-F-241	(Rev D) Fertilizers, Mixed, Commercial
FS JJJ-S-181	(Rev B) Seeds, Agricultural

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01300SUBMITTALS:

SD-01 Data

Manufacturer's Literature; FIO.

Manufacturer's literature discussing physical characteristics, application and installation instructions for erosion control material, and for

chemical treatment material.

SD-07 Schedules

SD-08 Statements

Delivery; FIO.

Delivery schedule, at least 10 days prior to the intended date of the first delivery.

Maintenance Report; FIO.

Written record of maintenance work performed.

Turf Establishment Period; FIO.

Written calendar time period for the turf establishment period. When there is more than one turf establishment period, the boundaries of the turfed area covered for each period shall be described.

SD-13 Certificates

Certificates of compliance certifying that materials meet the requirements specified, prior to the delivery of materials. Certified copies of the reports for the following materials shall be included:

a. Seed: For mixture, percent pure live seed, minimum percent germination and hard seed, maximum percent weed seed content, date tested and state certification.

c. Fertilizer: For chemical analysis, composition percent.

d. Agricultural Limestone: For calcium carbonate equivalent and sieve analysis.

g. Topsoil: For pH, particle size, chemical analysis and mechanical analysis.

1.5 DELIVERY, INSPECTION, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.3 Soil Amendments

Soil amendments shall be delivered to the site in the original, unopened containers bearing the manufacturer's chemical analysis. In lieu of containers, soil amendments may be furnished in bulk. A chemical analysis shall be provided for bulk deliveries.

1.5.2 Inspection

Seed shall be inspected upon arrival at the job site by the Contracting Officer for conformity to type and quality in accordance with paragraph MATERIALS. Other materials shall be inspected for meeting specified requirements and unacceptable materials shall be removed from the job site.

1.5.3 Storage

Materials shall be stored in areas designated by the Contracting Officer. Seed, lime and fertilizer shall be stored in cool, dry locations away from contaminants. Chemical treatment materials shall not be stored with other landscape materials.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Seed

2.1.1.1 Seed Classification

State-certified seed of the latest season's crop shall be provided in original sealed packages bearing the producer's guaranteed analysis for percentages of mixture, purity, germination, hard seed, weed seed content, and inert material. Labels shall be in conformance with AMS-01 and applicable state seed laws.

2.1.1.2 Seed Mixtures

Seed mixtures shall be proportioned by weight as follows:

Botanical Name	Common Name	Mixture Percent by Weight	Percent Pure Live Seed
Festuca arundinacea	Tall Fescue	70	85
Trifolium incarnatum	Crimson Clover	10	82
Lolium multiflorum	Annual Ryegrass	20	85

2.1.1.3 Quality

Seed shall conform to FS JJJ-S-181. Weed seed shall not exceed 1 percent by weight of the total mixture. Wet, moldy, or otherwise damaged seed shall be rejected.

2.1.3 Topsoil

2.1.3.1 Topsoil Materials

Topsoil shall be natural, friable, loam topsoil possessing the characteristics of representative soils in the vacinity that produce heavy growths of crops, grass, or other vegetation, and shall be obtained from naturally well drained areas. The topsoil shall be free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and shall be free from stones, stumps, and other objects larger than one-half inch in diameter, from roots and toxic substances, and from any other material or substance that might be harmful to plant growth or to be a hindrance to grading, planting, and maintenance operations.

2.1.3.2 Topsoil

Topsoil shall be a natural, friable soil representative of productive soils in the vicinity. It shall be obtained from well-drained borrow

areas, provided by the Contractor, and shall be free of any admixture of subsoil, foreign matter, objects larger than one inch in any dimension, toxic substances, and any material or substance that may be harmful to plant growth. The pH range shall be 6.2 to 7.0. Topsoil that does not meet this pH range shall be amended by the addition of pH adjusters, at a rate recommended based on soil tests.

2.1.4 Soil Amendments

Soil amendments shall consist of lime, fertilizer, and soil conditioners meeting the following requirements.

2.1.4.1 Lime

Lime shall be agricultural limestone and shall have a minimum calcium carbonate equivalent of 90 percent and shall be ground to such a fineness that at least 90 percent will pass a 10-mesh sieve and at least 50 percent will pass a 60-mesh sieve.

2.1.4.2 Fertilizer

Fertilizer shall be commercial grade, free flowing, uniform in composition and conforming to CID A-A-1909. Granular Fertilizer As recommended by the soil test.

2.1.5 Mulch

Mulch shall be free from weeds, mold, and other deleterious materials.

2.1.5.1 Straw

Straw shall be stalks from oats, wheat, rye, barley, or rice furnished in air-dry condition and with a consistency for placing with commercial mulch-blowing equipment.

2.1.5.2 Hay

Hay shall be native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings furnished in an air-dry condition suitable for placing with commercial mulch-blowing equipment.

2.1.5.3 Wood Cellulose Fiber

Wood cellulose fiber shall not contain any growth or germination-inhibiting factors and shall be dyed an appropriate color to facilitate visual metering during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0.

2.1.5.4 Paper Fiber Mulch

Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.

2.1.7 Water

Water shall not contain elements toxic to plant life.

2.1.8 Erosion Control Material

Soil erosion control shall conform to the following:

2.1.8.1 Soil Erosion Control Blanket

Machine produced mat of wood excelsior formed from a web of interlocking wood fibers, covered on one side with either knitted straw blanket-like mat construction, covered with biodegradable plastic mesh, or interwoven biodegradable thread, plastic netting or twisted kraft paper cord netting.

2.1.8.2 Soil Erosion Control Fabric

Knitted construction of polypropylene yarn with uniform mesh openings 3/4 to 1 inch square with strips of biodegradable paper. Filler paper strips shall last 6 to 8 months.

2.1.8.3 Soil Erosion Control Net

Heavy, twisted jute mesh weighing approximately 1.22 pounds per linear yard and 4 feet wide with mesh openings of approximately 1 inch square.

2.1.8.4 Soil Erosion Control Chemicals

High-polymer synthetic resin or cold-water emulsion of selected petroleum resins.

2.1.8.5 Hydrophilic Colloids

Hydrophilic colloids shall be physiologically harmless to plant and animal life, without phytotoxic agents. Colloids shall be naturally occurring, silicate powder based, and shall form a water insoluble membrane after curing. Colloids must resist mold growth.

2.1.8.6 Anchors

Erosion control anchor material shall be as recommended by the manufacturer.

PART 3 EXECUTION

3.1 SEEDING TIMES, CONDITIONS, AND AREAS

3.1.1 Seeding Time

Seed shall be sown from 1 Mar to 15 May for spring planting and from 16 Aug to 31 Oct for fall planting.

3.1.2 Areas to be Seeded

All disturbed ground areas within the limits of construction shall be topsoiled, tilled, limed, fertilized, seeded and mulched.

3.2 SITE PREPARATION

3.2.1 Grading

The Contracting Officer shall verify that finished grades are as indicated on drawings, and the placing of topsoil and the smooth grading has been completed in accordance with Section 02210 GRADING.

3.2.2 Placing Topsoil

Topsoil shall be distributed uniformily and spread evenly to an average thickness of three inches, with a minimum thickness of two inches. Topsoil shall be spread so that planting can proceed with little additional soil preparation of additional tillage. Surface irregularities resulting from topsoiling or other operations shall be leveled to prevent depressions. Grade shall be adjusted to assure that planted grade will be one inch below adjoining grade of any surfaced area. Topsoil shall not be placed when the subgrade is frozen, excessively wet, extremely dry, excessively compacted, or in a condition detrimental to the proposed planting or grading. Soil compacted by construction equipment or soil on compacted cut slopes of grades shall be pullverized to a minimum depth of two inches by disking or plowing before applying topsoil.

3.2.3 Application of Soil Amendments

3.2.3.1 Soil Test

A soil test shall be performed for pH, chemical analysis and mechanical analysis to establish the quantities and type of soil amendments required to meet local growing conditions for the type and variety of turf specified.

3.2.3.2 Lime

Lime shall be applied at the rate recommended by the soil test. Lime shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage operation.

3.2.3.3 Fertilizer

Fertilizer shall be applied at the rate recommended by the soil test. Fertilizer shall be incorporated into the soil to a minimum depth of 4 inches or may be incorporated as part of the tillage or hydroseeding operation.

3.2.4 Tillage

3.2.4.1 Minimum Depth

Soil on slopes gentler than 3-horizontal-to-1-vertical shall be tilled to a minimum depth of 4 inches. On slopes between 3-horizontal-to-1-vertical and 1-horizontal-to-1 vertical, the soil shall be tilled to a minimum depth of 2 inches by scarifying with heavy rakes, or other method. Rototillers shall be used where soil conditions and length of slope permit. On slopes 1-horizontal-to-1 vertical and steeper, no tillage is required.

3.2.5 Finished Grading

3.2.5.1 Preparation

Turf areas shall be filled as needed or have surplus soil removed to attain the finished grade. Drainage patterns shall be maintained as indicated on drawings. Turf areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of erosion or grade

deficiencies shall conform to topsoil requirements specified in Section 02210 GRADING. Finished grade shall be 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas.

3.2.5.2 Lawn Area Debris

Lawn areas shall have debris and stones larger than 1 inch in any dimension removed from the surface.

3.2.5.3 Field Area Debris

Field areas shall have debris and stones larger than 2 inches in any dimension removed from the surface.

3.2.5.4 Protection

Finished graded areas shall be protected from damage by vehicular or pedestrian traffic and erosion.

3.3 SEEDING

3.3.1 General

Prior to seeding, any previously prepared seedbed areas compacted or damaged by interim rain, traffic or other cause, shall be reworked to restore the ground condition previously specified. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.

3.3.2 Equipment Calibration

The equipment to be used and the methods of turfing shall be subject to the inspection and approval of the Contracting Officer prior to commencement of turfing operations. Immediately prior to the commencement of turfing operations, the Contractor shall conduct turfing equipment calibration tests in the presence of the Contracting Officer.

3.3.3 Applying Seed

3.3.3.1 Broadcast Seeding

Seed shall be uniformly broadcast at the rate of 4 pounds per 1000 square feet using broadcast seeders. Half of seed shall be broadcast in one direction, and the remainder at right angles to the first direction. Seed shall be covered to an average depth of 1/4 inch by disk harrow, steel mat drag, cultipacker, or other approved device.

3.3.3.3 Rolling

Immediately after seeding, except for slopes 3-horizontal-to-1 vertical and greater, the entire area shall be firmed with a roller not exceeding 90 pounds for each foot of roller width. Areas seeded with seed drills equipped with rollers shall not be rolled.

3.3.4 Hydroseeding

Seed and fertilizer shall be added to water and thoroughly mixed at the rates specified. Slurry shall be uniformly applied under pressure over the

entire area. The hydroseeded area shall not be rolled.

3.3.5 Mulch

3.3.5.1 Straw or Hay Mulch

Straw or hay mulch shall be spread uniformly at the rate of 2 tons per acre. Mulch shall be spread by hand, blower-type mulch spreader or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of a steep slope and continued uniformly until the area is covered. The mulch shall not be bunched. All seeded areas shall be mulched on the same day as the seeding.

3.3.5.2 Mechanically Anchoring

Immediately following spreading, the mulch shall be anchored to the soil by a V-type-wheel land packer, a scalloped-disk land packer designed to force mulch into the soil surface, or other suitable equipment.

3.3.5.4 Non-Asphaltic Tackifier

Hydrophilic colloid shall be applied at rate recommended by manufacturer. Apply with hydraulic equipment suitable for mixing and applying uniform mixture of tackifier.

3.3.5.6 Wood Cellulose Fiber

Wood cellulose fiber mulch for use with the hydraulic application of seed and fertilizer shall be applied as part of the hydroseeding operation.

3.3.6 Water

Watering shall be started within 7 days after completing the seeded area. Water shall be applied at a rate sufficient to ensure moist soil conditions to a minimum depth of 1 inch. Run-off and puddling shall be prevented.

3.5 EROSION CONTROL

3.5.1 Erosion Control Material

Erosion control material, where indicated or required, shall be installed in accordance with manufacturer's instructions. Placement of the erosion control material shall be accomplished without damage to installed material or without deviation to finished grade.

3.5.2 Temporary Turf Cover

3.5.2.1 General

When there are contract delays in the turfing operation or a quick cover is required to prevent erosion, the areas designated for turf shall be seeded with a temporary seed as directed by the Contracting Officer.

3.5.2.2 Application

When no other turfing materials have been applied, the quantity of one half of the required soil amendments shall be applied and the area tilled in accordance with paragraph SITE PREPARATION. Seed shall be uniformly broadcast and applied at the rate of 2.5 pounds per 1000 square feet. The area shall be watered as required.

3.6 RESTORATION AND CLEAN UP

3.7.1 Restoration

Existing turf areas, pavements and facilities that have been damaged from the turfing operation shall be restored to original condition at Contractor's expense.

3.6.2 Clean Up

Excess and waste material shall be removed from the planting operation and shall be disposed of off the site. Adjacent paved areas shall be cleaned.

3.7 PROTECTION OF TURFED AREAS

Immediately after turfing, the area shall be protected against traffic or other use by erecting barricades and providing signage as required, or as directed by the Contracting Officer.

3.8 TURF ESTABLISHMENT PERIOD

3.8.1 Commencement

The Turf Establishment Period for establishing a healthy stand of turf shall begin on the first day of work under this contract and shall end three (3) months after the last day of turfing operations required by this contract. Written calendar time period shall be furnished to the Contracting Officer for the Turf Establishment Period. When there is more than one turf establishment period, describe the boundaries of the turfed area covered for each period.

3.8.2.1 Seeded Area

a. Lawn Area: A satisfactory stand of turf from the seeding operation for a lawn area is defined as a minimum of 15 grass plants per square foot. Bare spots shall reseeded.

b. Field Area: A satisfactory stand of turf from the seeding operation for a field area is defined as a minimum of 10 grass plants per square foot. Bare spots shall be reseeded.

3.8.3 Maintenance During Establishment Period

3.8.3.1 General

Maintenance of the turfed areas shall include eradicating weeds, eradicating insects and diseases, protecting embankments and ditches from erosion, maintaining erosion control materials and mulch, protecting turfed areas from traffic, mowing, watering, and post-fertilization.

3.8.3.2 Mowing

a. Lawn Areas: Lawn areas shall be mowed to a minimum height of 3 inches when the average height of the turf becomes 4-5 inches. Clippings shall be removed when the amount of cut turf is heavy enough to damage the turfed areas.

b. Field Areas: Field areas shall be mowed once during the season to a minimum height of 3 inches.

3.8.3.3 Watering

Watering shall be at intervals to obtain a moist soil condition to a minimum depth of 1 inch. Frequency of watering and quantity of water shall be adjusted in accordance with the growth of the turf. Run-off, puddling and wilting shall be prevented.

3.8.3.4 Post-Fertilization

Nitrogen carrier fertilizer shall be applied at the rate of 0.5 pounds per 1000 square feet after the first month and again prior to the final acceptance. The application shall be timed prior to the advent of winter dormancy and shall avoid excessively high nitrogen levels.

3.8.3.5 Repair

The Contractor shall re-establish as specified herein, eroded, damaged or barren areas. Mulch shall also be repaired or replaced as required.

3.8.3.6 Maintenance Report

A written record shall be furnished to the Contracting Officer of the maintenance work performed.

3.9 FINAL ACCEPTANCE

3.9.1 Preliminary Inspection

Prior to the completion of the Turf Establishment Period, a preliminary inspection shall be held by the Contracting Officer. Time for the inspection shall be established in writing. The acceptability of the turf in accordance with the Turf Establishment Period shall be determined. An unacceptable stand of turf shall be repaired as soon as turfing conditions permit.

3.9.2 Final Inspection

A final inspection shall be held by the Contracting Officer to determine that deficiencies noted in the preliminary inspection have been corrected. Time for the inspection shall be established in writing.

-- End of Section -- End of Section --

CORPS OF ENGINEERS

U.S. ARMY

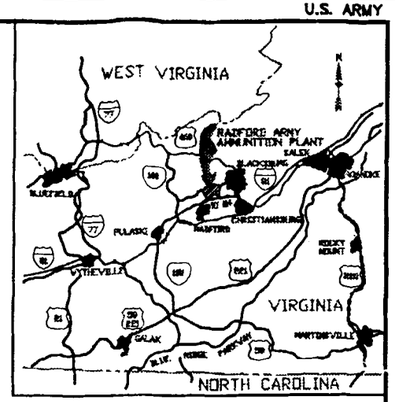
SEE SHEET T-2 & C-1

LOCATION MAP

RADFORD ARMY AMMUNITION PLANT
BIOPLANT EQUALIZATION BASIN CLOSURE

INDEX TO DRAWINGS

SHEET NO.	TITLE	NORFOLK DISTRICT FILE NO.	SHEET NO.	TITLE	NORFOLK DISTRICT FILE NO.
T-1	TITLE SHEET	RAD 256-1.1			
T-2	ORIENTATION, ACCESS AND HAUL ROUTE MAP	RAD 256-1.2			
C-1	EXISTING SITE PLAN	RAD 256-1.3			
C-2	DEMOLITION AND SALVAGE PLAN	RAD 256-1.4			
C-3	FINAL GRADING PLAN	RAD 256-1.5			
C-4	EROSION CONTROL AND FENCE DETAILS	RAD 256-1.6			



VICINITY MAP

SIGNATURES AFFIXED BELOW INDICATE OFFICIAL RECOMMENDATION AND APPROVAL OF ALL DRAWINGS IN THIS SET AS INDICATED ON INDEX OF DRAWINGS.

RECOMMENDED

PROJECT MANAGER

APPROVED

CHIEF, DESIGN BRANCH

APPROVED

CHIEF, ENGINEERING BRANCH

APPROVED

CHIEF, OPERATIONS DIVISION

APPROVED FOR

DATE

NO.	DATE	REVISION	BY	APP.

DEPARTMENT OF THE ARMY

DESIGNED: G.M.C.

DRAWN: C.S.T.

TRACED: G.M.C.

CHECKED: B.O.T.

BIOPLANT EQUALIZATION BASIN CLOSURE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

TITLE SHEET

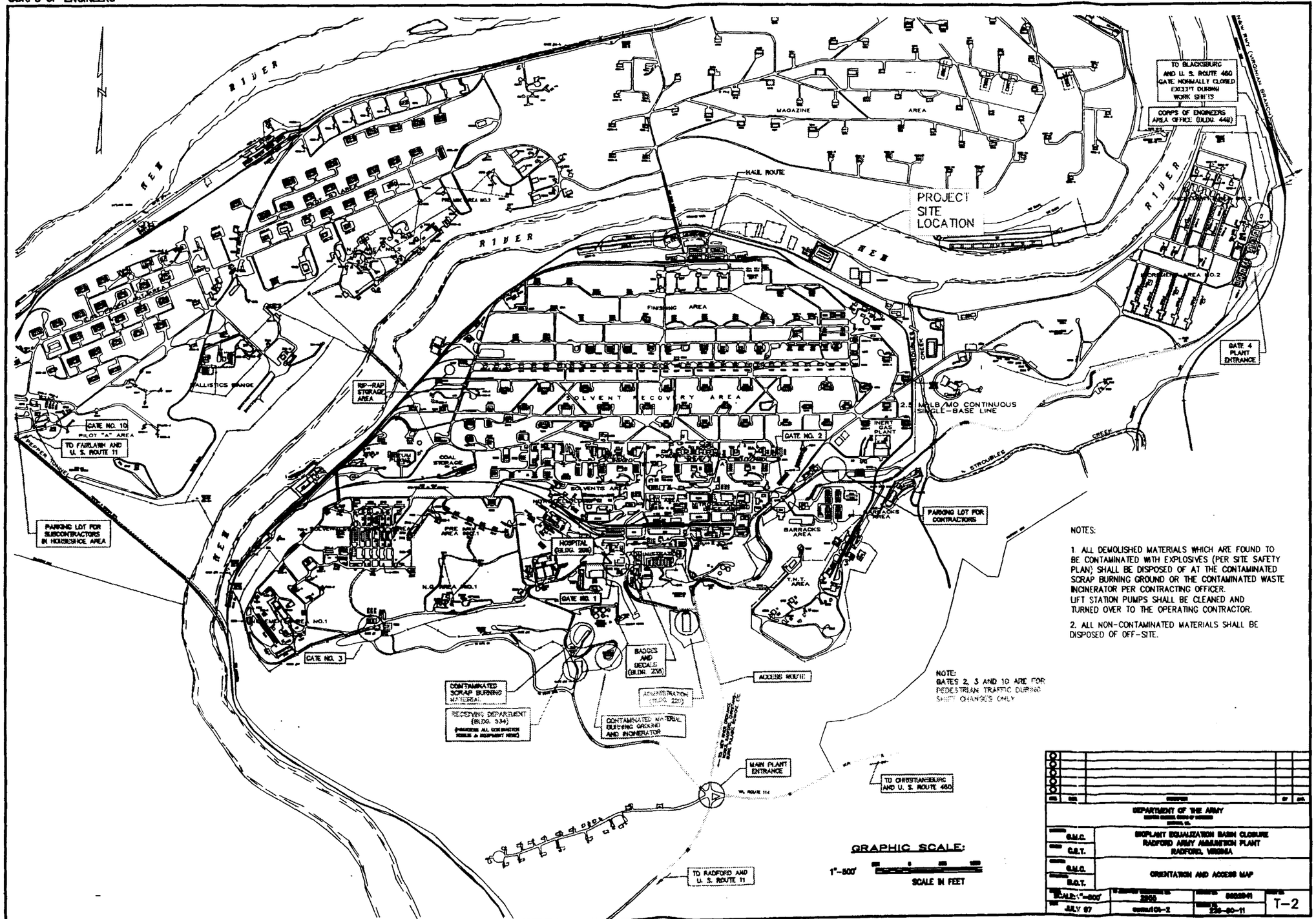
DATE	CONTRACT NO.	DRAWING NO.	SHEET NO.
JULY 97	2265	8903941	T-1
	numx101_1	256-00-11	

NORFOLK DISTRICT FILE NO. RAD 256-1.1

AS BUILT-JUL 98

CORPS OF ENGINEERS

U.S. ARMY



NOTES:

1. ALL DEMOLISHED MATERIALS WHICH ARE FOUND TO BE CONTAMINATED WITH EXPLOSIVES (PER SITE SAFETY PLAN) SHALL BE DISPOSED OF AT THE CONTAMINATED SCRAP BURNING GROUND OR THE CONTAMINATED WASTE INCINERATOR PER CONTRACTING OFFICER.
LIFT STATION PUMPS SHALL BE CLEANED AND TURNED OVER TO THE OPERATING CONTRACTOR.

2. ALL NON-CONTAMINATED MATERIALS SHALL BE DISPOSED OF OFF-SITE.

NOTE:
GATES 2, 3 AND 10 ARE FOR PEDESTRIAN TRAFFIC DURING SHIFT CHANGES ONLY

DEPARTMENT OF THE ARMY

G.M.C. / C.S.T. / G.M.C. / B.O.T.

BIOPLANT EQUALIZATION BASIN CLOSURE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

ORIENTATION AND ACCESS MAP

SCALE: 1"=500'

JULY 97

2946

DRAWING NO. 6825B-01

CONTRACT NO. DACA65-94-D-0011

T-2

NORFOLK DISTRICT FILE NO. RAD 256-1.2

AS BUILT-JUL 98

CORPS OF ENGINEERS

U.S. ARMY

E 10,890,000

E 10,890,500

E 10,891,000

E 10,891,500

N 3,600,000

N 3,599,500

NEW BIO-EQUALIZATION BASIN LOCATION

FOR CONTINUATION SEE SHEET T-2

ARCHAEOLOGICAL SITE (ABANDONED INDIAN VILLAGE)

PERMANENT SECURITY FENCE

TEMP. SECURITY FENCE

BIOPLANT EQUALIZATION BASIN (SEE SHEET C-2)

SHORELINE (VARIES)

NEW RIVER

SWMU 10

SWMU 35

SWMU 8

SWMU 36

CONSTRUCTION ENTRANCE

HAUL ROUTE

1756

1754

470

M.H.

LEGEND

- HAUL ROUTE
- ARCHIVED VIRGINIA STATE HISTORIC PRESERVATION OFFICE (SHPO) ARCHEOLOGICAL SITE (44Rd)?
- CONFIRMED VIRGINIA STATE HISTORIC PRESERVATION OFFICE (SHPO) ARCHEOLOGICAL SITE (44Rd)?
- CONSTRUCTION LIMITS
- PERMANENT SECURITY FENCE
- TEMPORARY SECURITY FENCE
- 1719.2 × EXISTING ELEVATION
- 1710 EXISTING CONTOUR
- LIGHT POLE
- POWER POLE
- ○ MH MANHOLE

ARCHAEOLOGICAL NOTES:

1. A CONTRACTOR-EMPLOYED ARCHAEOLOGICAL MONITOR (C-GAM) SHALL BE ON SITE DURING THE REMOVAL OF THE 12" SOIL/CEMENT LINER WITHIN THE LIMITS OF THE ARCHAEOLOGICAL SITE (44Rd). (SEE SPEC SECTION 02930 PARAGRAPH 1.6.3.1)

2. IF SIGNIFICANT ARCHAEOLOGICAL REMAINS ASSOCIATED WITH SITE ARE ENCOUNTERED AFTER THE REMOVAL OF THE 12" SOIL/CEMENT LINER THEN SECTION 01000, PARAGRAPH 1.6.3.3 SHALL BE IMPLEMENTED.

GRAPHIC SCALES:

1" = 80'

DEPARTMENT OF THE ARMY

DESIGNED	G.M.C.
DRAWN	C.S.T.
CHECKED	G.M.C.
APPROVED	S.O.T.
SCALE	1"=80'
DATE	JULY 97
CONTRACT NO.	2852
FILE NAME	cswmp10a_1
PROJECT NO.	8862841
WORK UNIT NO.	239-80-11

BIOPLANT EQUALIZATION BASIN CLOSURE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

EXISTING SITE PLAN

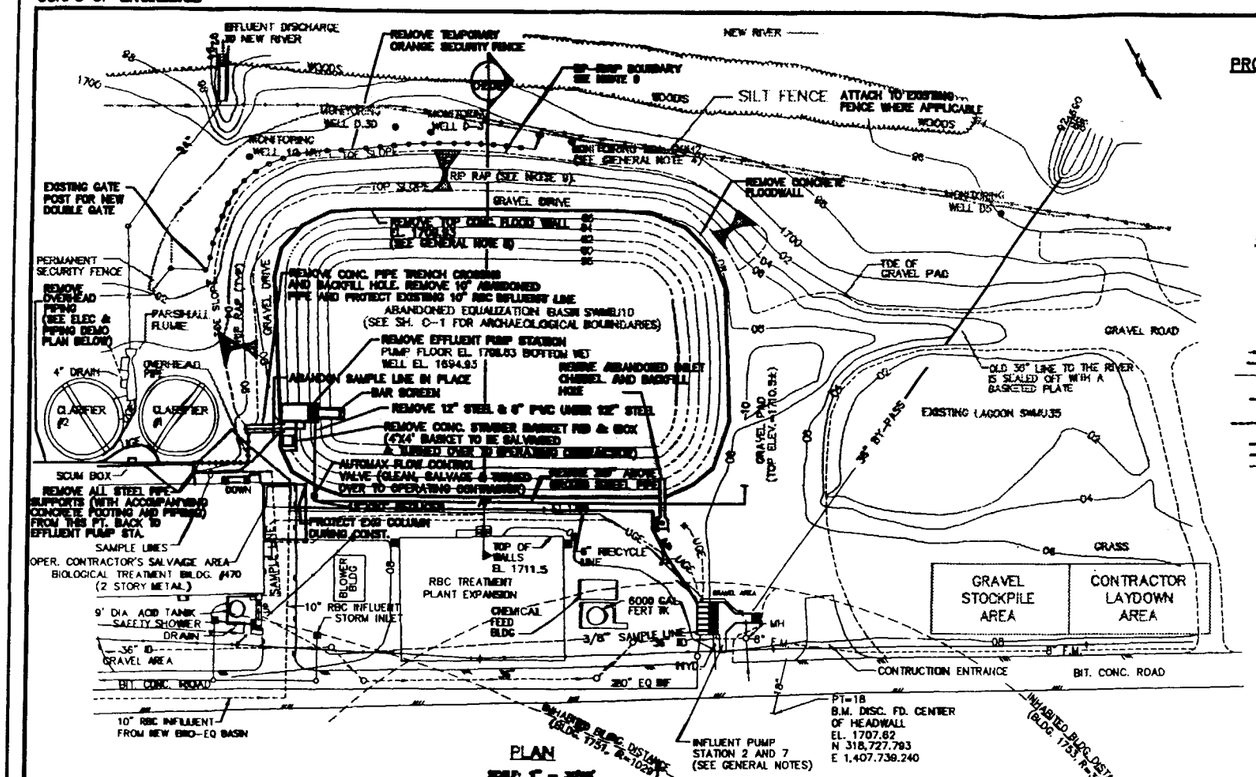
DRAWING NO. C-1

NORFOLK DISTRICT FILE NO. RAD 239-1.3

AS BUILT-JUL 98

CORPS OF ENGINEERS

U. S. ARMY



PLAN

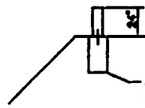
SCALE: 1" = 30'±

PROCESS PIPING ABBREVIATIONS

AP	PLANT AIR
EFF	EFFLUENT
EQ	EQUALIZATION TANK
FERT	FERTILIZER SOLUTION
FIL	FILTRATE
FM	FORCE MAIN
INF	INFLUENT
POLY	POLYMER
PS	PUMP STATION
RBC	ROTATING BIOLOGICAL CONTACTOR

CIVIL LEGEND

- MH — EXISTING MANHOLE
- EXISTING WATER VALVE
- UTILITY POLE
- OHP — OVERHEAD POWER
- UGE — UNDERGROUND ELECTRIC
- LIGHT POLE
- EDGE OF WOODS
- BITUMINOUS CONCRETE
- EXISTING FENCE
- EXISTING WATER LINE
- 02 — EXISTING CONTOUR
- HYD — EXISTING YARD HYDRANT
- GRAVEL/RIP-RAP
- DROP INLET
- F.M. — FORCE MAIN
- MONITORING WELL
- GRAVEL PAD
- PERMANENT SECURITY FENCE
- TEMPORARY SECURITY FENCE
- SPOT SHOT ELEVATION (APPROX.)



TYPICAL FLOODWALL SECTION

NOT TO SCALE

EQUIPMENT SALVAGE NOTES

THE FOLLOWING EQUIPMENT SHALL BE CLEANED AND STORED IN THE OPERATING CONTRACTOR'S SALVAGE AREA.

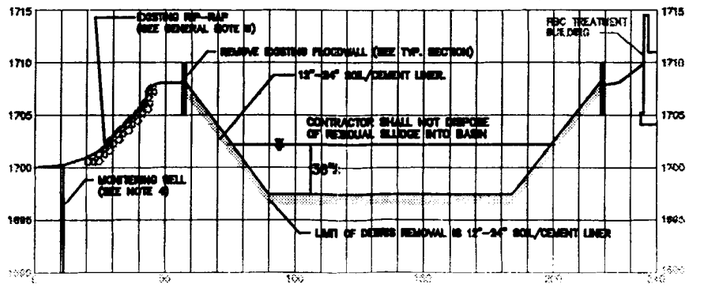
1. AUTOMATIC FLOW CONTROL VALVE
2. 4' x 4' BASKET
3. STRAINER
4. EQ PUMPS AND MOTORS

GENERAL NOTES:

1. CONTRACTOR SHALL RELOCATE GRAVEL FROM GRAVEL PAD TO NEW GRAVEL ROAD AND STOCKPILE LEFTOVER AT GRAVEL STOCKPILE AREA. ASSUME ±100 CY FOR BID PURPOSES.
2. CONTRACTOR SHALL CONFIRM THAT ALL PIPING TO BE REMOVED (e.g. 12" & 20" STEEL PIPE @ EQUALIZATION BASIN AND 6" PIPE FROM EFFLUENT PUMP STATION TO BLDG 470 AND EFFLUENT PUMP STATION) HAS BEEN CLEANED OUT OF ANY RESIDUAL SLUDGE. RESIDUAL SLUDGE MAY BE DISPOSED OF INTO THE INFLUENT PUMP STATION. CONTRACTOR SHALL TAKE ALL PRECAUTIONS TO AVOID RESIDUAL SLUDGE SPILLAGE ONTO THE GROUND. SEE SPEC SECTION 02072 FOR DETAILS.
3. THE LOCATION, ELEVATIONS, AND DIMENSIONS OF EXISTING STRUCTURES AND PIPING ARE BASED ON BEST AVAILABLE DATA. CONTRACTOR SHALL VERIFY ALL DATA IN THE FIELD PRIOR TO CONSTRUCTION AND NOTIFY THE CONTRACTING OFFICER IMMEDIATELY OF ANY DISCREPANCIES.
4. CONTRACTOR SHALL PROTECT ALL MONITORING WELLS DURING CONTRACT. IF ANY WELLS ARE DAMAGED BY CONTRACTOR (NO MATTER THE EXTENT OF DAMAGE) WELL OR WELLS SHALL BE ABANDONED AND A NEW WELL WILL BE DRILLED IMMEDIATELY ADJACENT TO THE DAMAGED WELL AND BUILT TO THE EXACT SPECIFICATIONS OF THE DAMAGED WELL. ALL CONSTRUCTION COSTS PERTAINING TO DAMAGED MONITORING WELLS SHALL BE INCURRED BY THE CONTRACTOR.
5. DURING CEMENT LINER EXCAVATION WITHIN THE BOUNDARIES OF ARCHAEOLOGICAL SITE # 44HU7 AND PRIOR TO BACKFILLING, CONTRACTOR SHALL COORDINATE ARCHEOLOGICAL INVESTIGATION WITH VIRGINIA STATE HISTORIC PRESERVATION OFFICE (SHPO). SEE SPECIFICATIONS FOR FURTHER DETAIL.
6. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UTILITIES. CONTRACTOR SHALL BE ADVISED BY ALLIANT TECHSYSTEMS WHEN UTILITY LINES ARE DISCONNECTED.
7. ONLY STORMWATER RUNOFF THAT COLLECTS IN THE EQ. BASIN SHALL BE PUMPED TO THE NEW BIOEQUALIZATION BASINS VIA THE INFLUENT PUMP STATION. INITIAL WATER TO BE PUMPED IS APPROX. 450,000 GAL.
8. FOR ESTIMATING CONCRETE QUANTITIES TO BE REMOVED, CLEANED AND DISPOSED OF OFF-SITE, ASSUME 175 CUBIC YARDS FOR EFFLUENT PUMP STATION, STRAINER BASKET PAD AND BOX, PIPE TRENCH CROSSING, INLET CHANNEL BOX, AND FLOODWALL.
9. PRIOR TO BACKFILLING, CONTRACTOR SHALL INITIALLY REMOVE THE RIP-RAP AND HAUL THIS MATERIAL TO THE RIP-RAP STORAGE AREA AS SHOWN ON SHEET 1-2. LOCATION OF STORAGE AREA TO BE CONFIRMED WITH USER. ASSUME 600 CY OF MIXED CLASS I & II RIP-RAP FOR BID PURPOSES.

SURVEY NOTES:

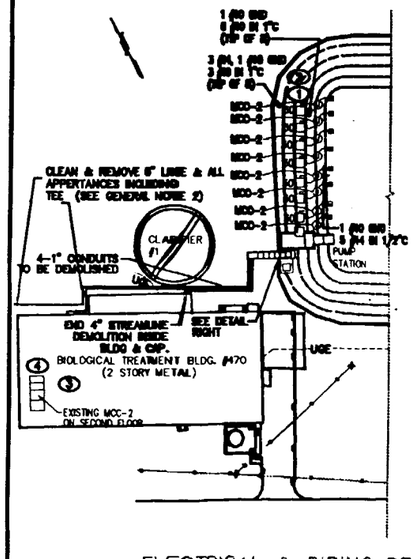
1. GRID SYSTEM IS VIRGINIA STATE SOUTH ZONE (NAD83).
2. LOCATION OF UNDERGROUND UTILITIES BASED ON AVAILABLE RAAP UTILITY SHEETS AND IS APPROXIMATE.
3. BENCHMARK-DISC FOUND IN CENTER OF HEADWALL LOCATED TO THE SOUTH AND ACROSS THE ROAD FROM THE EXISTING INFLUENT PUMP STATION. ELEVATION 1707.6. ALL ELEVATIONS ON THE DRAWING ARE BASED ON THIS BENCHMARK UNLESS OTHERWISE NOTED.



NOTE:
GROUNDWATER ELEV. 1687.0±

SECTION

SCALE: HORZ. 1"=20'± VERT. 1"=5'± (1 OF 2)



ELECTRICAL & PIPING DEMOLITION PLAN

SCALE: 1" = 30'±

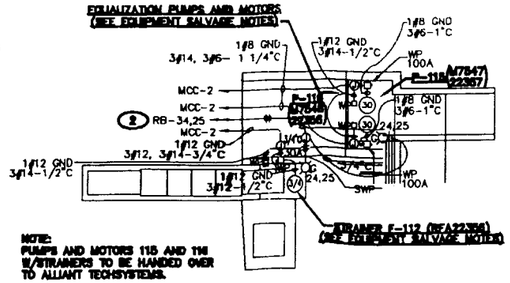
ELECTRICAL DEMOLITION NOTES

1. REMOVE EXISTING FUSED SAFETY SWITCH AND MOTORS.
2. REMOVE CONDUCTORS FROM EQUIPMENT BACK TO MCC-2 OR PANEL RB AS INDICATED BY DRAWINGS. ABANDON ALL UNDERGROUND CONDUITS IN PLACE AND REMOVE EXPOSED PORTIONS OF CONDUITS TO 1' BELOW GRADE. REMOVE EXPOSED WIRE TO 3' BELOW GRADE.
3. REMOVE ALL EXPOSED CONDUIT TO DEMOLISHED CIRCUITS FROM BLDG INTERIOR.
4. REVISE MOTOR CONTROL CENTER 2 (MCC-2) AND PANEL SCHEDULE FOR REMOVED WORK. LABEL AS THREE CIRCUITS AS SPARE.

ELECTRICAL DEMOLITION LEGEND

- FUSED SAFETY SWITCH TO BE REMOVED
- UNDERGROUND WIRING
- MCC-2 — WIRING TO MCC-2
- WIRING TO REMAIN
- ④ — JUNCTION BOX TO BE REMOVED
- LIGHT FIXTURE TO BE REMOVED

E.W.C.
C.M.S.
G.M.C.
B.G.T.



NOTE:
PUMPS AND MOTORS 115 AND 116 W/STRAINERS TO BE HANDED OVER TO ALLIANT TECHSYSTEMS.

PUMP STATION

SCALE: 1/8"=1'-0"±

GRAPHIC SCALES:

1" = 30'
1" = 20'
1" = 8'
1/8" = 1'-0"

DEPARTMENT OF THE ARMY	
G.M.C.	BIOPLANT EQUALIZATION BASIN CLOSURE RADFORD ARMY AMMUNITION PLANT RADFORD, VIRGINIA
C.B.T.	
G.M.C.	DEMOLITION AND SALVAGE PLAN
B.G.T.	
AS SHOWN	68828-H
15 JUL 97	256-60-11

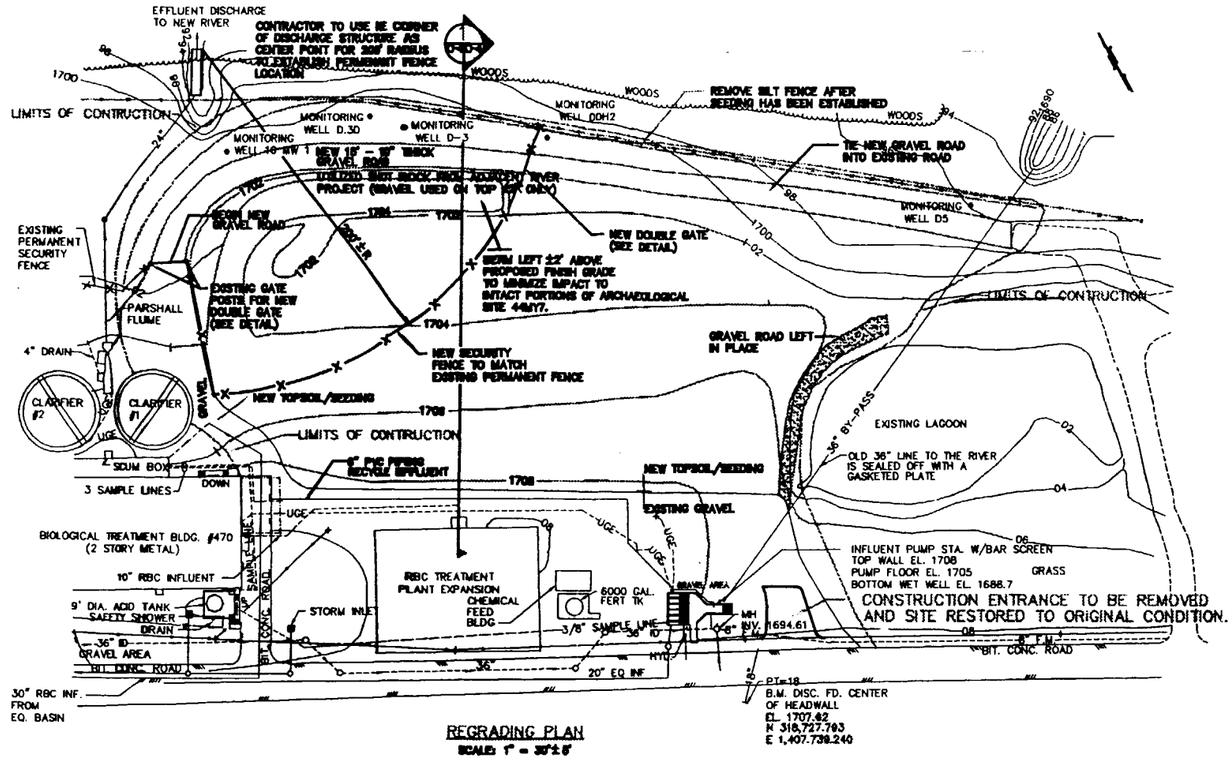
C-2

NORFOLK DISTRICT FILE NO. RAD 256-1.4

AS BUILT-JUL 98

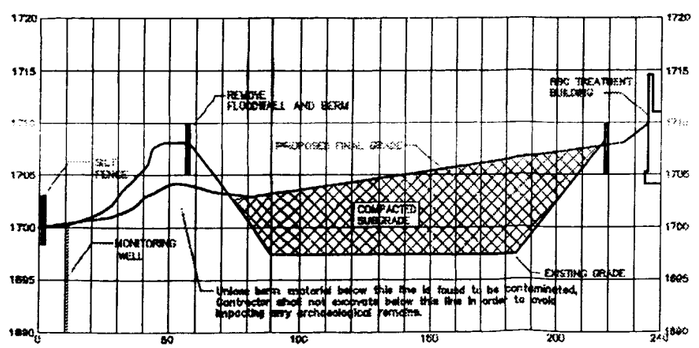
CORPS OF ENGINEERS

U.S. ARMY



REGRADING PLAN

SCALE: 1" = 30'±5'



SECTION

SCALE: HORZ. 1"=20'+/-
VERT. 1"=5'+/-

GRAPHIC SCALES:

1" = 5'

1" = 20'

1" = 30'

1" = 100'

DEPARTMENT OF THE ARMY

BIOPLANT EQUALIZATION BASIN CLOSURE
RADFORD ARMY AMMUNITION PLANT
RADFORD, VIRGINIA

FINAL GRADING PLAN

G.M.C.	
C.S.T.	
G.M.C.	
S.O.T.	
AS SHOWN	2905
15 JUL 97	comm10a_3
5952941	226-80-11

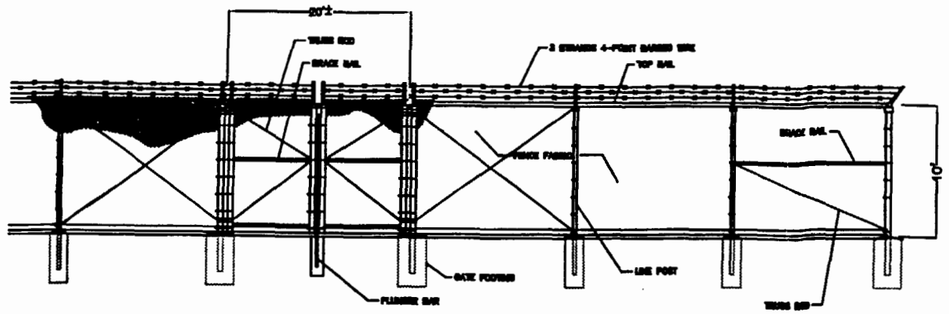
C-3

NORFOLK DISTRICT FILE NO. RAD 226-1.5

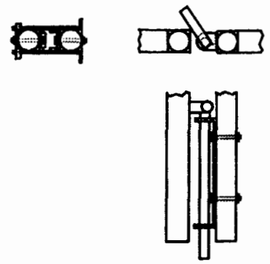
AS BUILT-JUL 98

CORPS OF ENGINEERS

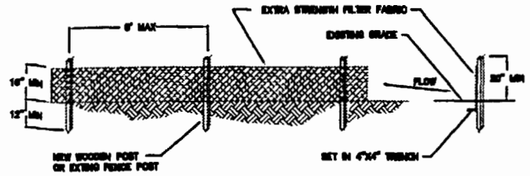
U.S. ARMY



TYPICAL SWING GATE



PLUNGER ROD ASSEMBLY

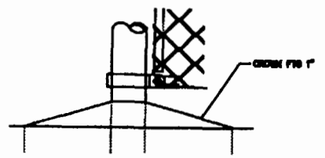


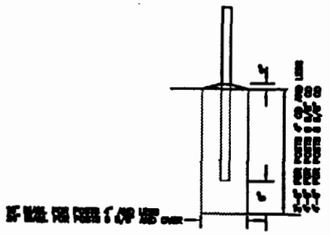
SILT FENCE DETAIL (VESCH STD & SPEC 3.05)

NTS

(NOTE: VESCH=VA EROSION & SEDIMENT CONTROL HANDBOOK)

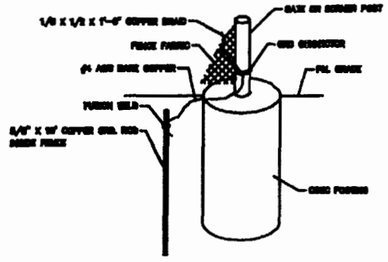
1. FILTER CLOTH TO BE FASTENED SECURELY PER VESCH STD & SPEC 3.05.
2. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
3. A 4" WIDE BY 4" DEEP TRENCH SHALL BE EXCAVATED UPSLOPE OF SILT FENCE.
4. BURY SILT FENCE A MIN. OF 8" IN TRENCH. WIRE FENCE A MIN. OF 2". BACKFILL AND COMPACT TRENCH.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN 'BULGES' DEVELOP IN THE SILT FENCE.
6. POSTS SHALL BE 60" MIN. STANDARD V OR T SECTION, MIN. WEIGHT= 1.33 LB/FT.
7. FILTER CLOTH SHALL MEET LATEST VDOH SPECIFICATIONS FOR SILT FENCE.



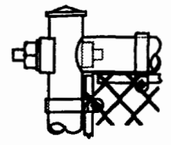


POST BASE DETAIL

NOTE: BASED FOR PLUNGER BAR AND GATE VALVES ARE SIMILAR TOP DIA. 1"-8" ENDING. ALL DIAMETERS AND ENDING ARE NOMINAL WALL ENDING GATES SHALL HAVE INDICATED NOMINAL DIAMETER AT SERVICE.



FENCE GROUNDING DETAIL

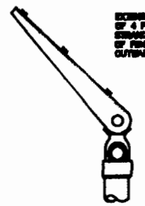


TOP RAIL CONNECTION DETAIL

WIRE TIE CONNECTION

NOTES

1. [illegible]
2. DETAILS ARE TO CLARIFY REQUIREMENTS BUT ARE NOT INTENDED TO LIMIT OTHER FENCE DESIGNS AND DEVICES SPECIFIED.
3. AT CONTRACTOR'S OPTION A WELDED INTERMEDIATE BRACE MAY BE USED IN LIEU OF TRANS BAND TO BRACE ALL WELDED GATE FRAMES.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER END CONSTRUCTION OF ALL GATES SUPPLIED.
5. GATE CONSTRUCTION SHOWN IS FOR INFORMATION AS TO TYPE AND DIMENSIONS USED ON THE LAYOUT PLANS. IN SO FAR AS POSSIBLE GATES AND FENCE SHALL BE OF THE MANUFACTURER'S DESIGN.



EXTENSION ARM WITH 3 STRANDS OF 4 POINT BARBED WIRE, TOP STRAND TO BE 1'-0" ABOVE TOP OF FENCE. ARMS SHALL POINT OUTWARD ON 45° ANGLE

EXTENSION ARM WITH 3 STRANDS

GENERAL NOTES FOR SEDIMENT AND EROSION CONTROL

1. SEDIMENT CONTROL MEASURES ARE NOT TO BE REMOVED UNTIL THE AREAS SERVED HAVE ESTABLISHED VEGETATIVE COVER, OR WITH THE PERMISSION OF THE CONTRACTING OFFICER.
2. ALL TEMPORARY STOCKPILES ARE TO BE LOCATED WITHIN AREAS PROTECTED BY SEDIMENT CONTROL MEASURES AND ARE TO BE TEMPORARILY STABILIZED.
3. TEMPORARY SEDIMENT CONTROL MEASURES (INCLUDING THOSE AROUND TEMPORARY STOCKPILES) ARE TO BE REMOVED AND THESE AREAS STABILIZED PRIOR TO RELEASE OF FINAL CONTRACTOR PAYMENT.
4. FILL AREAS NOT BEING ACTIVELY FILLED, GRADED, ETC. FOR MORE THAN 60 DAYS WILL BE SEEDED WITH TEMPORARY OR PERMANENT VEGETATION AS APPROPRIATE.
5. TEMPORARY SOIL EROSION CONTROL AND SEDIMENT CONTROL MEASURES ARE TO BE PROVIDED AS PER THE APPROVED PLAN PRIOR TO GRADING OPERATIONS. LOCATION ADJUSTMENTS ARE TO BE MADE IN THE FIELD AS NECESSARY. THE MINIMUM AREA PRACTICAL SHALL BE DISTURBED FOR THE MINIMUM POSSIBLE TIME.
6. IMPLEMENTATION OF THE SEDIMENT CONTROL PLAN SHALL BE IN ACCORDANCE WITH THE "VIRGINIA EROSION AND SEDIMENT CONTROL HANDBOOK – 3RD EDITION 1992", AND "EROSION AND SEDIMENT CONTROL REGULATION – VR 625-02-00".
7. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTATION AND MAINTENANCE OF THE APPROVED PLAN, AND ALL OTHER MEASURES NECESSARY TO CONTROL, FILTER, OR PREVENT SEDIMENT FROM LEAVING THE SITE.
8. ALL POINTS OF CONSTRUCTION INGRESS AND EGRESS SHALL BE PROTECTED TO PREVENT TRACKING OF MUD ONTO PUBLIC WAYS.
9. BEFORE EXCAVATION OR CONSTRUCTION BEGINS, THE CONTRACTOR IS TO CONSTRUCT AND COMPLETE THE SEDIMENT CONTROL MEASURES AND DEVICES AS SHOWN FOR ALL PHASES OF CONSTRUCTION.
10. THE CONTRACTOR SHALL INSPECT ALL EROSION CONTROL MEASURES PERIODICALLY AND AFTER EACH RUNOFF-PRODUCING RAINFALL EVENT. ANY NECESSARY REPAIRS OR CLEANUP TO MAINTAIN THE EFFECTIVENESS OF THE EROSION CONTROL DEVICES SHALL BE MADE IMMEDIATELY.
11. THE CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION OF ANY ADDITIONAL EROSION CONTROL MEASURES NECESSARY TO PREVENT EROSION AND SEDIMENTATION AS DETERMINED BY THE CONTRACTING OFFICER.
12. FOR SEEDING SCHEDULE SEE SPECIFICATIONS.

GATE POST SCHEDULE

GATE LEAF WIDTH (NOM.)	ROUND (NOM.)	WEIGHT	SQUARE	WEIGHT
6' OR LESS	2 1/2" O.D.	3.76#/L.F.	5.8"	5.76#/L.F.
[illegible]	4" O.D.	9.11#/L.F.	—	—
[illegible]	[illegible]	[illegible]	—	—
[illegible]	6 5/8" O.D.	24.7#/L.F.	—	—

GATE FRAME SCHEDULE

GATE HEIGHT AND WIDTH	ROUND (NOM.)	WEIGHT	SQUARE (NOM.)	WEIGHT
6' HEIGHT & LESS MAXIMUM WIDTH [illegible]	1.25"	2.27#/L.F.	1.25"	1.69#/L.F.
6' HEIGHT AND WIDTHS EXCEEDING 6 FEET	1.66"	3.73#/L.F.	2.00"	3.61#/L.F.

SWING TYPE GATES SHALL CHAIN LINK SECURITY FENCE

GRAPHIC SCALES:

1" = 20' 0' 10' 20' 30' 40'

NO.	DATE	DESCRIPTION	BY	APP.

DEPARTMENT OF THE ARMY

NORFOLK DISTRICT, CORPS OF ENGINEERS

NORFOLK, VA.

DESIGNED: G.M.C.	BIOPLANT EQUALIZATION BASIN CLOSURE
DRAWN: C.S.T.	RADFORD ARMY AMMUNITION PLANT
CHECKED: G.M.C.	RADFORD, VIRGINIA
APPROVED: G.M.C.	EROSION/SEDIMENT CONTROL AND
DATE: B.C.T.	FENCE NOTES AND DETAILS
SCALE: AS SHOWN	CONTRACT NO. 2000 / DRAWING NO. 668284-1 / SHEET NO. C-4
DATE: 30 JUL 97	FILE NAME: corros10a_4 / ENG FORM NO. 228-80-11

NORFOLK DISTRICT FILE NO. RAD 200-1.8

AS BUILT—JUL 98

Attachment 4
Daily Reports

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
132
Tuesday
12 May 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	15 May 98	SUPV. INT	
	DATE		DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 5-12-98 Report No. 127-133 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P. ~~Cloudy~~] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - demob and extra work b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

NO equip

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - complete grading of extra work begin demob
Note NO work done due to weather days 127-132

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Permission was give by Mark Bishop to begin demobilization

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

No equip

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 5-12-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									No equip		
Laborer	1	10											

	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	2										2
NO. OF HOURS (SUBTOTALS)		20									20
PREVIOUS TOTAL HOURS											3499
TOTAL HOURS THROUGH THIS DATE											3510

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
124
Monday
04 May 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

No work 02 and 03 May due to rain.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

05 May 98 — DATE

B — SUPV. INT

___ — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 5-4-98 Report No. 124-126 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

FQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: .05 inches] [Temp. ___ min. 60 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )

b. ( ) Ciminelli - Remove Silt Fence + Const. Berm

c. ( )

d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

N/A

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Remove Silt Fence + Const. Berm

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Mark Bishop - the drainage problem is NE corner

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

N/A

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

B Smith CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 5-4-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Powers Fence #	Powers Fence HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC mgr	1	6											
Laborer	1	6											
Foreman			1	1.5									
Laborer			2	1.5									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	2		3								5		
NO. OF HOURS (SUBTOTALS)		12		4.5							16.5		
											PREVIOUS TOTAL HOURS	3482.5	
											TOTAL HOURS THROUGH THIS DATE	3499.0	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
121
Friday
01 May 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	05 May 98		
	DATE	SUPV. INT	DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 5-1-98 Report No. 123 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: .75 inches] [Temp. ___ min. 50 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - drain pipe installation extra b. ( ) c. ( )
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Backhoe - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - install 150' drain pipe with end wall

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Backhoe - used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

drain pipe and endwall - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

[signature] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 5-1-98

LABOR CLASSIFICATION	PRIME										EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	12									Backhoe	8	4
Superintendent	1	12											
Laborer	1	12											

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	3										9
NO. OF HOURS (SUBTOTALS)		36									36
PREVIOUS TOTAL HOURS											3446.5
TOTAL HOURS THROUGH THIS DATE											3482.5

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
120
Thursday
30 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 08 May 98 DATE — SUPV. INT — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4/30 Report No. 122 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

FQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )

b. ( ) Ciminelli - Supervision ~~Forge~~ fine grading

c. ( ) Powers fence - fencing

d. ( )

e. ( ) Current elect - grounding

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

N/A

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - fine grading
Powers - fence Prep
Current - grounding fence + electrical demo walkthrough

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

N/A

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-30-98

LABOR CLASSIFICATION	PRIME		Powers Fence		Current Elect.						EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10											
Superintendent	1	10											
Laborer	1	10											
Foreman			1	3									
Laborer			2	3									
Electrician					2	4							
Apprentice					1	4							
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3		3		3						9		
NO. OF HOURS (SUBTOTALS)		30		9		12					51		
PREVIOUS TOTAL HOURS											3395.5		
TOTAL HOURS THROUGH THIS DATE											3446.5		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
119
Wednesday
29 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 08 May 98 DATE — SUPV. INT — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-29-98 Report No. 121 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

Weather: [Clear] [P~~C~~loudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )

b. ( ) Ciminelli - Fine grading

c. ( )

d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

N/A

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Fine grading

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

N/A

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Miller CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-29-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10											
Superintendent	1	10											
Laborer	1	10											

	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	3	■		■		■		■		■	3
NO. OF HOURS (SUBTOTALS)	■	30	■		■		■		■		30
PREVIOUS TOTAL HOURS											3365.5
TOTAL HOURS THROUGH THIS DATE											3395.5

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **118**
Tuesday
28 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 08 May 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-28-98 Report No. 120 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 72 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - fine grading b. ( )
c. ( )
d. ( )
e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Tractor - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - fine grading, liner Placement

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Tractor - used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BE Emmons

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-28-98

LABOR CLASSIFICATION	PRIME										EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Tractor	5	5
Superintendent	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3										3		
NO. OF HOURS (SUBTOTALS)		30									30		
PREVIOUS TOTAL HOURS											3335.5		
TOTAL HOURS THROUGH THIS DATE											3365.5		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **117**
Monday
27 April 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

No work 22 or 23 April due to rain.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

01 May 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-27-98 Report No. 119 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 78 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Project oversight b. ( ) c. ( ) Powers Fence - begin fence installation d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

No equip on site

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Powers Fence - Fence poles set

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: meeting conducted for fence installation

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

No equip on site

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Fence poles - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-27-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Powers Fence #	Powers Fence HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									None		
Superintendent	1	10											
Foreman			1	10									
Laborer			1	10									
Laborer			1	10									
NO. OF EMPLOYEES (SUBTOTALS)	2		3								TOTALS	5	
NO. OF HOURS (SUBTOTALS)		20		30								50	
											PREVIOUS TOTAL HOURS	3285.5	
											TOTAL HOURS THROUGH THIS DATE	3335.5	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 111
Tuesday
21 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Attended preparatory inspection for fencing. See details in CQC report

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 24 Apr 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-21-98 Report No. 113 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - paper & prep work b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

~~Paver - used~~
Roller used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - paper and prep work

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Mark Bishop discussed finalizing the road

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Roller used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Sutherland CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-21-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Roller	1	9
~~Superintendent~~													

	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	1	■		■		■		■		■	1
NO. OF HOURS (SUBTOTALS)	■	10	■		■		■		■		10
PREVIOUS TOTAL HOURS											3275.5
TOTAL HOURS THROUGH THIS DATE											3285.5

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 4-27

Title: EQ Basin Closure Spec Section: 02931

Drawing No(s): C-4

Definable Feature of Work: Installation of Fence

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	Brandon Schleunner	QC mgr	Ciminelli
2.	Mark Bishop	Engineer	ALOE
3.	"Chuck" Sweat	Forman	Powers Fence
4.			
5.			
6.			
7.			
8.			

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO ____

II. Do all parties have up-to-date drawings and specifications? YES X NO ____

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.			
2.			
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES X NO _____

II. Have all materials been checked for contract compliance against approved shop drawings? YES X NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. _____

2. _____

3. _____

4. _____

E. TESTS required in accordance with contract requirements:

Test/Paragraph	Frequency
1. _____	_____
2. _____	_____
3. _____	_____
4. _____	_____
5. _____	_____
6. _____	_____

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES X NO _____
If yes, attach a copy, if no, explain:

_____

_____

_____

_____

_____

G. EQUIPMENT Requiring Operational Check:

1. _____

2. _____

3. _____

4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

_____

_____

_____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

_____

_____

_____

BG Eck

Quality Control Representative
Signature

ACTIVITY HAZARD ANALYSIS

PRINCIPAL STEPS Identify steps involved & sequence of activities.	POTENTIAL HAZARDS Analyze each principal step for potential hazards.	RECOMMENDED CONTROLS Develop specific controls for each potential hazard.
Set Poles	drilling rig (personal injury)	use experienced contractor
	Pour concrete	have laborer directing truck
hang Fence	personal injury to hands, eyes, head)	wear gloves, safety glasses, hard hat

SHEET ____ OF ____

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
110
Monday
20 April 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	24 Apr 98	SUPV. INT	
	DATE		DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-20-98 Report No. 111-112 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

Eq Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - install road b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Roller - not used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - install road

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See Equipment & Manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGM

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-20-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Dozer	8	2
Superintendent	1	10									Roller	0	10
~~Laborer~~													

	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	2										2
NO. OF HOURS (SUBTOTALS)		20									20

PREVIOUS TOTAL HOURS: 3255.5

TOTAL HOURS THROUGH THIS DATE: 3275.5

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-18-98 Report No. 109110 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: .5 inches] [Temp. ___ min. 55 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Place topsoil b. ( ) Hodge - hauling c. ( )
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Roller not used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - place topsoil
Hodge - Hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Dozer - used
Roller - not used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

topsoil - waiting for test results

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGEnvLa

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-18-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Dozer	9	1
Superintendent	1	10									Roller	0	10
Oper. Laborer	1	10											
Truckers			15	8									
NO. OF EMPLOYEES (SUBTOTALS)	3		15								TOTALS	18	
NO. HOURS (SUBTOTALS)		30		120								150	
											PREVIOUS TOTAL HOURS	3105.5	
											TOTAL HOURS THROUGH THIS DATE	3255.5	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **107**
Friday
17 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	24 Apr 98		
	DATE	SUPV. INT	DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-17-98 Report No. 109 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P X loudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - prep work for Topsoil b. ( )
c. ( )
d. ( )
e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Roller - not used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - prep work for topsoil

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Dozer - used
Roller not used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-17-98

LABOR CLASSIFICATION	PRIME										EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	8									Dozer	0	10
Superintendent	1	8									Roller	0	10
Laborers	1	8											

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	3										3
NO. OF HOURS (SUBTOTALS)		24									24
PREVIOUS TOTAL HOURS											3081.5
TOTAL HOURS THROUGH THIS DATE											3105.5

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
106
Thursday
16 April 1998

Concur with the contractor's report for this period? ___ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ___ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ___ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	24 Apr 98	SUPV. INT	
	DATE		DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-16-98 Report No. 108 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P/Cloudy] [Cloudy] [Rain: .15 inches] [Temp. ____ min. 65 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Backfill b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli Backfill

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Dozer - used
Roller - used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGE [illegible] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-16-98

LABOR CLASSIFICATION	PRIME										EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Dozer	4	6
Superintendent	1	10									Roller	2	8
Laborer	1	10											

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	3										3
NO. OF HOURS (SUBTOTALS)		30									30
PREVIOUS TOTAL HOURS											3051.5
TOTAL HOURS THROUGH THIS DATE											3081.5

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
105
Wednesday
15 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	24 Apr 98		
	DATE	SUPV. INT	DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-15-98 Report No. 107 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P~~C~~loudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - import & Place Fill b. ( ) Hodge - hauling c. ( ) T&R - Soil testing d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

13th, 14th, 15th lifts

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See ~~qa~~ test report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See manpower & equip report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

backfill - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Enfinger CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-15-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	F & R #	F & R HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	12									Dozer	8	4
Superintendent	1	12									Excavator off site	10	0
Operator	1	10									Roller	6	6
~~QC~~ Laborer	1	12											
Trucker					2	10.5							
Trucker					5	10							
Trucker					4	9.5							
Trucker					4	9							
Trucker					1	6.5							
Soil Tech			1	9									
NO. OF EMPLOYEES (SUBTOTALS)	4		1		16						TOTALS	21	
NO. OF HOURS (SUBTOTALS)		~~48~~ 46 365		9		120.5						205	
											PREVIOUS TOTAL HOURS	2846	
											TOTAL HOURS THROUGH THIS DATE	3051.5	

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

13", 14", 15" lifts

DESCRIPTION OF TEST:

See attached

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Conner

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

BG Eck

DATE 7-16-98

REMARKS:

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RSRA- BO Plant
Client's Name: Caminelli Services
Inspection of: Basin Enclosure Book: 11

F & R Job No.:
Date: 4/15/98
Technician: P. Corker

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Contractor placed 8" Lift at Basin Enclosure. Placement was done by a "650-John Deere" Dozer. Compaction was done by a Vibratory roller.
Lift # 13, 14 [redacted] and # 15 Completed.

Technician observed the above mentioned.
Performed Nuclear Density Tests.
Performed Sand-Cone, Obtain sample for atterberg limits, and gradation.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAP-Bio-Plant **Date:** 4/15/98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	30' S.W. From Toe of slope Sec-C	-1	15.7	113.2	95.5	90%	Optim	59969C
2	30' S.E. from Toe of slope Sec-B	-1	13.8	114.0	96.2	↓	↓	
3	15' N.W. From Top of slope Sec-D	6"	16.6	110.6	96.9	↓	↓	
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	118.5	12.2	Grey Brown Clayey Sand	
	114.1		Yellow Brown Sand	

Remarks: Lift #13

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

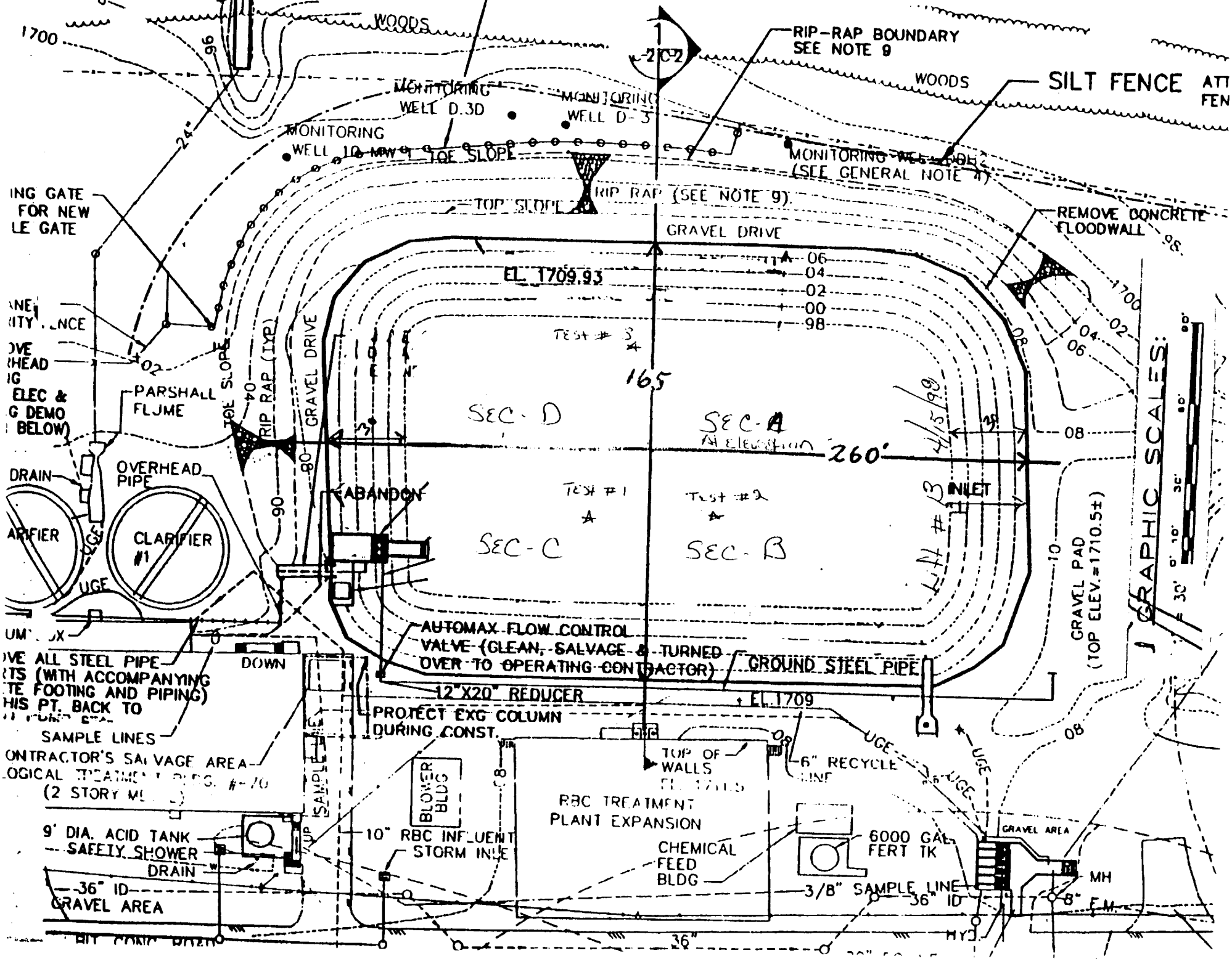
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


WOODS
RIP-RAP BOUNDARY
SEE NOTE 9
SILT FENCE
MONITORING WELL D-3D
MONITORING WELL D-3
MONITORING WELL 10 MW-1
TOE SLOPE
TOP SLOPE
RIP RAP (SEE NOTE 9)
GRAVEL DRIVE
REMOVE CONCRETE FLOODWALL
EL. 1709.93
SEC-D
SEC-A
SEC-C
SEC-B
260'
165'
PARSHALL FLUME
OVERHEAD PIPE
ABANDON
INLET
CLARIFIER #1
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL 1709
PROTECT EXG COLUMN DURING CONST.
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT PLANT EXPANSION
BLOWER BLDG
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
36" ID
GRAVEL AREA
10" RBC INFLUENT
STORM INLET
CHEMICAL FEED BLDG
6000 GAL FERT TK
3/8" SAMPLE LINE
GRAVEL PAD (TOP ELEV.=1710.5±)
MH
8" F.M.
GRAPHIC SCALES

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. Bio Plant **Date:** 4-15-98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	25' S.W. Top of slope Sec-C	-8"	108.3	14.7	92.0	90%	NG 8.6" Depth	
2	40' N.W Top of slope Sec-D	-0	103.7	14.1	90.8	↓	↓	
3	40' S.E. Top of slope Sec-B	-0	109.4	13.8	93.0			
4	10' S.W. from corner slope Sec C	-0	To be Determined, 4-16-98			↓	SC	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	117.6	13.9	Dark Brown Sandy Clay	
	114.1			

Remarks: Lift # 14

Froehling & Robertson, Inc.

Technician: P Conner

Key:

SC - Sand Cone (ASTM D1556)

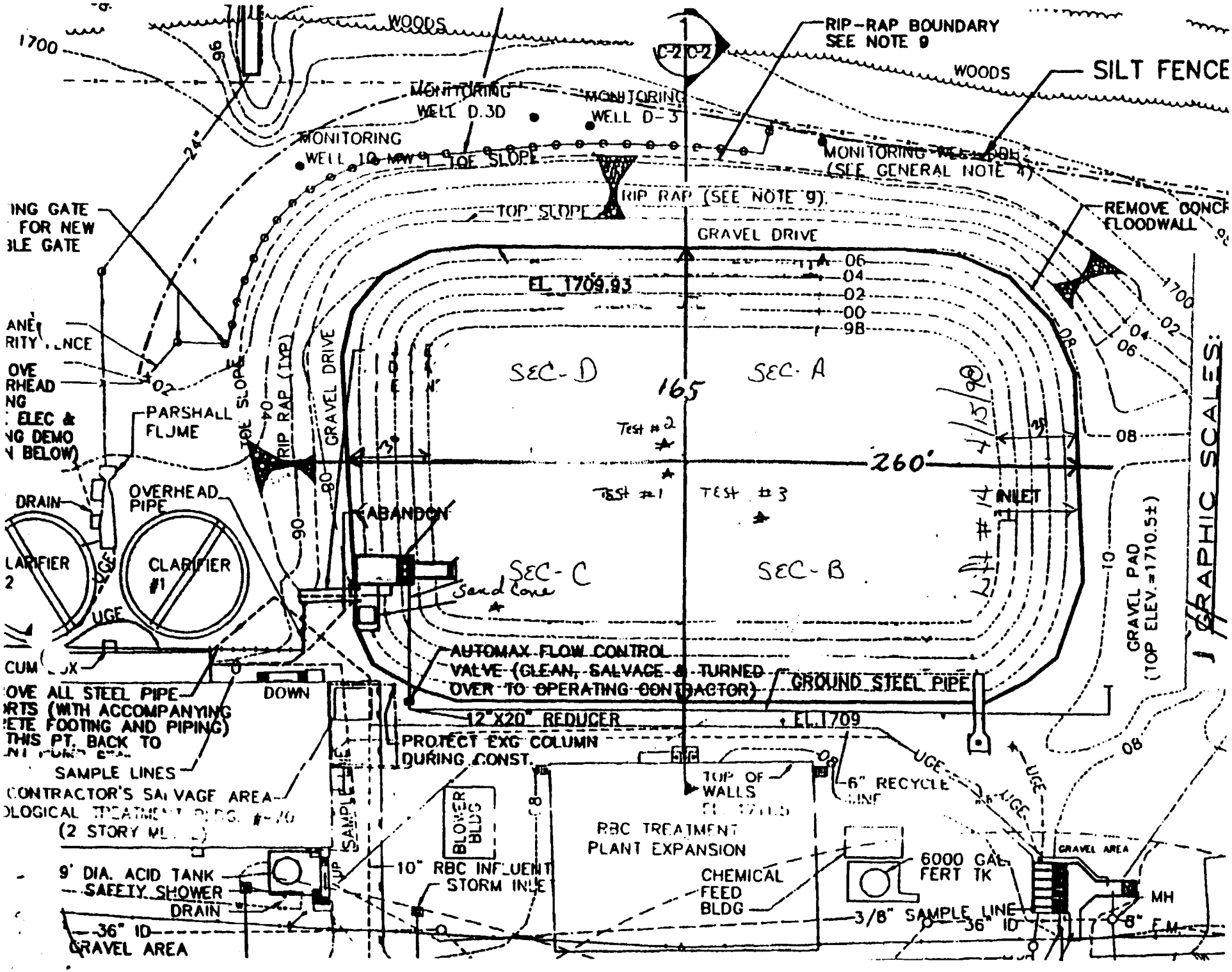
NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

Form No. 117


WOODS
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
TOP SLOPE
RIP RAP (SEE NOTE 9)
GRAVEL DRIVE
EL. 1709.93
SEC-D
SEC-A
SEC-C
SEC-B
165'
260'
Test #1
Test #2
Test #3
PARSHALL FLUME
OVERHEAD PIPE
DRAIN
CLARIFIER #1
ABANDON
Sand Cone
INLET
GRAVEL PAD (TOP ELEV.=1710.5±)
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN DURING CONST.
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT PLANT EXPANSION
BLOWER BLDG
10" RBC INFLUENT
STORM INLET
CHEMICAL FEED BLDG
6000 GAL FERT TK
3/8" SAMPLE LINE
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
36" ID
GRAVEL AREA
MH
8" F.M.
GRAPHIC SCALES:

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. Bio Plant **Date:** 4/15/98

Client: Cimarelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	10' S.W. of slope SEC. C	-0	15.8	107.3	91.2	90%	8-6" Depth	
2	10' S.E of slope SEC. B	-0	14.5	107.5	91.4	90%	"	
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	117.6	13.9	Dark Brown	

Remarks:

Lift #15

Froehling & Robertson, Inc.

Technician:

Key:

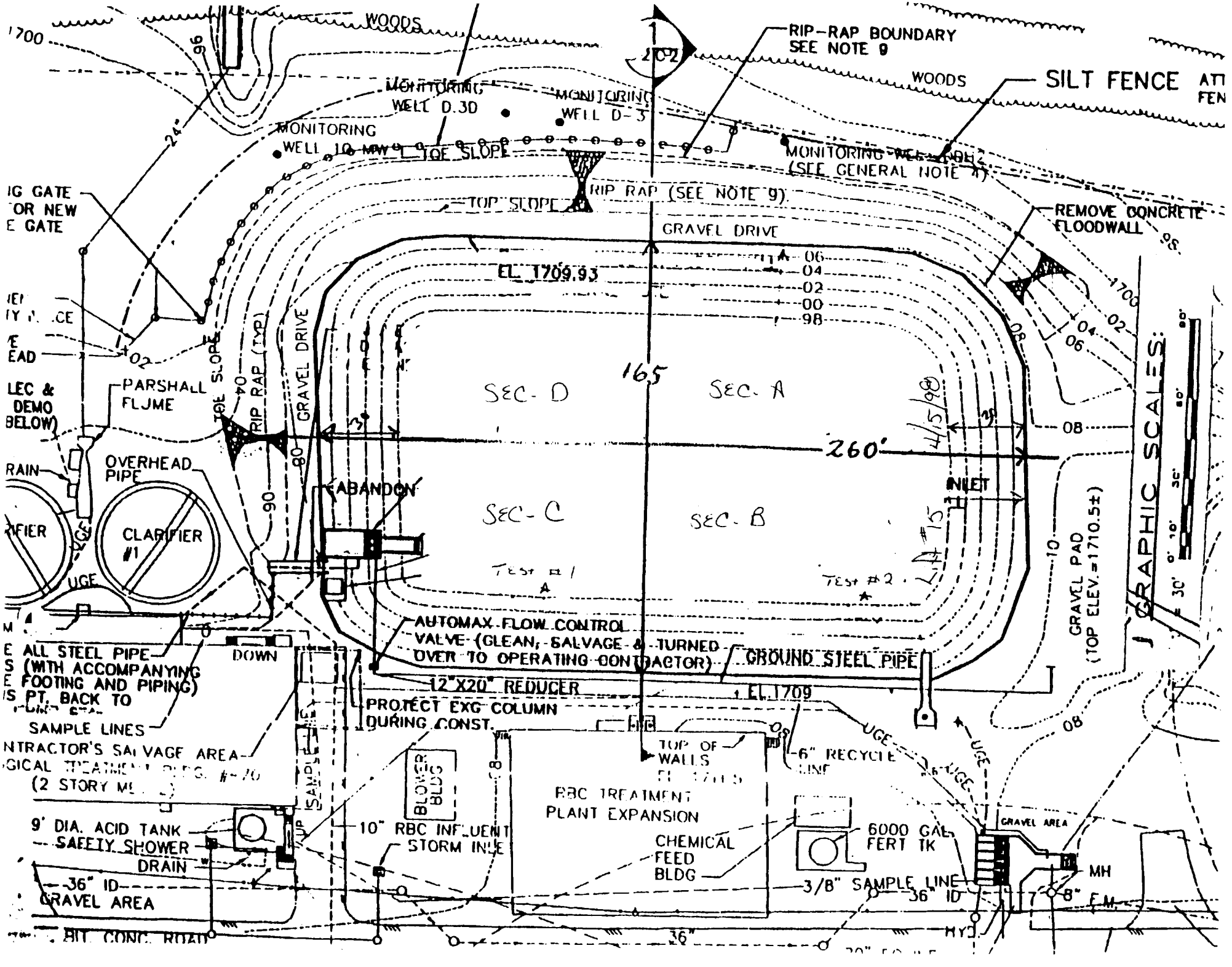
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


WOODS
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
MONITORING WELL D-30
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
TOP SLOPE
RIP RAP (SEE NOTE 9)
GRAVEL DRIVE
REMOVE CONCRETE FLOODWALL
EL 1709.93
SEC-D
SEC-A
SEC-C
SEC-B
165'
260'
PARSHALL FLUME
OVERHEAD PIPE
CLARIFIER #1
ABANDON
INLET
GRAVEL PAD (TOP ELEV.=1710.5±)
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL 1709
PROTECT EXG COLUMN DURING CONST.
6" RECYCLE LINE
SAMPLE LINES
BLOWER BLDG
RBC TREATMENT PLANT EXPANSION
10" RBC INFLUENT
STORM INLE
CHEMICAL FEED BLDG
6000 GAL FERT TK
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
36" ID
GRAVEL AREA
3/8" SAMPLE LINE
MH
8" F.M.
BIT. CONC. ROAD
GRAPHIC SCALES

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
104
Tuesday
14 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 24 Apr 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-14-98 Report No. 106 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P~~C~~loudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - import & place fill b. ( ) Hodge - hauling c. ( ) F&R - soil testing d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

13th, 14th, 15th lifts - Ciminelli
hauling fill - Hodge
soil testing - F&R

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip & manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Backfill - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

[signature] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-14-98

LABOR CLASSIFICATION	PRIME		Fw. R		Hodge Trucking						EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Dozer	8	2
Superintendent	1	10									Roller	4	6
Operator	1	10									Excavator - off site	10	0
Soil Tech			1	4									
Trucker					3	7							
Trucker					1	6							
Trucker					5	8							
Trucker					9	8.5							
Trucker					2	9							

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	3		1		20						24
NO. OF HOURS (SUBTOTALS)		30		4		161.5					195.5
PREVIOUS TOTAL HOURS											2650.5
TOTAL HOURS THROUGH THIS DATE											2846

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

Lift 12

DESCRIPTION OF TEST:

see attached

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Conner

TITLE Field Tech

SIGNATURE see attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

BG Erickson

DATE 4-15-98

REMARKS:

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAP- B10 Plant
Client's Name: Ciminelli Services
Inspection of: Basin Enclosure Back-fill

F & R Job No.:
Date: 4-14-98
Technician: A. Conner

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Contractor placed 8" lift at Basin Enclosure.
Compaction was done by a vibratory roller.
Lift # 12 Completed.

Technician observed above mentioned.
Performed Nuclear Density Tests and Sand Core.
Obtained sample of soil to be taken back to lab for gradation and atterberg limits.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAP B10 Plant **Date:** 4/14/98

Client: Ciminelli SERVICES **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	20' N.W. From top of slope SEC D	-1½	11.7	111.6	91.7	90	5-6" Depth	
2	10' S.W. From Corner slope SEC	-2	11.1	121.0	99.4		"	
3	12' S.W. From Corner slope SEC-C	-2	12.7	121.0	99.4		SC	
4	25' N.E. From Top of slope SEC-A	-0	11.3	121.5	99.8		NG	
5	10' S.E. From Corner slope SEC B	-0	11.6	111.9	91.9		"	
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Yellow Tan	

Remarks: Lift #12

Froehling & Robertson, Inc.

Technician:

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

FROEHLING & ROBERTSON, INC.

Daily Field Compaction Tests

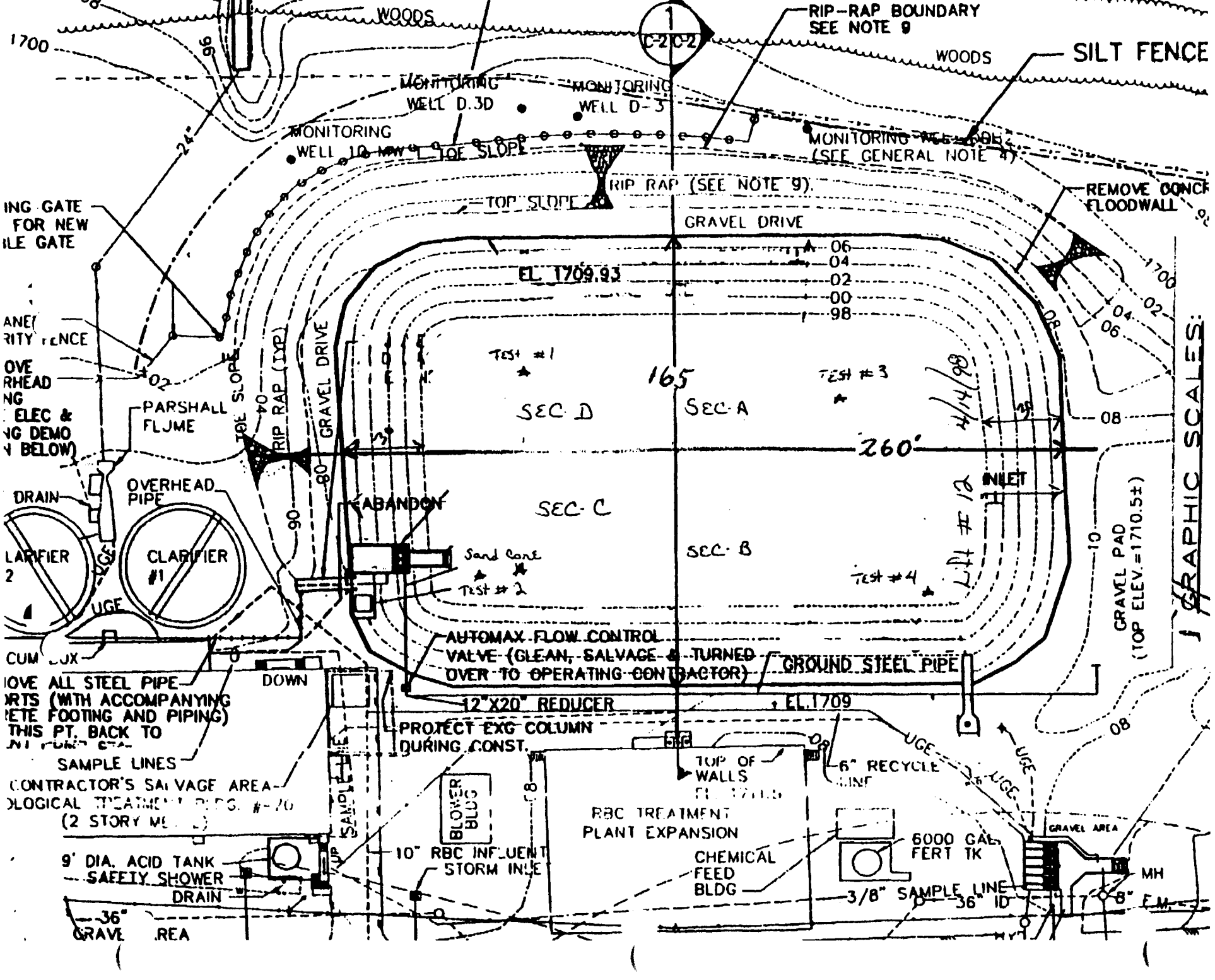
Made for: Ciminelli Services Date 4/14/08

Project: RAAP- Bio Plant

Location: 12' S.W. From Corner Slope Sec. C Lift # 12

A. Wet Weight, Soil + Bucket, lbs.	5.75				
B. Weight Bucket, lbs.	1.15				
C. Weight Wet Soil, lbs. (A-B)	4.6				
D. Initial Weight, lbs. Jar + Sand	16.08				
E. Final Weight, lbs. Jar + Sand	8.86				
F. Sand used, lbs. (D-E)	7.22				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	3.32				
I. Weight of Sand (lbs./cu. ft.)	98.9				
J. Vol. of Hole (H/I) cu. ft.	.0337				
K. Cup + Soil Wet	5.75				
L. Cup + Soil Dry	5.23				
M. Moisture Lost (K-L)	.52				
N. Cup + Soil Dry	5.23				
O. Cup	1.15				
P. Dry Soil (N-O)	4.08				
Q. Percent Moisture (M/P) 100	12.7				
R. Dry Soil, lbs. C/(1 + Q/100)	4.08				
S. Dry Soil, pcf (R/J)	121.0				
T. Maximum Density (From Curve)	121.7				
U. Percent Density (S/T) 100	99.4				

P. Conner (Technician)


WOODS
RIP-RAP BOUNDARY
SEE NOTE 9
SILT FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
RIP RAP (SEE NOTE 9).
TOP SLOPE
MONITORING WELL
(SEE GENERAL NOTE 4)
GRAVEL DRIVE
EL. 1709.93
TEST #1
TEST #3
SEC D
SEC A
SEC C
SEC B
TEST #2
TEST #4
165
260'
PARSHALL FLUME
OVERHEAD PIPE
DRAIN
CLARIFIER #1
ABANDON
Sand Cone
INLET
GRAVEL PAD
(TOP ELEV.=1710.5±)
AUTOMAX FLOW CONTROL
VALVE (CLEAN, SALVAGE & TURNED
OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN
DURING CONST.
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT
PLANT EXPANSION
BLOWER BLDG
10" RBC INFLUENT
STORM INLE
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
36" GRAVEL AREA
CHEMICAL FEED BLDG
6000 GAL FERT TK
3/8" SAMPLE LINE
36" ID
GRAVEL AREA
MH
8" F.M.
GRAPHIC SCALES:

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **103**
Monday
13 April 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	17 Apr 98	SUPV. INT	
	DATE		DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-13-98 Report No. ~~109~~ 102-105 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - import & Place fill b. ( ) F&R - soil testing c. ( ) Hodge - hauling d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Roller - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Lift 10 and 11 - Ciminelli
density test - F&R
hauling - Hodge

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See manpower and Equip. report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Backfill in spec.

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Smith

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4/13/98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	F.E.R #	F.E.R HRS	Hodge Trucking #	Hodge Trucking HRS				EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10								Dozer	8	2
Superintendent	1	10								Roller	5	5
Operator	1	10								Excavator off Site	10	0
Laborer	1	10										
Soil tech			1	4								
Truck driver					1	3						
Truck driver					4	8						
Truck driver					5	8.5						
Truck driver					1	9						
										TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		1		11					16		
NO. OF HOURS (SUBTOTALS)		40		4		86.5				130.5		
										PREVIOUS TOTAL HOURS 2520		
										TOTAL HOURS THROUGH THIS DATE 2650.5		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

9th, 10th, 11th, lifts

DESCRIPTION OF TEST:

See attached

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Conner

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

DGSch

DATE 4-14-98

REMARKS: Still waiting for official classification see attached letter

SINCE
1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAF BIO Plant
Client's Name: Ciminelli Services
Inspection of: Basin Enclosure

F & R Job No.: L
Date: 4/13/98
Technician: P. Conner

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Contractor placed 8" lift at Basin Enclosure. Placement was done by a "John Deere" Dozer, Compaction done by Vibratory roller.
Lift # 10 : 11" Completed.

Technician observed the above mentioned. Performed Nuclear Density Tests and Hand Core Test. Obtained sample from Hand Core to be taken back to lab to perform gradation & Atterberg limits.

FROEHLING & ROBERTSON, INC.

Daily Field Compaction Tests

Made for: Cimnelli Services Date 4-13-98

Project: RAAP- Bio. Plant Basins Enclosure

Location: 45' North of Top slope 10th Lift

A. Wet Weight, Soil + Bucket, lbs.	5.71				
B. Weight Bucket, lbs.	1.15				
C. Weight Wet Soil, lbs. (A-B)	4.56				
D. Initial Weight, lbs. Jar + Sand	15.84				
E. Final Weight, lbs. Jar + Sand	8.46				
F. Sand used, lbs. (D-E)	7.38				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	3.48				
I. Weight of Sand (lbs./cu. ft.)	98.9				
J. Vol. of Hole (H/I) cu. ft.	.0035				
K. Cup + Soil Wet	5.71				
L. Cup + Soil Dry	5.18				
M. Moisture Lost (K-L)	.53				
N. Cup + Soil Dry	5.18				
O. Cup	1.15				
P. Dry Soil (N-O)	4.03				
Q. Percent Moisture (M/P) 100	13.1				
R. Dry Soil, lbs. C/(1 + Q/100)	4.03				
S. Dry Soil, pcf (R/J)	115.1				
T. Maximum Density (From Curve)	118.5				
U. Percent Density (S/T) 100	97.1				

P. Conner (Technician)

Form 113

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. Bio Plant **Date:** 4-13-98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	12' N.W. From top of Slope sec-D	-1½	12.7	112.2	94%	90%	8.6" Depth	6596C
2	32' N.W. From top of Slope SEC-D	-1½	11.7	116.4	98.2	↓	↓	
3	10' S.W. From Bottom Slope Sec-C	-3	12.7	117.2	98.9	↓	↓	
4						↓	↓	
5	45' N. From top of Slope SEC. A-B	-1	13.1	118.5	97.1	↓	SC	
6						↓	↓	
7	30' E. From top Slope SEC- A	-1	12.4	110.1	92.9	↓	NG	
8	40' S.E From top Slope SEC.-B	-1	12.3	110.5	93.2	↓	↓	
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
6596A C	118.5	12.2	Yellow Tan	

Remarks: Lift # 10

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. BIO Plant **Date:** 4/13/98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	10' N.E. from Top slope Sec. A	-0	12.8	119.2	97.9	90%	8-6" Depth	
2	10' S.E. from Top slope Sec-B	-0	11.0	113.2	93.0	↓	↓	
3	30' N.W. From Top slope Sec. C	-2	10.7	120.2	98.7			
4	40' S.W. From Corner Slope Sec. D	-1	12.1	118.1	97.0			
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Tan Brown	

Remarks: Lift # 11

Froehling & Robertson, Inc.

Technician:

Key:

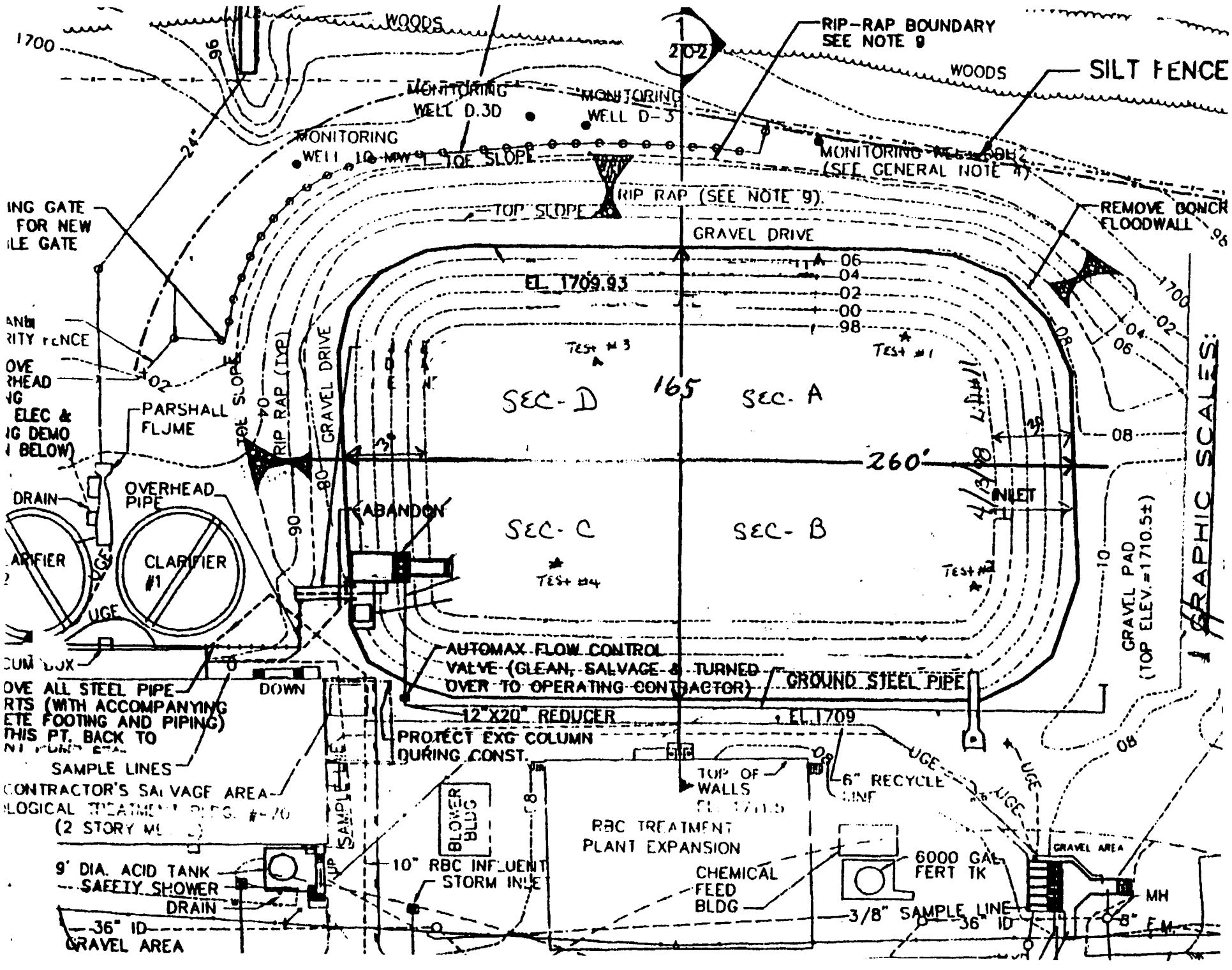
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


WOODS
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
MONITORING WELL D-2
(SEE GENERAL NOTE 4)
RIP RAP (SEE NOTE 9)
TOP SLOPE
GRAVEL DRIVE
REMOVE CONCR FLOODWALL
EL 1709.93
SEC-D
SEC. A
SEC-C
SEC-B
165'
260'
Test #3
Test #1
Test #4
Test #2
PARSHALL FLUME
OVERHEAD PIPE
DRAIN
CLARIFIER #1
ABANDON
INLET
GRAVEL PAD (TOP ELEV.=1710.5±)
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL 1709
PROTECT EXG COLUMN DURING CONST.
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT PLANT EXPANSION
BLOWER BLDG
10" RBC INFLUENT
STORM INLE
CHEMICAL FEED BLDG
6000 GAL FERT TK
3/8" SAMPLE LINE
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
36" ID
GRAVEL AREA
MH
8" F.M.
GRAPHIC SCALE

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
99
Thursday
09 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 12 Apr 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-9-98 Report No. 101 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: .5 inches] [Temp. ___ min. ___ max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - import fill + place b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - not used
Dozer - not used
Roller - not used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

~~None~~ rained out No fill imported - fill stock piled @ pit, paper work completed

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

None - Rained out

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

None

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equipment & Man Power report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

Bob Ed

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-9-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	5									Dozer	0	
Superintendent	1	5									Roller	0	
Operator	1	5									Excavator - offsite	0	
Laborer	1	0											

	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4	■		■		■		■		■	4
NO. OF HOURS (SUBTOTALS)	■	15	■		■		■		■		15
PREVIOUS TOTAL HOURS											2505
TOTAL HOURS THROUGH THIS DATE											2520

SINCE
1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAP. Bio Plant
Client's Name: Ciminelli Services
Inspection of: Basin enclosure Backfill

F & R Job No.: /
Date: 4/9/98
Technician: P. Correa

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

Contractor placed an 8" lift at Basin Enclosure. Placement was done by a John Deere Dozer. Compaction done by Vibratory roller. 9th: 10th lift completed.

Technician performed Density Tests. Materials checked in color and percentage of rock. A sample was taken to lab. So proctor could be matched up with Density readings.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAF - Bio Plant **Date:** 4/7-8/98

Client: Connell Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	40' N.W. from Top of Slope Sec. D	-3	10.9	116.6	95.8	90%	8-6" Depth	
2	24' S.W. from Toe of Slope Sec. C	-4	11.6	119.7	98.3	↓	↓	
3	32' N.E. from Top of Slope Sec. A	-2	12.0	114.8	94.3			
4	44' S.E. from bottom of Slope Sec. B.	-4	10.7	122.7	100+			
5	20' E. from top of Slope Sec-A	-2	12.2	112.0	92.0			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Dark Grey Silt	

Remarks: 9th Lift

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

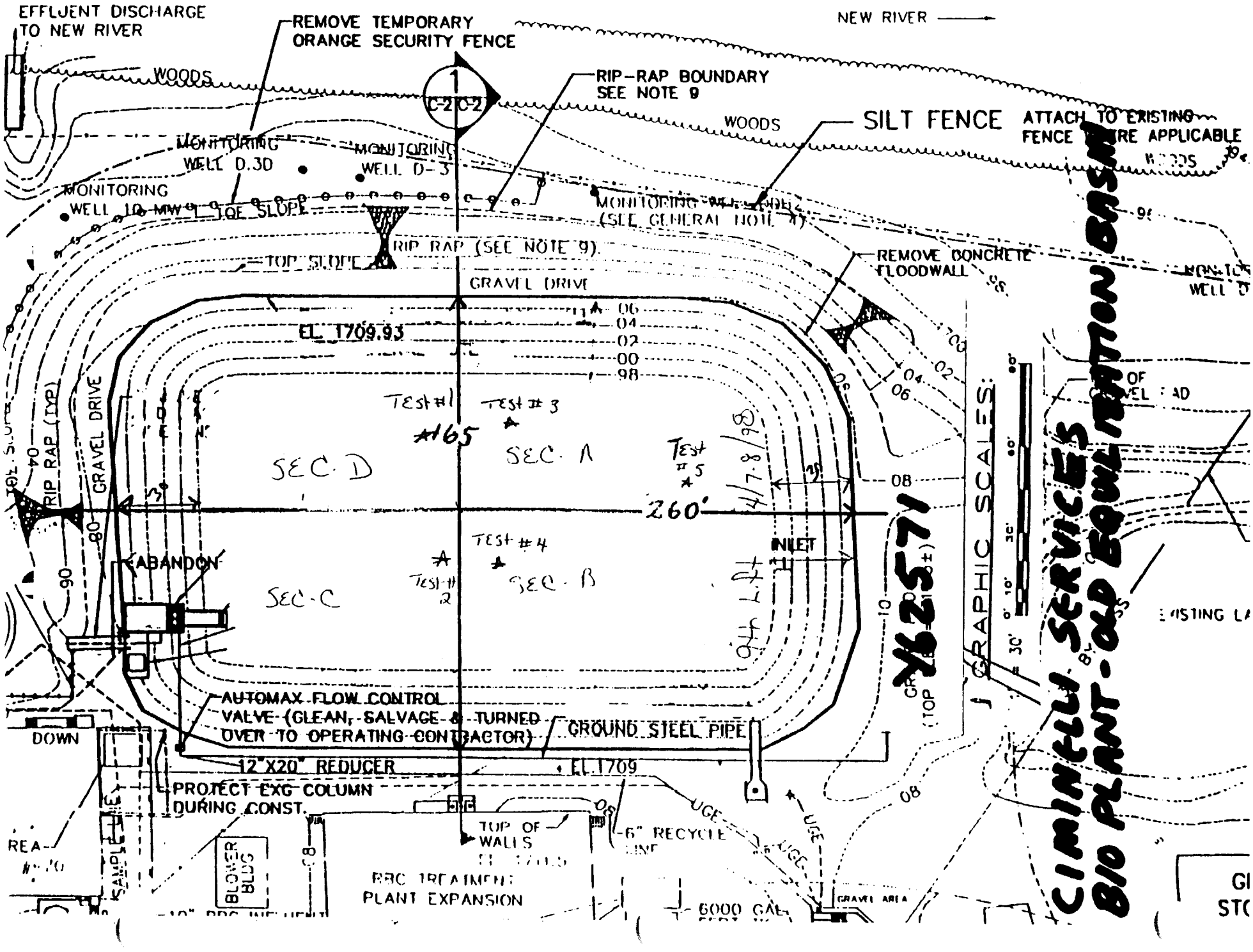
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


EFFLUENT DISCHARGE TO NEW RIVER
REMOVE TEMPORARY ORANGE SECURITY FENCE
NEW RIVER
WOODS
RIP-RAP BOUNDARY SEE NOTE 9
C-2C-2
SILT FENCE
ATTACH TO EXISTING FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10-MW
TOE SLOPE
MONITORING WELL
(SEE GENERAL NOTE 4)
RIP RAP (SEE NOTE 9)
TOP SLOPE
REMOVE CONCRETE FLOODWALL
GRAVEL DRIVE
EL. 1709.93
RIP RAP (TYP)
GRAVEL DRIVE
Test #1
Test # 3
#165
SEC. D
SEC. A
Test #5
260'
Test #4
Test #2
SEC. C
SEC. B
ABANDON
INLET
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN DURING CONST.
TOP OF WALLS
6" RECYCLE LINE
BLOWER BLDG
RBC TREATMENT PLANT EXPANSION
6000 GAL
GRAVEL AREA
GRAPHIC SCALES
EXISTING LA
CIMINELLI SERVICES
BIO PLANT - OLD BOWLING ALLEY

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **98**
Wednesday
08 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	09 Apr 98	SUPV. INT	
	DATE		DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-8-98 Report No. 100 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - import + place fill b. ( )
( ) Hodge - hauling c.
( ) F+R - soil testing d. ( )
e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Roller - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - import + place 9th, 1/2 of 10th lift
Hodge - haul fill
F+R - soil testing

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

Field density tests - waiting for lab report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip & manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Fill material - In spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Erickson CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-8-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	F&R #	F&R HRS	Hodge Trucking #	Hodge Trucking HRS					NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	12								EQUIPMENT DESCRIPTION		
Superintendent	1	12								Dozer	8	4
Operator	1	13								Roller	4	8
Laborer	1	12								Excavator-offsite	12	1
Field Tech			1	8								
					7	9						
					4	85						
					1	8						
NO. OF EMPLOYEES (SUBTOTALS)	4		1		12					TOTALS		
NO. OF HOURS (SUBTOTALS)		49		8		105					17	
											162	
										PREVIOUS TOTAL HOURS	2343	
										TOTAL HOURS THROUGH THIS DATE	2505	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
97
Tuesday
07 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	09 Apr 98	SUBV. INT	
	DATE		DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-9-98 Report No. 99 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Import fill & place b. ( ) Hodge - hauling c. ( ) F+R - Soil Testing d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - placed 7th, 8th, 1/2 of 9th Lift
Hodge - hauling
F+R - Soil testing

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test Report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equipment & Manpower Report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Fill Material - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGS [signature] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-7-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	E & R #	E & R HRS					EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	11									Dozer	8	3
Superintendent	1	11									Roller	5	6
Operator	1	11									Excavator - off site	11	0
Laborer	1	11											
Trucker			1	9.5									
Trucker			2	10									
Trucker			3	9.5									
Trucker			7	9									
Trucker			1	7									
Soil Tech					1	9.5							
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		14		1						19		
NO. OF HOURS (SUBTOTALS)		44		129		9.5					182.5		
PREVIOUS TOTAL HOURS											2160.5		
TOTAL HOURS THROUGH THIS DATE											2343		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

6th, 7th, & 8th lift

DESCRIPTION OF TEST:

3 Nuclear gage, Sand cone

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Conner

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

TG Sucha

DATE 4-7-98

REMARKS: Still waiting for moisture density curve and new classification - expect Thursday am

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RARP Bio Plant
F & R Job No.:
Client's Name: Ciminelli
Date: 4/2/98
Inspection of: Basin - Closure Backfill
Technician: P. Coxen

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

I. Contractor Activities
1. Contractor placed 8" lift from Borrow site. Placement was done by a dozer - Compaction done by a vibratory roller.
2. Contractor Completed lift #6 #7 & #8, half of #9.

II. Technician Activity
1. Technician observed above mentioned.
2. Performed Nuclear Density Tests, and two Sand-Cone tests.
3. Obtained samples of soil from lift to be taken back to lab to perform gradations and atterberg l.m.ts.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAA - Bio Plant **Date:** 4/7/98

Client: Ciminelli SERVICES **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	32' N.E. from top of slope SEC A	-4	13.8	111.6	91.7	90	8-6" Depth	
2	40' N.E from Top of slope SEC D	-6	19.2	~~103.4~~	~~79.0~~			
3	40% Rock Correction		19.2	121.4	99.7			
4	30' S.W. from corner of slope SEC C	-6	13.6	111.6	91.7			
5	30' S.E. from corner SEC B	-6	14.7	109.5	89.9			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Yellow Tan	

Remarks: 6th Lift Completed

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

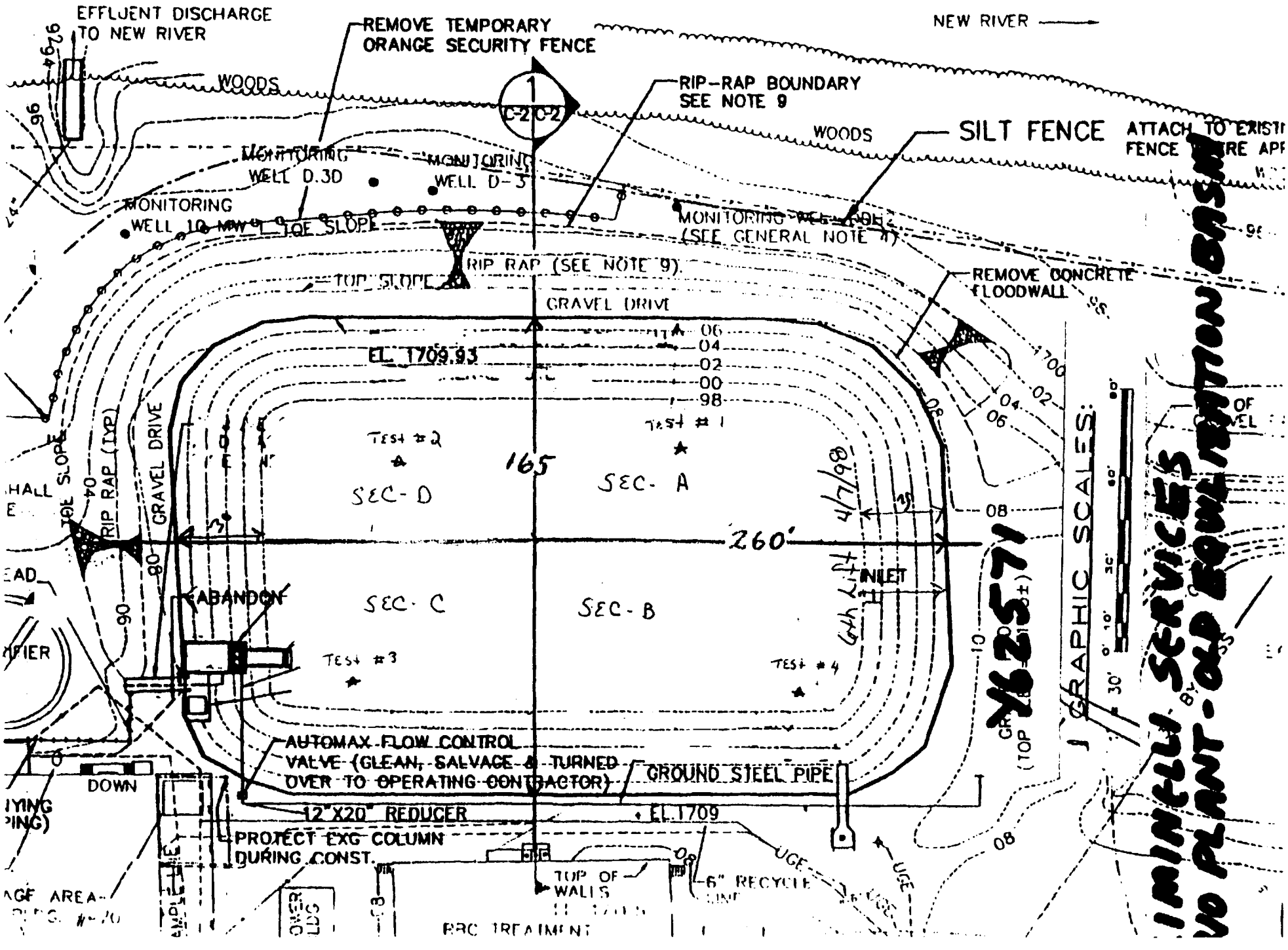
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


EFFLUENT DISCHARGE TO NEW RIVER
REMOVE TEMPORARY ORANGE SECURITY FENCE
NEW RIVER
WOODS
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
ATTACH TO EXISTI FENCE
MONITORING WELL D-30
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
MONITORING WELL D-2 (SEE GENERAL NOTE 4)
RIP RAP (SEE NOTE 9)
TOP SLOPE
REMOVE CONCRETE FLOODWALL
GRAVEL DRIVE
EL. 1709.93
TEST #2
TEST #1
SEC-D
SEC-A
165
260'
SEC-C
SEC-B
TEST #3
TEST #4
RIP RAP (TYP)
GRAVEL DRIVE
ABANDON
INLET
AUTOMAX FLOW CONTROL VALVE (GLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL 1709
PROTECT EXG COLUMN DURING CONST.
TOP OF WALLS
6" RECYCLE
GRAPHIC SCALES
DOWN
AREA
TREATMENT
4/7/98
92571
IMMEDIATE SERVICES
TO PLANT - OLD ROWLAND BASIN

FIELD DENSITY SUMMARY SHEETS

Project: RAAP- Bio Plant **Date:** 4/7/98

Client: Cimarelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	36' S.E. from Corner Slope SEC-B	-5	20.6	~~101.9~~	~~77.9~~	90%	NG 8-6" Depth	
2	30% Rock Correction			116.9	96.0			
3	30' S.W. from Toe of slope SEC-C	-5	17.1	110.0	90.3			
4	20' from S.W. Corner SEC-D	-5	8.8	112.0	92.0		SC	
5	10' N.E. from top of slope SEC-A	-3	14.1	~~108.4~~	~~89.0~~		NG 8-6"	
6	30% Rock Correction			120.4	98.9			
7	25' N.W. from top of slope SEC D	-3	12.8	111.0	91.2			
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Yellow Tan	

Remarks: 7th lift Completed

Froehling & Robertson, Inc.

Technician: P. Cornell

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

FROEHLING & ROBERTSON, INC.

Daily Field Compaction Tests

Made for: Cimiselli Services Date 4/7/99

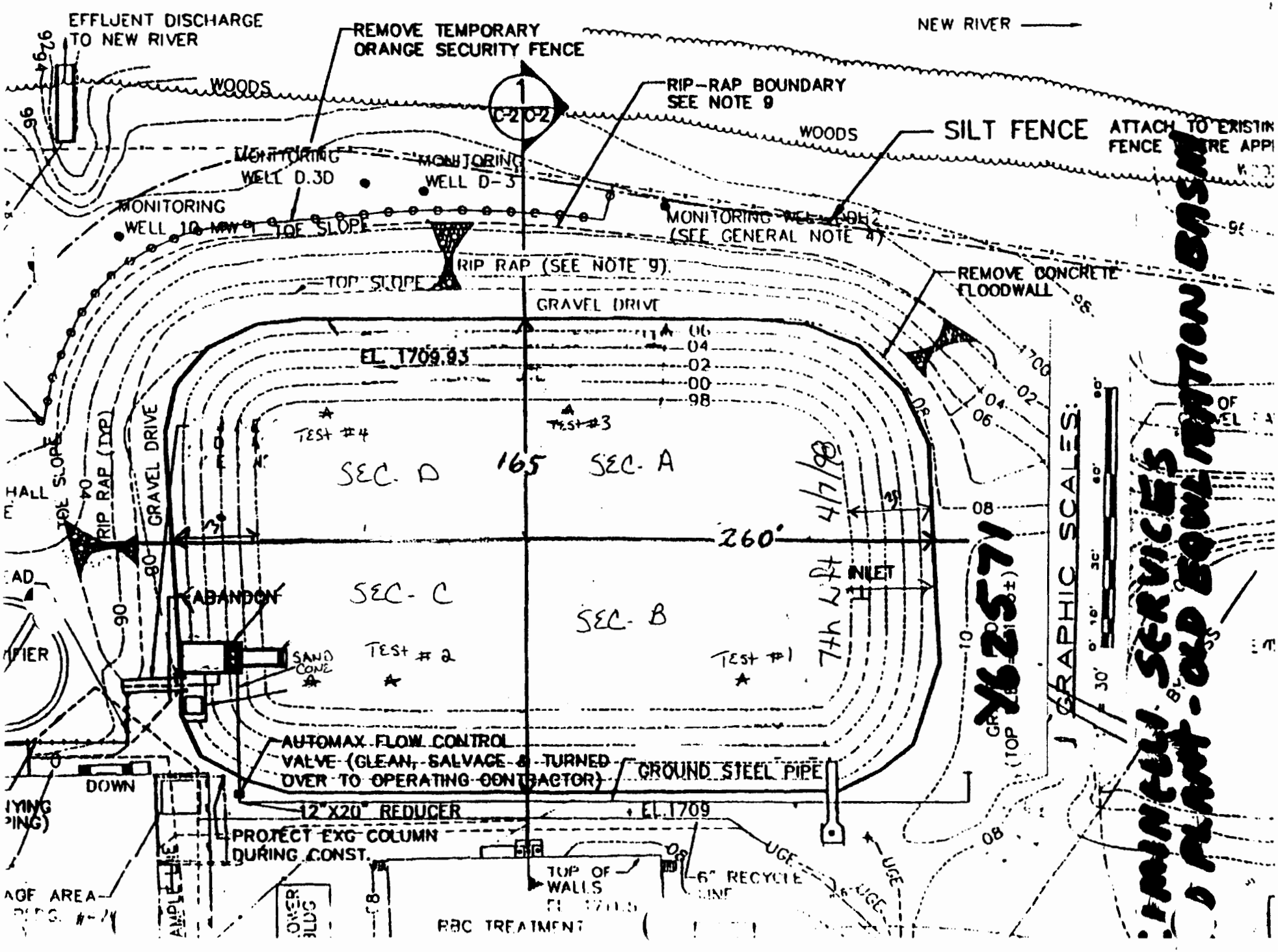
Project: BART Bio Plant

Location: Basin Enclosure - 20' from SW Corner 7th Lift

A. Wet Weight, Soil + Bucket, lbs.	6.02				
B. Weight Bucket, lbs.	1.15				
C. Weight Wet Soil, lbs. (A-B)	4.87				
D. Initial Weight, lbs. Jar + Sand	15.98				
E. Final Weight, lbs. Jar + Sand	8.16				
F. Sand used, lbs. (D-E)	7.82				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	3.92				
I. Weight of Sand (lbs./cu. ft.)	98.3				
J. Vol. of Hole (H/I) cu. ft.	.0399				
K. Cup + Soil Wet	6.02				
L. Cup + Soil Dry	5.59				
M. Moisture Lost (K-L)	.43				
N. Cup + Soil Dry	6.02				
O. Cup	1.15				
P. Dry Soil (N-O)	4.87				
Q. Percent Moisture (M/P) 100	8.8%				
R. Dry Soil, lbs. C/(1 + Q/100)	4.47				
S. Dry Soil, pcf (R/J)	112.0				
T. Maximum Density (From Curve)	121.7				
U. Percent Density (S/T) 100	92.0				

P Conner (Technician)

S


EFFLUENT DISCHARGE TO NEW RIVER
REMOVE TEMPORARY ORANGE SECURITY FENCE
NEW RIVER
WOODS
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW-1
TOE SLOPE
MONITORING WELL (SEE GENERAL NOTE 4)
RIP RAP (SEE NOTE 9)
TOP SLOPE
REMOVE CONCRETE FLOODWALL
GRAVEL DRIVE
EL. 1709.93
TEST #4
TEST #3
SEC. D
SEC. A
SEC. C
SEC. B
TEST #2
TEST #1
RIP RAP (TYP)
GRAVEL DRIVE
ABANDON
SAND CONE
INLET
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN DURING CONST.
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT
GRAPHIC SCALES
260'
165
4/7/88
74h 47m
93571

FIELD DENSITY SUMMARY SHEETS

Project: RAAP B10 - Plant **Date:** 4/7/98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	30' N.E. from Top of Slope SEC-D	-5	14.9	110.1	90.4	90%	NG 8-6 Depth	
2								
3	40' From S.W. Slope SEC-C	-5	10.7	124.3	102.1			
4								
5	36' From [illegible] SEC-B	-4	11.7	118.8	97.6			
6								
7	10' From N.E. Corner SEC-A	-3	12.7	~~108.0~~	~~88.7~~			
8				124.7	102.4		V	
9	15' From N.E. Corner SEC-A	-3	10.5	116.3	95.5		SC	
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
	121.7	11.4	Yellow Tan	

Remarks: 8th Lift

Froehling & Robertson, Inc.

Technician:

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

ROEHLING & ROBERTSON, INC.

Daily Field Compaction Tests

Made for: Cimarelli Service Date 4/~/99

Project: RRMP B.O. P...

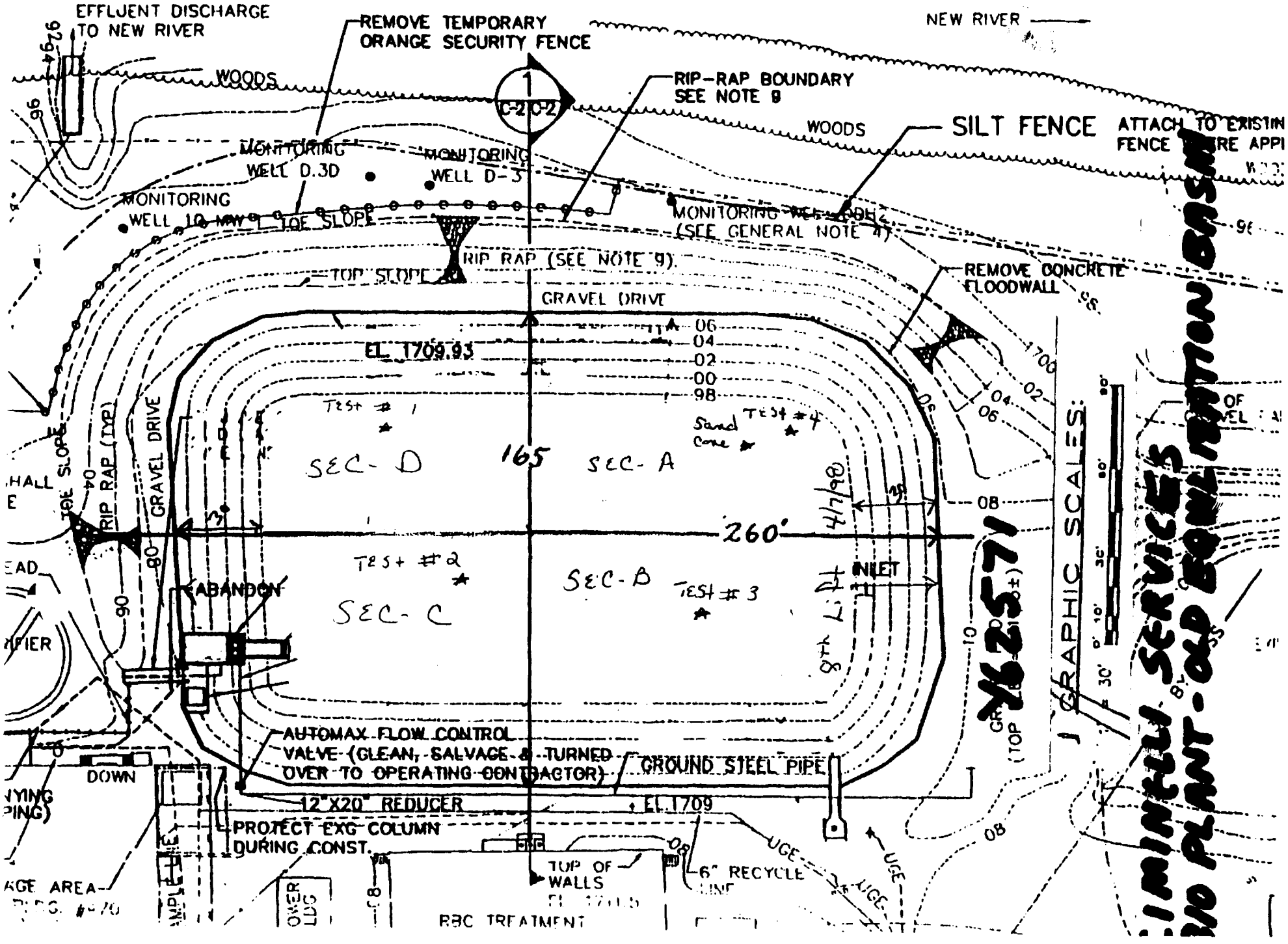
Location: Base Course - 15' from N.E. Corner Lift #8

A. Wet Weight, Soil + Bucket, lbs.	7.37				
B. Weight Bucket, lbs.	1.15				
C. Weight Wet Soil, lbs. (A-B)	6.22				
D. Initial Weight, lbs. Jar + Sand	15.72				
E. Final Weight, lbs. Jar + Sand	7.06				
F. Sand used, lbs. (D-E)	8.66				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	4.76				
I. Weight of Sand (lbs./cu. ft.)	98.3				
J. Vol. of Hole (H/I) cu. ft.	.0484				
K. Cup + Soil Wet	7.37				
L. Cup + Soil Dry	6.78				
M. Moisture Lost (K-L)	.59				
N. Cup + Soil Dry	6.78				
O. Cup	1.15				
P. Dry Soil (N-O)	5.63				
Q. Percent Moisture (M/P) 100	10.5				
R. Dry Soil, lbs. C/(1 + Q/100)	5.63				
S. Dry Soil, pcf (R/J)	116.3				
T. Maximum Density (From Curve)	95.5				
U. Percent Density (S/T) 100	121.7				

P. Conner (Technician)

Form 113

S


EFFLUENT DISCHARGE TO NEW RIVER
REMOVE TEMPORARY ORANGE SECURITY FENCE
NEW RIVER
WOODS
RIP-RAP BOUNDARY SEE NOTE 9
C-2 C-2
WOODS
SILT FENCE
ATTACH TO EXISTIN FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
MONITORING WEL
(SEE GENERAL NOTE #
RIP RAP (SEE NOTE 9)
TOP SLOPE
REMOVE CONCRETE FLOODWALL
GRAVEL DRIVE
EL 1709.93
06
04
02
00
98
Test # 1
Test #4
Sand Core
SEC- D
165
SEC- A
TOE SLOPE
RIP RAP (TYP)
GRAVEL DRIVE
08
260'
4/7/98
Test #2
SEC- C
SEC- B
Test # 3
INLET
ABANDON
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL 1709
PROTECT EXG COLUMN DURING CONST.
TOP OF WALLS
6" RECYCLE LINE
UGE
RBC TREATMENT
GRAPHIC SCALES
K2571
MINTU SERVICES
RO PLANT - OLD BOWLING ALLEY

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **96**
Monday
06 April 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Note REMARKS in CQC report. Questions centered around proctor being representative of material being used. Response and follow-up by quality control manager was good/noteworthy.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 09 Apr 98 — SUPV. INT — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-6-98 Report No. 95-98 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - loading trucks, placing fill, compacting b. ( ) c. ( ) Hodge - hauling d. ( ) F&R - Soil testing e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used off site
Roller - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Placed 5th and 6th lift
Hodge - import fill
F&R - soil tests

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip & Man Power report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

fill material - see below

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): At approx 2:30 pm Mark Bishop questioned the classification of the fill material and the location of the density tests. Ciminelli believes that the fill material is acceptable, but is waiting for lab verification on wet. pending. ⟹ over

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGS

CONTRACTOR'S QC SYSTEM MANAGER

Ciminelli does acknowledge some of the void that Mark Bishop witnessed on the 5th lift and will make every attempt to spread the material more uniformly. Also at about 3:00 pm Jody Blackburn witnessed that some of the chunks in question were indeed being broken ~~with~~ while placed. Also a laborer will be on site for the remainder of the backfilling operation to remove any rock that does not break into acceptable size. Material classification is expected Wed am and will be submitted as soon as available. By taking these steps test location should not be an issue. Tomorrows (Tuesdays) site visit by Jody Blackburn or Mark Bishop should confirm or deny the effectiveness of the impending actions

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-6-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	F&R #	F&R HRS	Hodge Trucking #	Hodge Trucking HRS				EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	12								Dozer	8	4
Superintendent	1	12								Roller	6	6
Operator	1	12								Excavator - off site	12	0
Soil Tech			1	3.5								
Trucker					7	8						
Trucker					4	8.5						
Trucker					4	9						
NO. OF EMPLOYEES (SUBTOTALS)	3		1		15					TOTALS	19	
NO. OF HOURS (SUBTOTALS)		36		3.5		126					165.5	
										PREVIOUS TOTAL HOURS	1995	
										TOTAL HOURS THROUGH THIS DATE	2160.5	

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

5th 8" Lift

DESCRIPTION OF TEST:

See attached

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME ~~Brad~~ Perry Corser

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

BG Sullivan

DATE 4-6-98

REMARKS:

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAF Bio Plant
Client's Name: Centrelle Services
Inspection of: Basin Enclosure

F & R Job No.:
Date: 4/4/98
Technician: L. Correa

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

I Contractor Activity
1) Contractor placing fill at an 8" lift at Basin Enclosure. Placement was done by a dozer. Compaction was done by a vibratory roller.
2) Fill came from borrow area behind Wilco on Rt 460. Fill is different than a given proctor. Fill contains gray soil with approximately 50% of rock.
3) Fifth Lift Completed.

II Technician Activity
1. Technician batched 3-point proctor on borrow material in lab.
2. Observed the above mentioned
3. Performed Nuclear Density Tests on 5th lift and also performed Sand Cone.
4. Sample of Sand Cone was gathered and taken back to lab for Atterberg Limits to be performed.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAP - Bio Plant **Date:** 4/6/98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	30' NE. from top of slope Sec.-A	-7	~~14.4~~	~~106~~	~~83.0~~	90%	NG 8.6 Depth	65-98
2	40% Correction		14.4	109.6	99.6			
3	25' S.E from Toe of slope Sec-B	-7	~~18.8~~	~~104.1~~	~~79.5~~			
4	40% Correction		8.8	119.1	91.0			
5	25' S.W from Toe of Slope Sec-C	-7	10.5	118.3	90.4			
6	15' N.W. from Toe of slope Sec D	-7	~~12.7~~	~~113.4~~	~~86.6~~			
7	40% Rock Correction		12.7	131.4	100	✓		
8								
9	30' S.W from Toe of slope Sec-C	-7	Not Available				SC	
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65-98	130.8	8.9	Yellow Brown Clay	

Remarks: 5th Lift Material is different than previous Material is gray with large [illegible] not yellow Brown clays

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

ROEHLING & ROBERTSON, IN

Daily Field Compaction Tests

Made for: (Cunningham Channel) Date 4/6/95

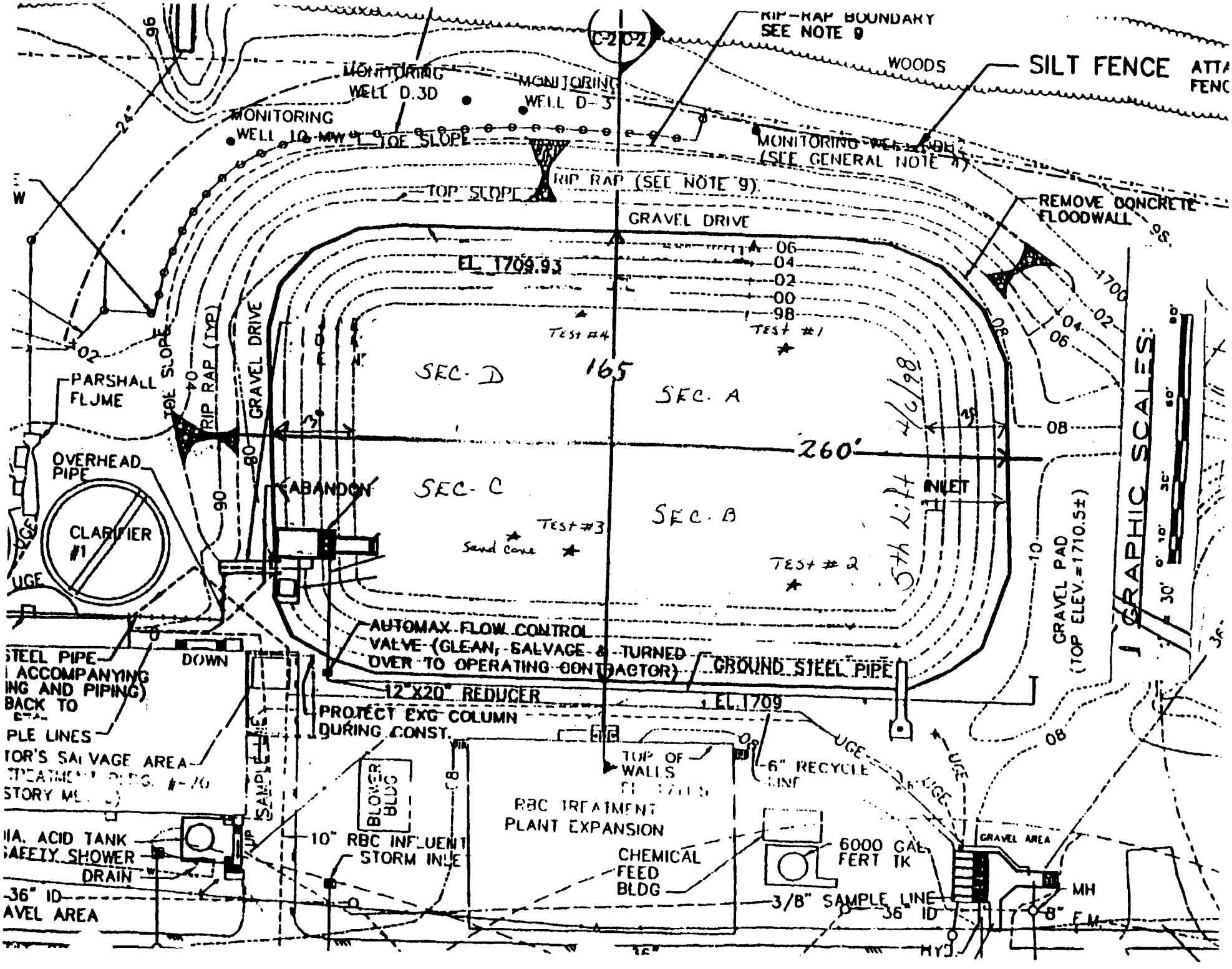
Project: FAA-D-2 Expansion

Location: Boring 2 Elevation (Gray Brown w/Rock)

A. Wet Weight, Soil + Bucket, lbs.	6.88				
B. Weight Bucket, lbs.	1.15				
C. Weight Wet Soil, lbs. (A-B)	5.73				
D. Initial Weight, lbs. Jar + Sand	16.13				
E. Final Weight, lbs. Jar + Sand	8.62				
F. Sand used, lbs. (D-E)	7.51				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	3.61				
I. Weight of Sand (lbs./cu. ft.)	99.5				
J. Vol. of Hole (H/I) cu. ft.	.036				
K. Cup + Soil Wet	6.88				
L. Cup + Soil Dry	6.40				
M. Moisture Lost (K-L)	.48				
N. Cup + Soil Dry	6.43				
O. Cup	1.15				
P. Dry Soil (N-O)	5.33				
Q. Percent Moisture (M/P) 100	7.5				
R. Dry Soil, lbs. C/(1 + Q/100)	5.33				
S. Dry Soil, pcf (R/J)	145.2				
T. Maximum Density (From Curve)	PROCTOR NOT				
U. Percent Density (S/T) 100	AVAILABLE AT THIS TIME				

P. Carew (Technician)

Form 113


C-2
C-2
RIP-RAP BOUNDARY
SEE NOTE 9
WOODS
SILT FENCE
MONITORING WELL D-3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
TOP SLOPE
RIP RAP (SEE NOTE 9)
MONITORING WELLS
(SEE GENERAL NOTE 4)
REMOVE CONCRETE FLOODWALL
GRAVEL DRIVE
EL. 1709.93
TEST #4
TEST #1
SEC. D
SEC. A
SEC. C
SEC. B
165
260'
PARSHALL FLUME
OVERHEAD PIPE
CLARIFIER #1
ABANDON
TEST #3
Sand Cone
TEST #2
5th Lift 4/6/98
INLET
GRAVEL PAD
(TOP ELEV.=1710.5±)
GRAPHIC SCALES
AUTOMAX FLOW CONTROL
VALVE (CLEAN, SALVAGE & TURNED
OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN
DURING CONST.
6" RECYCLE LINE
TOP OF WALLS
RBC TREATMENT
PLANT EXPANSION
BLOWER BLDG
10" RBC INFLUENT
STORM INLET
CHEMICAL FEED BLDG
6000 GAL FERT TK
GRAVEL AREA
MH
8" F.M.
3/8" SAMPLE LINE
36" ID
DOWN
SAMPLE

FROEHLING & ROBERTSON, I. .

Daily Field Compaction Tests

Made for: Cimirelli Services Date 4/2/98

Project: RAAP- BIO Plant

Location: Basin Enclosure - 15' from N.W. Corner Lift #3 (Clay)

A. Wet Weight, Soil + Bucket, lbs.	5.55				
B. Weight Bucket, lbs.	1.13				
C. Weight Wet Soil, lbs. (A-B)	4.42				
D. Initial Weight, lbs. Jar + Sand	16.35				
E. Final Weight, lbs. Jar + Sand	8.95				
F. Sand used, lbs. (D-E)	7.4				
G. Sand in Cone and Plate, lbs.	3.90				
H. Sand used in Hole (F-G)	3.5				
I. Weight of Sand (lbs./cu. ft.)	98.3				
J. Vol. of Hole (H/I) cu. ft.	.0356				
K. Cup + Soil Wet	5.26				
L. Cup + Soil Dry	4.651				
M. Moisture Lost (K-L)	.609				
N. Cup + Soil Dry	4.651				
O. Cup	.84				
P. Dry Soil (N-O)	3.811				
Q. Percent Moisture (M/P) 100	16.0%				
R. Dry Soil, lbs. C/(1 + Q/100)	3.811				
S. Dry Soil, pcf (R/J)	107.05				
T. Maximum Density (From Curve)	117.6				
U. Percent Density (S/T) 100	91.0				

P. Conner (Technician)

Form 113

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **92**
Thursday
02 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

07Apr98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-2-98 Report No. 94 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - backfill b. ( ) Hodge - hauling fill c. ( ) F&R - Soil Testing d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Excavator - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

All contractors involved with Importing fill, backfilling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test report

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip + manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Backfill - in spec

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

[signature] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-2-98

LABOR CLASSIFICATION	PRIME		Hodge Trucking		F&R						EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Dozer	~~8~~6	~~2~~4
Superintendent	1	10									Roller	4	6
Operator	1	10											
Truck driver			4	8							Excavator @ pit	8	2
Truck driver			4	7.5									
Soil tech					1	6							
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3		8		1						12		
NO. OF HOURS (SUBTOTALS)		30		62		6					98		
PREVIOUS TOTAL HOURS											1897		
TOTAL HOURS THROUGH THIS DATE											1995		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

3rd + 4th lift

DESCRIPTION OF TEST:

See attached

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Cooper

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

BG Ellen

DATE 4-2-98

REMARKS:

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAP Bio-Plant
F & R Job No.:
Client's Name: Cimirelli Services
Date: 4/2/98
Inspection of: Equalization Basin - Backfill
Technician: P. Correa

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

I. Contractor Activity
1. Contractor placed remaining backfill at west end area from on-site borrow fill. Lift # 3 is Completed.
2. Contractor placed backfill with different material for the 4th lift. Placement was done by a dozer. - Compaction done by a vibratory roller. 4th lift has been completed.

II. Technician Activity
1. Observed the above mentioned.
2. Performed a Sand Core at North west end on 3rd Lift.
3. Performed Nuclear Density's on both 3rd & 4th lift.
4. Nuclear Tests performed on 4th lift had trouble passing. Proctor did not match with the material. Technician did a rock Correction of 30%. This was done by sieving soil through a 3/4 sieve and comparing the plus and minus. ~~Retained~~ Reference of a "Nomograph" was also used for Rock Correction to determine Compaction.
5. A soil sample was obtained and taken back to lab for a proctor.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAP- Bio Plant **Date:** 4/2/98

Client: Cimnell, SERVICES **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	20' from N.W. Corner Sec-D	-8	19.3	106.2	90.3	90%	NG 8-6" Depth	65925
2	25' From S.W. Corner Sec-C	-8	15.5	115.6	98.2	90%	NG 8-6" Depth	65925
3								
4	15' From N.W. Corner Sec-D	-8					SC	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65925	117.6	13.9	Dark Reddish Brown Sandy Clay	

Remarks:
Remaining half of test 8 ft. West End

Froehling & Robertson, Inc.

Technician:

Key:

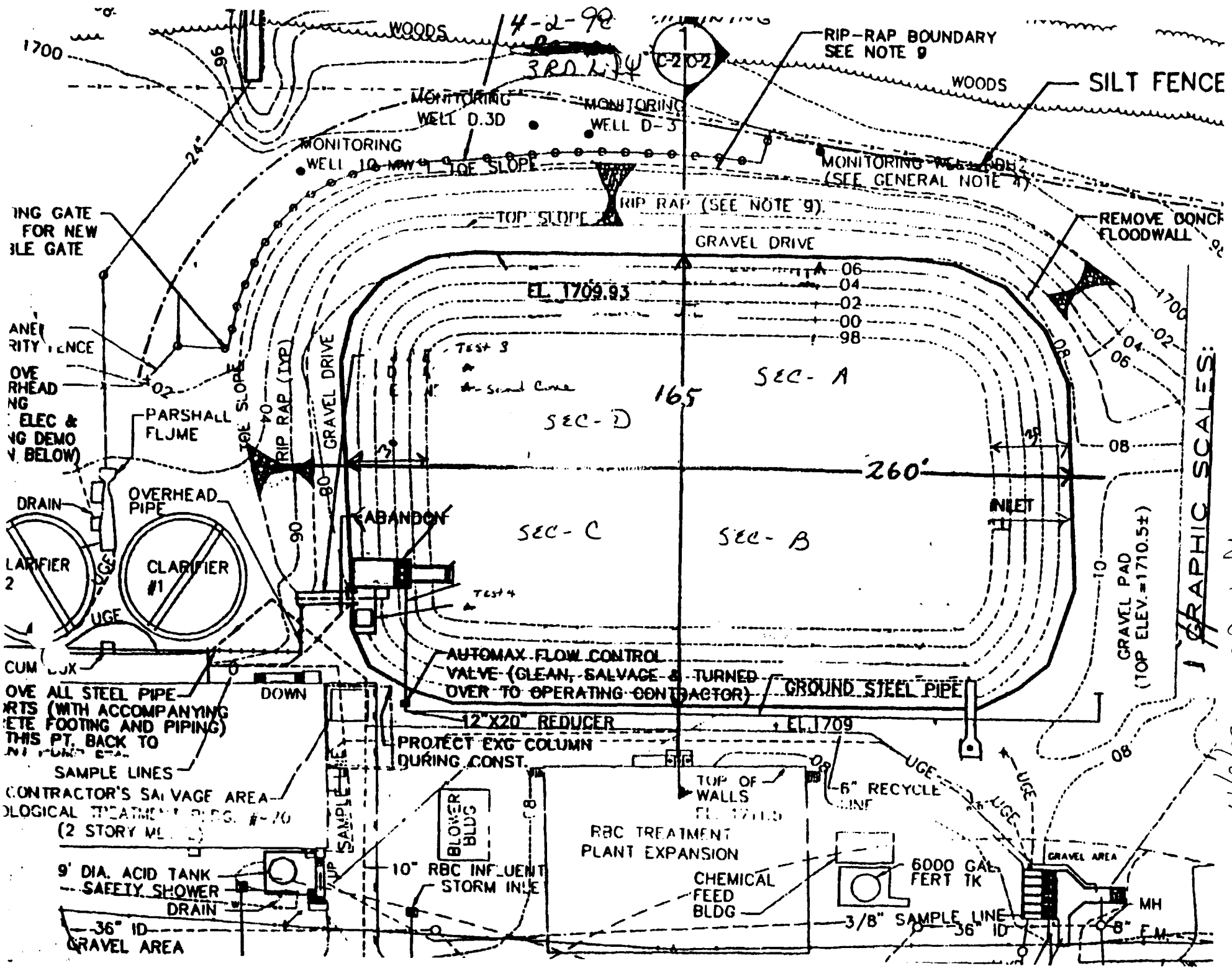
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


4-2-98
3RD LIFT
WOODS
1700
RIP-RAP BOUNDARY SEE NOTE 9
SILT FENCE
MONITORING WELL D.3D
MONITORING WELL D-3
MONITORING WELL 10 MW
TOE SLOPE
TOP SLOPE
RIP RAP (SEE NOTE 9)
GRAVEL DRIVE
EL. 1709.93
SEC-A
SEC-B
SEC-C
SEC-D
165'
260'
INLET
ABANDON
PARSHALL FLUME
OVERHEAD PIPE
DRAIN
CLARIFIER #1
AUTOMAX FLOW CONTROL VALVE (CLEAN, SALVAGE & TURNED OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN DURING CONST.
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
TOP OF WALLS
6" RECYCLE LINE
RBC TREATMENT PLANT EXPANSION
BLOWER BLDG
10" RBC INFLUENT
STORM INLET
CHEMICAL FEED BLDG
6000 GAL FERT TK
GRAVEL AREA
MH
3/8" SAMPLE LINE
36" ID
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
GRAVEL PAD (TOP ELEV.=1710.5±)
REMOVE CONC FLOODWALL
GRAPHIC SCALES
4/2/98 3RD LIFT

FIELD DENSITY SUMMARY SHEETS

Project: RAAP Bio-Plant Date: 4/2/98

Client: Ciminelli Services Record No.:

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	20' N.E. From Toe of slope Sec A	-7	~~14.4~~	~~107.9~~	~~82.4~~	90%	NG 4-6" Depth	~~65926~~
2	w/30% Rock Correction		14.4	119.9	91.6			
3	25' S.E. From Toe of slope Sec B	-7	~~16.1~~	~~111.3~~	~~85.0~~			
4	w/30% Rock Correction		16.1	120.6	92.2			
5	35' N.W. From Toe of slope Sec C	-7	12.8	120.6	92.2			
6	50' S.W. From Toe of slope Sec D	-7	~~15.2~~	~~107.6~~	~~82.2~~			
7	w/30% Rock Correction		15.2	120.9	92.4			
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65926	130.8	8.9	Yellow BRN clay	

Remarks:
material is not matching with proctor.
4th Lift Completed.

Froehling & Robertson, Inc.

Technician:

Key:

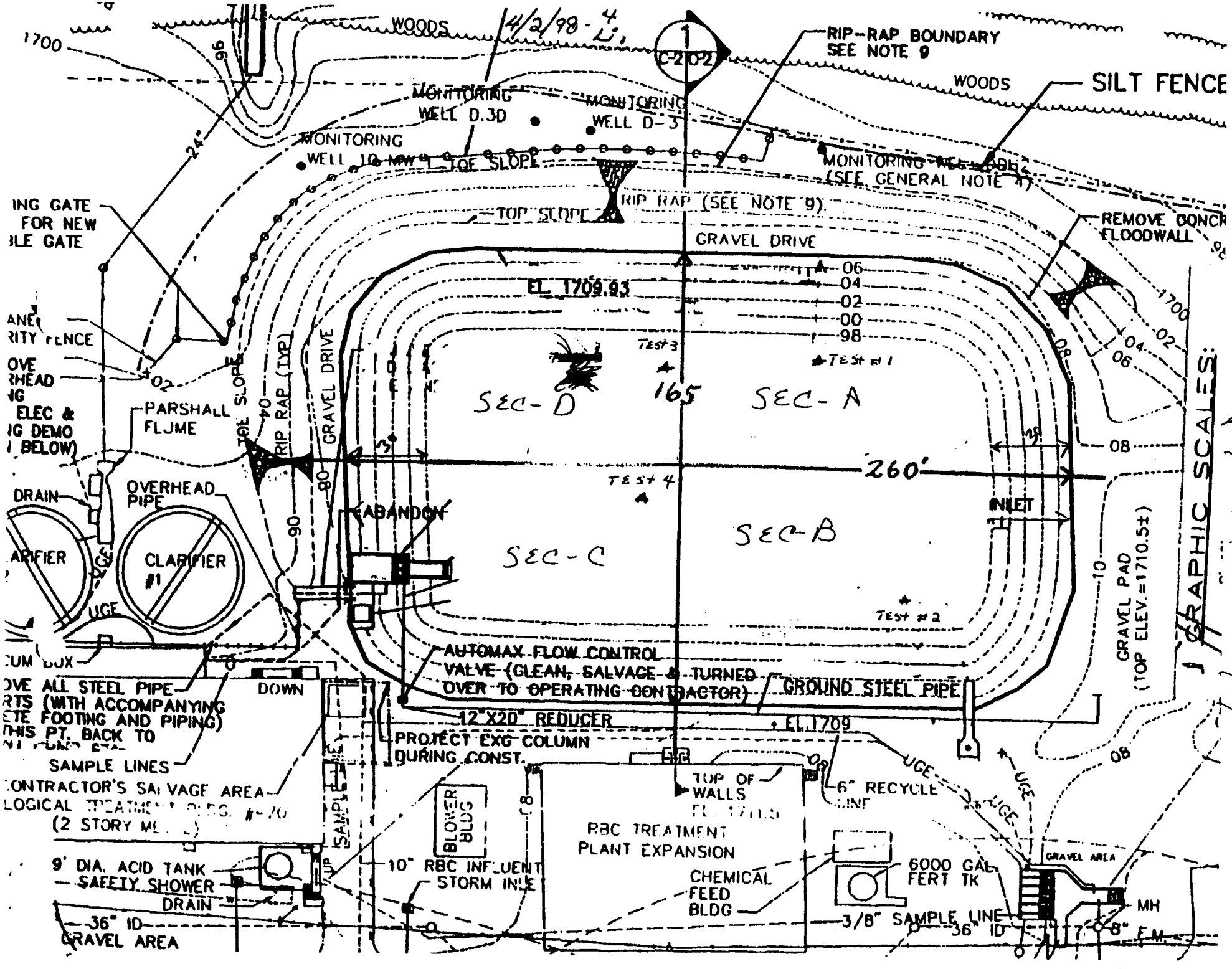
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


WOODS
4/2/98 - 4
1700
96
C-2.0-2
RIP-RAP BOUNDARY
SEE NOTE 9
WOODS
SILT FENCE
MONITORING
WELL D.3D
MONITORING
WELL D-3
MONITORING
WELL 10 MW
TOE SLOPE
MONITORING WELL D-2
(SEE GENERAL NOTE 4)
RIP RAP (SEE NOTE 9)
TOP SLOPE
ING GATE
FOR NEW
LE GATE
REMOVE CONCR
FLOODWALL
GRAVEL DRIVE
EL. 1709.93
06
04
02
00
98
ANE
RITY FENCE
OVE
RHEAD
NG
ELEC &
IG DEMO
BELOW)
PARSHALL
FLUME
TOE SLOPE
RIP RAP (TYP)
GRAVEL DRIVE
Test 3
Test #1
SEC-D
165
SEC-A
08
260'
Test 4
SEC-C
SEC-B
Test #2
INLET
DRAIN
OVERHEAD
PIPE
ABANDON
CLARIFIER
#1
UGE
GRAVEL PAD
(TOP ELEV.=1710.5±)
AUTOMAX FLOW CONTROL
VALVE (CLEAN, SALVAGE & TURNED
OVER TO OPERATING CONTRACTOR)
GROUND STEEL PIPE
12"X20" REDUCER
EL. 1709
PROTECT EXG COLUMN
DURING CONST.
DOWN
SAMPLE LINES
CONTRACTOR'S SALVAGE AREA
(2 STORY ME
TOP OF
WALLS
6" RECYCLE
LINE
BLOWER
BLDG
RBC TREATMENT
PLANT EXPANSION
9' DIA. ACID TANK
SAFETY SHOWER
DRAIN
10" RBC INFLUENT
STORM INLET
CHEMICAL
FEED
BLDG
6000 GAL
FERT TK
3/8" SAMPLE LINE
36" ID
GRAVEL AREA
GRAVEL AREA
MH
8" F.M.
GRAPHIC SCALES
4/2/98 - 4/4/17

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **91**
Wednesday
01 April 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

07 Apr 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 4-1-98 Report No. 93 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P. Cloudy] [Cloudy] [Rain: .5 inches] [Temp. ___ min. 70 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )

b. ( ) Ciminelli - Remove berm, backfill

c. ( )

d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Roller - used
Excavator - left site today

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - remove berm, backfill

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO Deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip + manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

NO earthmoving until 1pm due to Soil Conditions

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 4-1-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Dozer	4	6
Superintendent	1	10									Roller	2	8
Operator	1	10									Excavator	0	5
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3										3		
NO. OF HOURS (SUBTOTALS)		10									30		
											PREVIOUS TOTAL HOURS 1867		
											TOTAL HOURS THROUGH THIS DATE 1897		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **90**
Tuesday
31 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 07 Apr 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-31-98 Report No. 92 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 85 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) C- Ciminelli - remove berm / Backfill b. ( )

c. ( ) S- Geary & Pape - Arch Monitoring

d. ( ) S- F&R - Soil testing e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Loader - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Placed 2nd lift and portion of 3rd
Geary & Pape - Concluded Arch Monitoring
F&R - Soil testing

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

See test report for 3-31-98

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip + manpower Reports

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-31-94

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Grove Pape #	Grove Pape HRS	EER #	EER HRS					EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	4	6
Superintendent	1	10									Dozer	5	5
Operator	1	10									Roller	4	6
CSAM			1	10									
Soil tech					1	3							
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3		1		1						5		
NO. OF HOURS (SUBTOTALS)		30		10		3					43		
											PREVIOUS TOTAL HOURS 1824		
											TOTAL HOURS THROUGH THIS DATE 1867		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

Soil Lifts

DESCRIPTION OF TEST:

Nuclear Gage

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Penny Conner

TITLE Field Tech

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

BG Sadler

DATE 4-1-98

REMARKS: Samples collected for Sand Cone, Atterberg limits, and gradation analysis

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAP Bio-Plant
Client's Name: Ciminelli Services
Inspection of: Backfill - Basin Enclosure

F & R Job No.:
Date: 3/31/98
Technician: P. Carver

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

I Contractor Activity
1. Contractor placed an 8" lift at Equalization Basin. Soil came from on-site borrow area. Placement was done by a John Deere Loader - Compaction done by Ingersoll-Rand vibratory roller. 2nd lift has been completed
2. 3rd lift was placed at East end

II Technician Activity
1. Technician observed above mentioned Performed Density Tests. F&R Engineer was on site and reviewed test. Rock Correction.
A sample of soil was taken back to lab for Atterberg limits test and gradation analysis.

F&R Form 116

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. Bio Plant **Date:** 3/31/98

Client: Cinnelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	15' N.E. from Toe of slope sec A	-9	20.6	106.0	90.1	90%	NG 8.6" Depth	65925
2	60' S.E From Toe of Slope Sec B	-9	21.1	104.6	88.9			
3	Test #2 +4 Rock Correction at 7%			108.6	92.3			
4	10' N.W. From Toe of Slope. Sec-C	-9	17.3	111.0	94.3			
5	8' N.W. From Toe of slope. Sec-D	-9	17.2	107.3	91.2			
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65925	117.6	13.9	Dark Brown Sandy Clay	

Remarks:
Tests were taken at Equalization Basin
Tests were taken on 2nd Lift.

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

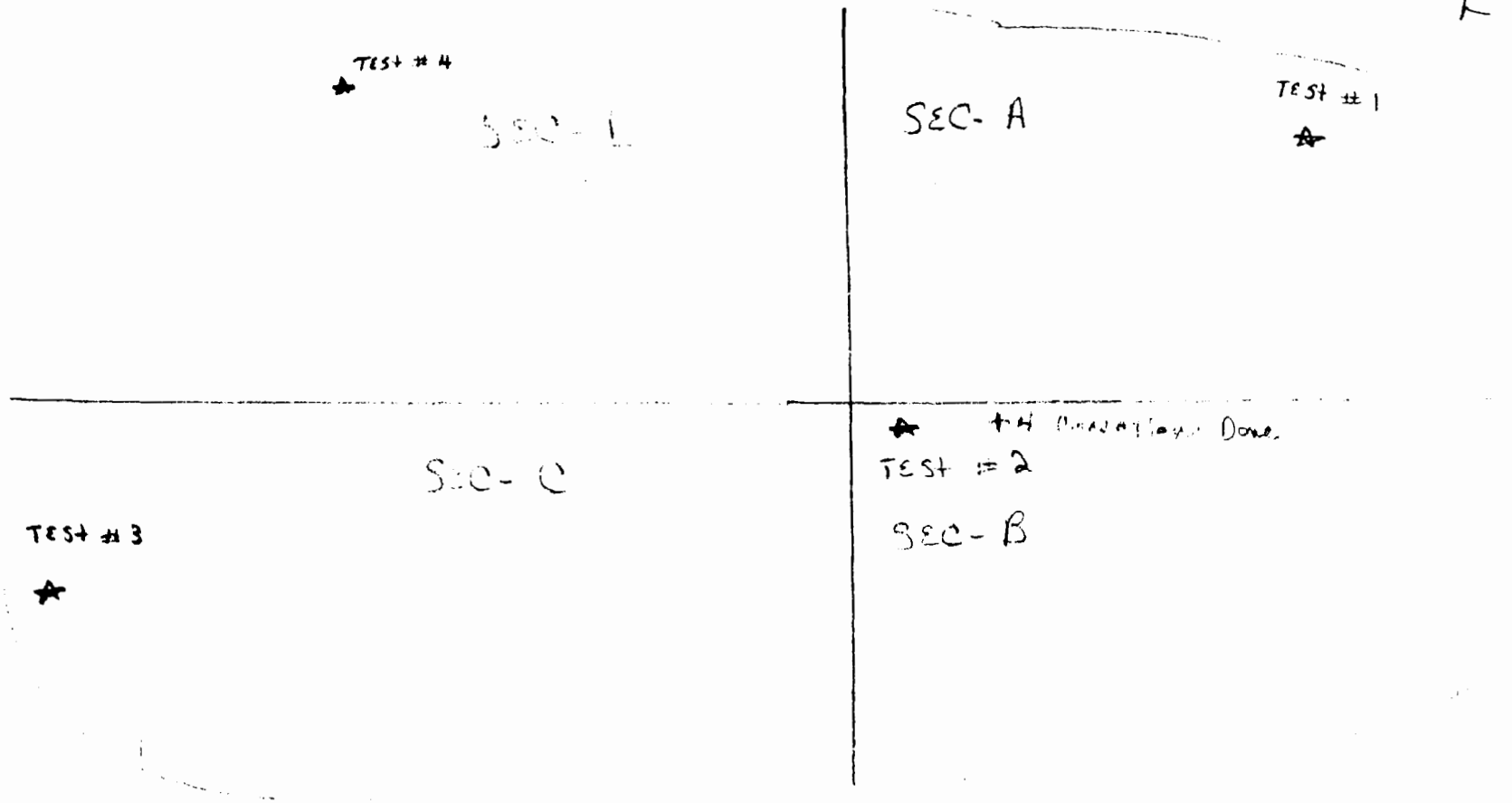
SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)


N
E
W
S
TEST # 4
SEC- D
SEC- A
TEST # 1
TEST # 3
TEST = 2
SEC- C
SEC- B

FIELD DENSITY SUMMARY SHEETS

Project: RAAP. Bio Plant **Date:** 3/31/98

Client: Ciminelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.		
1	20' N.E. from Top of Slope Sec A	-8	19.4	107.6	91.4	90%	NG 8-6" Depth	65925
2	30' S.E from Top of Slope Sec B	-8	22.7	103.2	88.2	↓	↓	↓
3	TEST #2 - +4 Rock Correction at 7% Sec-C			107.2	91.1	↓	↓	↓
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65925	117.6	13.9	Dark Brown Sandy Clay	

Remarks:
Tests were taken at Equalization Basins 3rd lift East End only

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

SC - Sand Cone (ASTM D1556)

NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

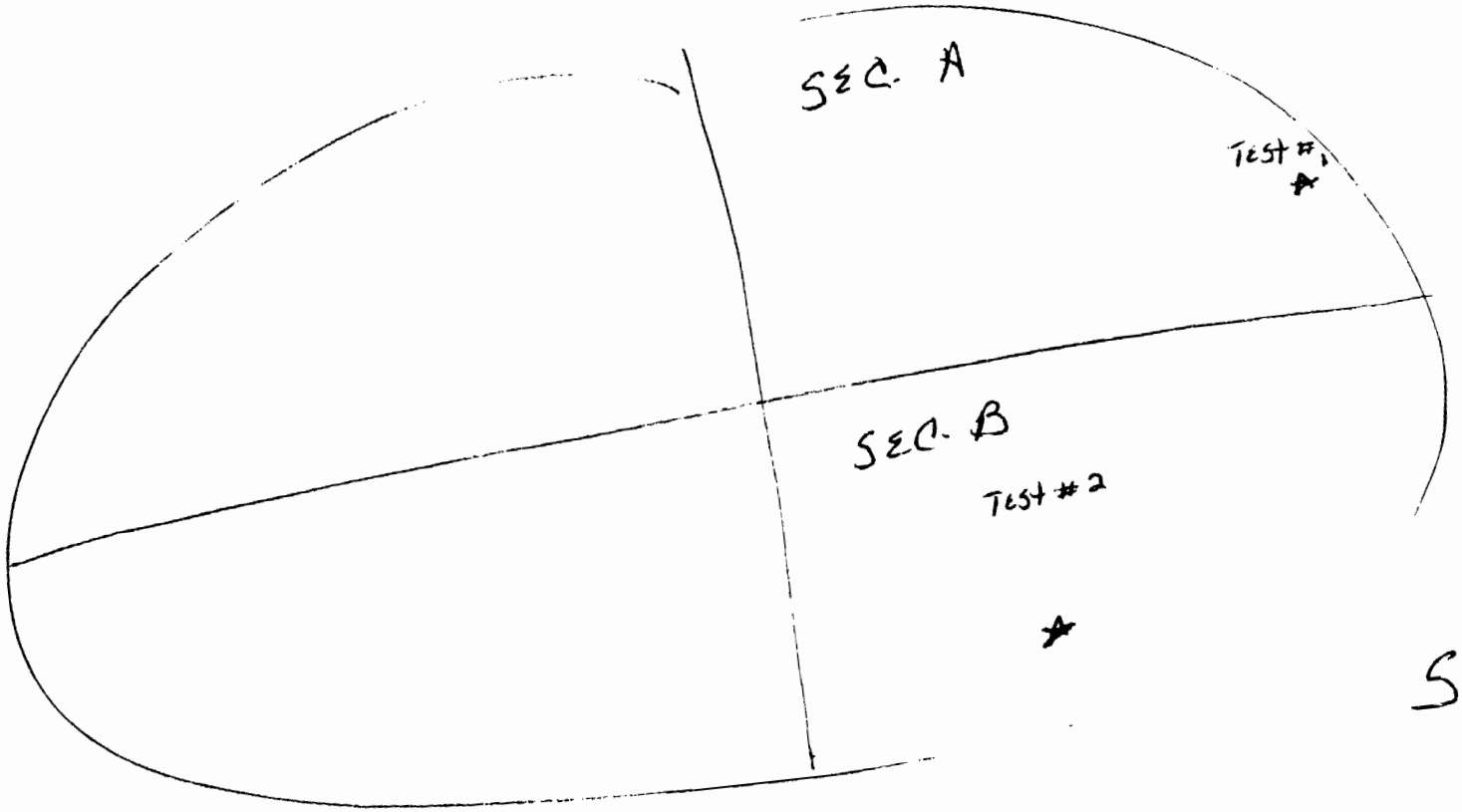
STD. - (ASTM D698)

MOD. - (ASTM D1557)

3/31/98
1/2 of 3rd lift

E

N



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W

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **89**
Monday
30 March 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Attended preparatory inspection on backfilling operations.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 01 Apr 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-30-98 Report No. 89-91 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 80 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - remove berm and back fill b. ( )

c. ( ) Grey & Pape - Arch Monitoring d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Excavator - used
Roller - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - portion of berm removed, 8" lift of loose material placed compacted to approx 6"
Grey & Pape - Arch. Monitoring

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: 8:00 am Meeting w/ Mark Bishop, Penny Conner, Eric Sullivan, Brendon Schlammer for removing berm and backfilling.

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

2/ Nuclear Gauge test performed all satisfactory

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Excavator - used
Vibratory roller - used
Dozer - used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

Vibratory roller

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Swallen CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 9-28-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Gray & Pape #	Gray & Pape HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CSAM			1	10									

	PRIME #	PRIME HRS	Gray & Pape #	Gray & Pape HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)			1								1
NO. OF HOURS (SUBTOTALS)				10							10
PREVIOUS TOTAL HOURS											1764
TOTAL HOURS THROUGH THIS DATE											1774

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-29-98

LABOR CLASSIFICATION	PRIME		Gray & Pape								EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
CSAM			1	10									

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)		■	1	■		■		■		■	1
NO. OF HOURS (SUBTOTALS)	■		■	10	■		■		■		10
										PREVIOUS TOTAL HOURS	1774
										TOTAL HOURS THROUGH THIS DATE	1784

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-30-98

LABOR CLASSIFICATION	PRIME		Gray & Pape								EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Excavator	6	4
Superintendent	1	10									Dozer	3	7
Operator	1	10									Roller	3	7
Csam			1	10									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	3		1								4		
NO. OF HOURS (SUBTOTALS)		30		10							40		
PREVIOUS TOTAL HOURS											1784		
TOTAL HOURS THROUGH THIS DATE											1824		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 3-30-98

Title: Remove Berm, Backfill Spec Section: 02210

Drawing No(s): C-3

Definable Feature of Work: Remove Berm, Backfill

A. PERSONNEL PRESENT:

	Name	Position	Company
1.	Mark Bishop	Field Eng.	Army Corps of Eng
2.	Penny Conner	~~F & R~~ Field Tech	~~&~~ F & R
3.	Ed Sullivan	Superintendent	Ciminelli
4.	Brandon Schlemmer	QC Mgr	"
5.			
6.			
7.			
8.			

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO _____

II. Do all parties have up-to-date drawings and specifications? YES X NO _____

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.			
2.	N/A		
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES X NO X

II. Have all materials been checked for contract compliance against approved shop drawings? YES X NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. Sand Cone density equip
2. _____
3. _____
4. _____

E. TESTS required in accordance with contract requirements:

	Test/Paragraph	Frequency
1.	See Sec. 02210 @ 3.13	
2.		
3.		
4.		
5.		
6.		

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES X NO _____
If yes, attach a copy, if no, explain:

previously submitted

G. EQUIPMENT Requiring Operational Check:

1. Excavator
2. Dozer
3. Roller
4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

Quality Control Representative Signature

Bi. Plant Old Equalizati.. Basin Closure CSC Job No: 9708

TEST REPORT

CONTRACTOR'S NAME: Ciminelli Services Corp.

STRUCTURE OR BUILDING EQ Basin Closure

CONTRACT NO: DACA65-98-C-0015

DESCRIPTION OF ITEM, SYSTEM OR PART OF SYSTEM TESTED:

Lift #1

DESCRIPTION OF TEST:

Nuclear Gage

NAME AND TITLE OF PERSON IN CHARGE OF PERFORMING TESTS FOR CONTRACTOR:

NAME Terry Conner

TITLE Field Technician

SIGNATURE See attached

I HEREBY CERTIFY THAT THE ABOVE DESCRIBED ITEM, SYSTEM OR PART OF SYSTEM HAS BEEN TESTED AS INDICATED ABOVE AND FOUND TO BE ENTIRELY SATISFACTORY AS REQUIRED IN THE CONTRACT SPECIFICATIONS.

SIGNATURE OF CONTRACTOR QUALITY CONTROL INSPECTOR

DATE 3-31-98

REMARKS:

SINCE 1881

FROEHLING & ROBERTSON, INC.
GEOTECHNICAL • ENVIRONMENTAL • MATERIALS
ENGINEERS • LABORATORIES
"OVER ONE HUNDRED YEARS OF SERVICE"

DAILY REPORT

Project Name: RAAF Bio Plant
Client's Name: Ciminelli Services
Inspection of: Back Fill

F & R Job No.: ✓
Date: 3/30/88
Technician: P. Carver

This report and the attached data sheet(s) constitute a summary of observations and tests performed by F&R's engineering technician. The statements made herein do not constitute a certification. Approval of data for final report can only be made by F&R's engineers and cannot be conveyed on this form. Interpretations based on this data are the responsibility of others.
THIS IS A FIELD COPY AND IS SUBJECT TO REVIEW AND REVISION.

I Contractor Activity
1. Contractor placed a 6" lift at Equalization Basin. Soil came from on site borrow area. Placement was done by a "John Deere" Dozer. Compaction was done by "Ingersoll Rand" vibratory roller. One lift completed.

II. Technician Activity
1. Technician observed the above mentioned
2. Performed Density Tests - and obtained a sample of soil from each test. Soil sample taken to shop for "#4" Correction.

FIELD DENSITY SUMMARY SHEETS

Project: RARP Bio. Plant **Date:** 3/30/98

Client: Cimnelli Services **Record No.:**

Test No.	Test Location	Elev.	Field Moisture Content (%)	Field Dry Density (pcf)	Percent of Maximum Dry Density		Field Test Type	Proctor No.
					Act.	Spec.	NG	
1	22' N.E. from TOE of slope SEC-A	-10'	17.5	111.5	94.8	90%	[illegible]	65925
2	10' S.E. from TOE of slope SEC-B	-10'	18.5	112.7	95.7	90%	↓	↓
3	25' S.E. from TOE of slope SEC-C	-10'	17.9	109.1	92.7	90%		
4	20' N.E. from TOE of slope SEC-D	-10'	17.3	111.3	94.6	90%	↓	↓
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								

Proctor No.	Max. Dry Density (pcf)	Optimum Moisture (%)	Soil Class.	Lab Test Type
65925	117.6	13.9	Dark Brown Sandy Clay	

Remarks:
Tests made at Equalization Basin.

Froehling & Robertson, Inc.

Technician: P. Conner

Key:

SC - Sand Cone (ASTM D1556)

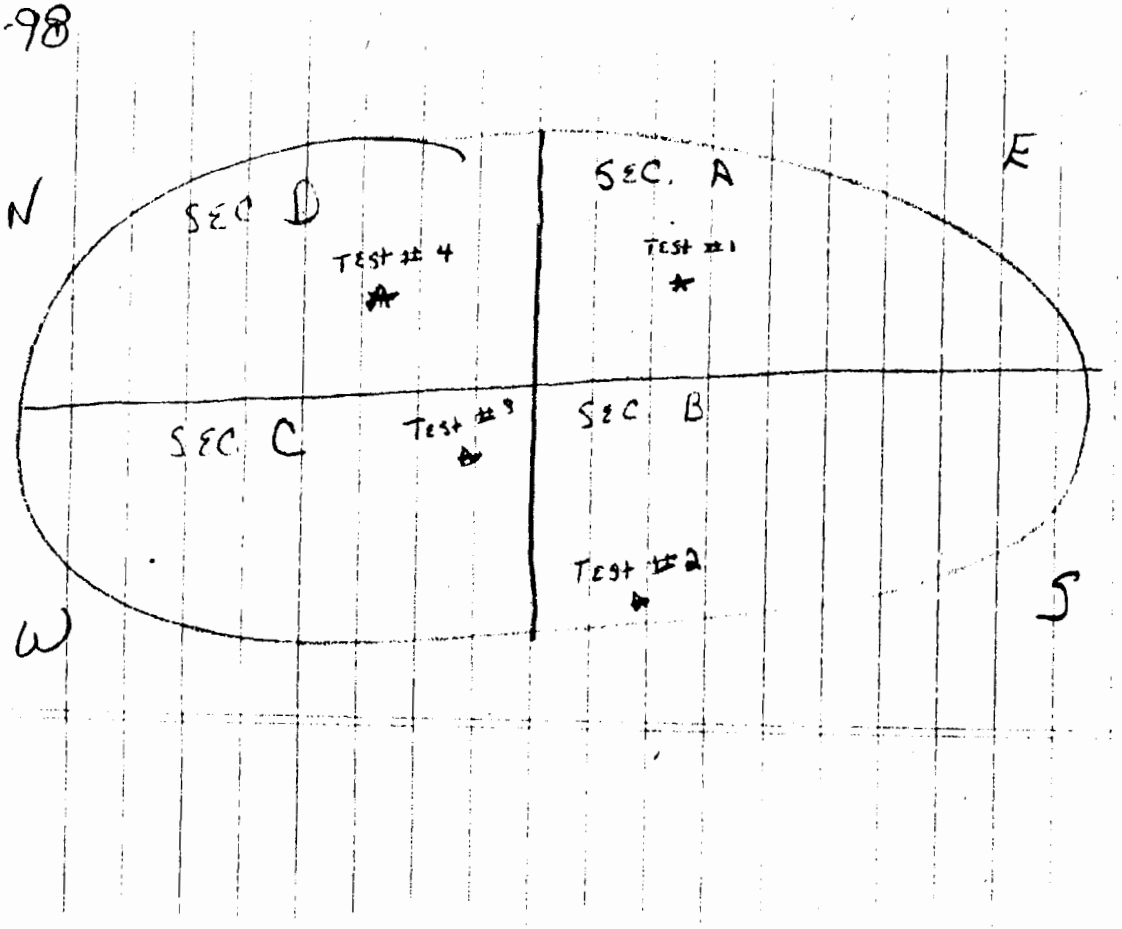
NG - Nuclear Gauge (ASTM D2922 & D3017)

DC - Drive Cylinder (ASTM D2937)

STD. - (ASTM D698)

MOD. - (ASTM D1557)

3-30-98



QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **86**
Friday
27 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

RAAP, OPCON and VA DEQ conducted an inspection associated with RAAP's closure plan/permit with DEQ. Inspection is irrelevant to this contract.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

01 Apr 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-27-98 Report No. 88 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 78 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) C - Ciminelli - basin prep for Inspection b. ( )
( ) S - Gray & Pape - Arch. Investigation c.
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

N/A dozer - used
excavator - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - basin prep. for inspection / prep for backfill
Gray & Pape - Arch. monitoring

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used): See Equip & Manhours report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate: N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Eth CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-27-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Craig & Pate #	Craig & Pate HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									dozer	2	8
Superintendent	1	10									excavator	4	6
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		1								5		
NO. OF HOURS (SUBTOTALS)		40		10							50		
											PREVIOUS TOTAL HOURS	1764	
											TOTAL HOURS THROUGH THIS DATE	1814	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
85
Thursday
26 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

In am today, Area Engr. and undersigned met w/ Ciminelli at their request. Archeological monitor has asked permission to perform some digs to investigate. Raised no objections provided progress ~~on~~ not impacted.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

30 MAR 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-26-98 Report No. 87 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 75 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Liner Removal / Prep for DEQ
b. ( ) Sub - Gray & Pape - Air Monitoring
c. ( ) Sub - Hedge - trucking
d. ( )
e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - liner removal / Basin Prep for Inspection
Gray & Pape - CSAM
Hedge - hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See Equip & Manpower Report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Meeting @ 8:00 am granted CSAM additional time

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Eck

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-26-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Grant Taylor #	Grant Taylor HRS	Hobbs Trucking #	Hobbs Trucking HRS					EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	5	5
Superintendent	1	10									Dozer	3	5
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
Trucker					1	3.5							
NO. OF EMPLOYEES (SUBTOTALS)	4		1		1						TOTALS	6	
NO. OF HOURS (SUBTOTALS)		40		10		3.5						53.5	
											PREVIOUS TOTAL HOURS	1710.5	
											TOTAL HOURS THROUGH THIS DATE	1764	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **83**
Tuesday
24 March 1998

Concur with the contractor's report for this period? ___ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ___ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ___ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

No work Monday, 23 March 1998 (82). Contractor planned to work Tuesday - Friday

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

27MAR98 — DATE

SUPV. INT

DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-24-98 Report No. 81-85 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P. ~~S~~Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. ___ min. 45 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - liner removal and disposal b. ( ) S - Gray & Pape - Arch. Monitoring c. ( ) S - Hodge Trucking - hauling d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - liner removal disposal
Gray & Pape - Arch monitoring
Hodge Trucking - hauling liner

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip. & manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Erickson CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-24-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Gray & Taylor #	Gray & Taylor HRS	Hodge Trucking #	Hodge Trucking HRS					EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	9	1
Superintendent	1	10									dozer	2	8
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
Trucker					8	10							
Trucker					6	9.5							
Trucker					3	9							
NO. OF EMPLOYEES (SUBTOTALS)	4		1		17						TOTALS	22	
NO. OF HOURS (SUBTOTALS)		40		10		164						214	
											PREVIOUS TOTAL HOURS	1331	
											TOTAL HOURS THROUGH THIS DATE	1545	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
84
Wednesday
25 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	27MAR98		
	DATE	SUPV. INT	DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-25-98 Report No. E6 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 45 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - liner removal & disposal b. ( ) Gray & Pape - Arch. monitoring c. ( ) Hodge Trucking - hauling d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Removal/disposal of liner
Gray & Pape - CSAM
Hodge Trucking - hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used): See equip & Manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate: N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Meeting 3-26-98 @ 8AM to discuss CSAM progress

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-25-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Gray & Pape #	Gray & Pape HRS	Hodge Trucking #	Hodge Trucking HRS					EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	9	1
Superintendent	1	10									dozer	2	8
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
Trucker					4	7.5							
Trucker					9	7							
Trucker					3	6.5							
Trucker					1	3							
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		1		17						22		
NO. OF HOURS (SUBTOTALS)		40		10		115.5					165.5		
											PREVIOUS TOTAL HOURS 1545		
											TOTAL HOURS THROUGH THIS DATE 1710.5		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
78
Thursday
19 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop
MARK A. BISHOP

27 MAR 98
DATE

SUPV. INT

DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-19-98 Report No. 80 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P. Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 65 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Liner removal / disposal b. ( )
c. ( ) Gray & Pape - Arch. Monitoring
d. ( ) Hodge Trucking - Hauling e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Continued removal of liner in Arch. area / disposal
Gray & Pape - CSAM
Hodge Trucking - Hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equipment & Manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Waiting for response form Corp to RFI stating Cimarelli is exceeding liner quantities for disposal

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Ellen

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-19-98

LABOR CLASSIFICATION	PRIME		Gray & Pape		Hodge Trucking						EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
QC Mgr	1	10									Excavator	8	2
Superintendent	1	10									Dozer	4	4
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
Trucker					6	10.5							
Trucker					9	10							
Trucker					1	9.5							
Trucker					1	7.5							

	PRIME #	PRIME HRS	Gray & Pape #	Gray & Pape HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4		1		17						22
NO. OF HOURS (SUBTOTALS)		40		10		170					220
PREVIOUS TOTAL HOURS											1111
TOTAL HOURS THROUGH THIS DATE											1331

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
78
Thursday
19 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop
MARK A. BISHOP

27 MAR 98
DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-19-98 Report No. 80 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P. Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 65 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Ciminelli - Liner removal / dispose / b. ( ) c. ( ) Gray & Pape - Arch. Monitoring d. ( ) Hodge Trucking - Hauling e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
Dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Continued removal of liner in Arch. area / dispose
Gray & Pape - CSAM
Hodge Trucking - Hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equipment & Manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Waiting for response form Corp to RFI stating Cimarelli is exceeding liner quantities for disposal

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Ellen

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-19-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Gray & Tape #	Gray & Tape HRS	Hodge Trucking #	Hodge Trucking HRS				EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10								Excavator	8	2
Superintendent	1	10								Dozer	4	4
Operator	1	10										
Laborer	1	10										
CSAM			1	10								
Trucker					6	10.5						
Trucker					9	10						
Trucker					1	9.5						
Trucker					1	7.5						
										TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		1		17					22		
NO. OF HOURS (SUBTOTALS)		40		10		170				220		
										PREVIOUS TOTAL HOURS 1111		
										TOTAL HOURS THROUGH THIS DATE 1331		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 77
Wednesday
18 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

During afternoon site, observed use of jackhammer. Discussed with B. Schlemmer that this activity not covered in AHA for concrete removal. Reviewed safety precautions required and informed Schlemmer to implement.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — 20 MAR 98 — SUPV. INT — DATE

MARK A. BISHOP — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-18-98 Report No. 79 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] (Cloudy) (Rain) ___ inches] [Temp. ___ min. 44 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( )

b. ( ) Contractor - Ciminelli - liner removal

c. ( ) Sub - Gray + Tape - ESAM

d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Dozer - used
Excavator - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - removal of liner / Flood wall in Arch Area
Gray + Tape - Arch monitoring

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Mark Bishop - use of Jackhammer Requires additional Safety protections. See below #7

7. Job Safety (Include deficiencies and corrective action taken:

Jack hammer - requires Arch protection and clipped & lashed hoses in addition to hearing protection. Items will be in place 3-19-98

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See Equipment & Manpower report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

Possible delay in DEQ inspection - will advise

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-18-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Gray + Page #	Gray + Page HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Dozer	8	2
Superintendent	1	10									Excavator	10	0
Operator	1	10											
Laborer	1	10											
CSAM			1	10									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		1								5		
NO. OF HOURS (SUBTOTALS)		40		10							50		
											PREVIOUS TOTAL HOURS 1061		
											TOTAL HOURS THROUGH THIS DATE 1111		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
76
Tuesday
17 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 20MAR98 — DATE

SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-17-10 Report No. 78 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: .25 inches] [Temp. ___ min. 38 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - liner & Concrete removal b. ( ) c. ( ) Sub - Hodge Trucking - hauling d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator
Dozer

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - liner removal
Hodge - hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO Deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equip report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGS/Lee CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-17-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Dozer	7	3
Superintendent	1	10									Excavator	9	1
Operator	1	10											
Laborer	1	10											
Trucker			10	60									
Trucker			3	9.5									
Trucker			4	9									
NO. OF EMPLOYEES (SUBTOTALS)	4		17								TOTALS	21	
NO. OF HOURS (SUBTOTALS)		40		164.5								204.5	
											PREVIOUS TOTAL HOURS	856.5	
											TOTAL HOURS THROUGH THIS DATE	1061.0	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
75
Monday
16 March 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	20MAR98		
	DATE	SUPV. INT	DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-16-98 Report No. 77 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work: EB Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 35 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) C - Ciminelli - removal of soil/cement liner b. ( )
c. ( ) S - Hodge Trucking - hauling
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Continued removal and hauling soil/cement liner

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See Manpower + equip report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

D Gallagher CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-16-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									dozer	6	4
Superintendent	1	10									excavator	8	2
Operator	1	10											
Laborer	1	10											
Trucker			4	10									
Trucker			3	9.5									
Trucker			1	9									
Trucker			5	8									
Trucker			1	7.5									
Trucker			3	7									
Trucker			1	8.5									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		18								22		
NO. OF HOURS (SUBTOTALS)		40		154.5							194.5		
											PREVIOUS TOTAL HOURS: 662		
											TOTAL HOURS THROUGH THIS DATE: 856.5		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
71
Thursday
12 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	20MAR98	SUPV. INT	
	DATE		DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-12-98 Report No. 73 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P~~C~~loudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 32 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) C - Ciminelli - soil/cement liner removal b. ( ) S - Hudgen Trucking - hauling c. ( )

d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
dozer - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Continued removal and hauling of basin liner

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See manpower + equip report

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-12-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC mgr	1	10									excavator	7	3
Superintendent	1	10									dozer	4	4
Operator	1	10											
Laborer	1	10											
Trucker		E	3	10									
Trucker			1	9									
Trucker			5	8									
Trucker			1	7									
Trucker			1	4.5									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		11								15		
NO. OF HOURS (SUBTOTALS)		40		98.5							138.5		
											PREVIOUS TOTAL HOURS: 523.5		
											TOTAL HOURS THROUGH THIS DATE: 662		

* Note last report incorrectly dated. should be 3-11-98

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
70
Wednesday
11 March 1998

Concur with the contractor's report for this period? ___ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ___ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ___ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

NO SITE VISITS ON ANNUAL LEAVE

Guy Rhodes attended initial inspection on liner removal.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

14 MAR 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-11-98 Report No. 72 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work: EQ Basin Closure

Weather: [Clear] ~~[Cloudy]~~ [Cloudy] [Rain: ___ inches] [Temp. ___ min. 28 max.] Other Weather Conditions windy

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Site demolition b. ( ) Sub - Hodge Trucking - hauling debris c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used
dozer - used
dump trucks - used

See manpower & equipment report for hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Site demolition / removal of soil cement liner
Hodge Trucking - hauling debris

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: on removal of concrete flood wall and soil / cement liner - satisfactory - Guy Rhodes present

c. Follow-up Phase: N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See equipment data sheet

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

~~N/A~~ BGS One dump truck broke down 1.5 hr. delay while hydring truckers

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGS CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-10-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Hodge Trucking #	Hodge Trucking HRS	#	HRS	#	HRS	#	HRS
QC Mgr	1	10								
Superintendent	1	10								
Operator	1	10								
Laborer	1	10								
Truck driver			5	9						
Truck driver			1	4.5						
NO. OF EMPLOYEES (SUBTOTALS)	4		6							
NO. OF HOURS (SUBTOTALS)		40		47.5						

EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
excavator	7	3
dozer	3	7
5 dump trucks	9	0
1 dump truck	4.5	0
TOTALS	10	
	89.5	
PERVIOUS TOTAL HOURS	434	
TOTAL HOURS THROUGH THIS DATE	523.5	

Bio Plant Old Equalization Basin Closure CSC Job No; 9708

INITIAL PHASE CHECKLIST

CONTRACTOR'S NAME: Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Initial Held: 3-11-98

Title: EQ Basin Closure Spec Section: 02072 @ 3.5.1.2 + 3.5.1.3

Drawing No(s).: _____

Definable Feature of Work: Demolition of Concrete Flood Wall and Removal of soil/cement liner

A. PERSONNEL PRESENT:

Name	Position	Company
1. Brandon Schlemmer	QC Mgr	Ciminelli Services
2. Guy Rhodes	Field Eng.	Army Corps of Eng
3.		
4.		
5.		
6.		

B. MATERIALS being used are in strict accordance with the contract plans and specifications? YES X NO _____

If not, explain: _____

C. WORKMANSHIP:

I. Procedures and/or work methods witnessed are in strict compliance with the requirement of the contract specifications? YES X NO _____

If not, explain: _____

II. Workmanship is acceptable? YES X NO _____

State area where improvement is needed: _____

D. SAFETY violations and corrective action taken: No violation

E. COMMENTS: Guy Rhodes very please with progress

Quality Control Representative Signature

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
69
Tuesday
10 March 1998

Concur with the contractor's report for this period? ___ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ___ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ___ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

NO SITE VISITS ON ANNUAL LEAVE.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 14 MAR 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-10-98 Report No. 71 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P. ~~Cl~~oudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 35 max.] Other Weather Conditions

Flurries

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - site demolition b. ( ) Sub - Gem City - Scrap metal c. ( )

d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used 8 hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Soil/cement liner pulled down and stockpiled for loading. Stayed out of Auth. area Gem City hauled last load of scrap metal

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

Visual confirmation that remainder of piping was clean confirmed by Crystal Compton & Guy Rhodes

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Excavator used 8 hrs

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-10-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC mgr	1	10									excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4										4		
NO. OF HOURS (SUBTOTALS)		40									40		
											PREVIOUS TOTAL HOURS	394	
											TOTAL HOURS THROUGH THIS DATE	434	

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **68**
Monday
09 March 1997

Concur with the contractor's report for this period? ___ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ___ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ___ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

NO SITE VISITS. ON ANNUAL LEAVE

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

14 MAR 98 — DATE

SUPV. INT

DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-9-98 Report No. 67-70 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. ___ min. 58 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Site Demolition b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used 8hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - continued demolition of ~~Hot~~ floodwall - and soil/sediment liner - also completed demolition of steel piping

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:
N/A

b. Initial Phase:
N/A

c. Follow-up Phase:
N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Excavator - used 9 hrs

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): removed extra piping and support stanchion per instructions - waiting for approval of C-Sam

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-9-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4										4		
NO. OF HOURS (SUBTOTALS)		40									40		
											PREVIOUS TOTAL HOURS: 354		
											TOTAL HOURS THROUGH THIS DATE: 394		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
64
Thursday
05 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP	14 MAR 98	SUPV. INT	
	DATE		DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-5-98 Report No. 66 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 45 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - site demolition b. ( )

c. ( ) Sub - Gen City - hauling scrap metal d. ( )

e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used 8 hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - pipe demolition

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

b. Initial Phase: Pipe demolition satisfactory

c. Follow-up Phase:

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

Visual Confirmation By Allied Tech Systems that pipe is satisfactorily clean

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Excavator - used 8 hrs

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Engineering

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-5-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											

	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4										4
NO. OF HOURS (SUBTOTALS)		40									40
PREVIOUS TOTAL HOURS											314
TOTAL HOURS THROUGH THIS DATE											354

Bio Plant Old Equalization Basin Closure CSC Job No; 9708

INITIAL PHASE CHECKLIST

CONTRACTOR'S NAME: Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Initial Held: 3-5-98

Title: EQ Basin Closure Spec Section: 2072 & 3.5.1.4

Drawing No(s).:

Definable Feature of Work: Demolition of Steel Piping

A. PERSONNEL PRESENT:

Name	Position	Company
1. Brandon Schlemmer	QC Mgr	Ciminelli
2. Ed Sullivan	Superintendent	"
3. Mark Bishop	Field Eng	Army Corps of Eng.
4. Crystal Compton	Field Eng	Alliant Tech Systems
5.		
6.		

B. MATERIALS being used are in strict accordance with the contract plans and specifications? YES X NO

If not, explain:

C. WORKMANSHIP:

I. Procedures and/or work methods witnessed are in strict compliance with the requirement of the contract specifications? YES Y NO _____

If not, explain: _____

II. Workmanship is acceptable? YES X NO _____

State area where improvement is needed: _____

D. SAFETY violations and corrective action taken: No violations

E. COMMENTS: Preparatory stated that pressure washer was not present. Pressure washer is now on site and being used.

_____
Quality Control Representative
Signature

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 63
Wednesday
04 March 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Am meeting with RAAP, OPCON & Ciminelli to discuss sludge cleaning procedures. See submittal rec'd 09 Feb 98 and Trans. No. 3 for details. Preparatory for pipe removal held in afternoon.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 4MAR98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-4-98 Report No. 65 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. ___ min. 38 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - site demolition b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:
Ciminelli - began demolition of ~~steel~~ steel pipe, it is being staged for washing. Demolition of effluent station to point where it needs to be washed

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: demolition of steel pipe @ 1pm

b. Initial Phase:

c. Follow-up Phase:

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

excavator - used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Procedure for demolition of steel pipe finally agreed upon. It is a deviation from specifications, See work plan for revised procedure

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Eddleman CONTRACTOR'S QC SYSTEM MANAGER

Also Note: Report date 3-3-98 should be #64 not #63. BGS

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-4-98

LABOR CLASSIFICATION	PRIME										EQUIPMENT DESCRIPTION	NO. HOURS	
	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS		USED	IDLE
CQC Mgr	1	10									Excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4										4
NO. OF HOURS (SUBTOTALS)		40									40
PREVIOUS TOTAL HOURS											277
TOTAL HOURS THROUGH THIS DATE											314

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 3-4-98

Title: EQ Basin Closure Spec Section: 2072 & 3.5.1.4

Drawing No(s):

Definable Feature of Work: demolition of steel pipe

A. PERSONNEL PRESENT:

	Name	Position	Company	
1.	Brandon Schlemmer	Ciminelli		
2.	Ed Sullivan	"		
3.	Mark Bishop	Army Corps of Eng.		
4.	Guy Rhodes	"		
5.				
6.				
7.				
8.				

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO

II. Do all parties have up-to-date drawings and specifications? YES X NO

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.	N/A		
2.			
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES _____ NO X

II. Have all materials been checked for contract compliance against approved shop drawings? YES X NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. Pressure washer
2. _____
3. _____
4. _____

E. TESTS required in accordance with contract requirements:

	Test/Paragraph	Frequency
1.	Visual Inspection by Jerry Redder	Before pipe can leave site
3.		
4.		
5.		
6.		

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES X NO _____
If yes, attach a copy, if no, explain:

previously submitted

G. EQUIPMENT Requiring Operational Check:

1. Excavator
2. Chop Saw
3. _____
4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

BG E

Quality Control Representative Signature

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 62
Tuesday
03 March 1998

Concur with the contractor's report for this period? ___ Yes ✓ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ✓ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

During mid afternoon site visit, observed demo work on sludge line. Instructed Ciminelli to stop this work until preparatory held and procedures established for handling sludge residue.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — 4 MAR 98 — SUPV. INT — DATE

MARK A. BISHOP | DATE | SUPV. INT | DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-3-98 Report No. 63 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp: 3~ min. 38 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Site demolition b. ( ) c. ( )
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - demo effluent station, steam line, air line

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:
N/A

b. Initial Phase:
N/A

c. Follow-up Phase:
N/A

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Mark Bishop - 3-2-98 @ about 3 pm asked work to Stop on G Sludge line Remove.

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

Excavator used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGS

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-3-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
QC Mgr	1	10									Excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											

	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4	■		■		■		■		■	4
NO. OF HOURS (SUBTOTALS)	■	10	■		■		■		■		40
PREVIOUS TOTAL HOURS											234
TOTAL HOURS THROUGH THIS DATE											274

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: **61**
Monday
02 March 1997

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

Mark A. Bishop — MARK A. BISHOP

4 MAR 98 — DATE

SUPV. INT

DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 3-2-98 Report No. 60-63 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work: EQ Basin Closure

Weather: [Clear] [P ~~Cloudy~~] [Cloudy] [Rain: ___ inches] [Temp. 50 min. ____ max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Site demolition b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - used 8 hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - continued Electrical demolition, demolition of flood wall, dewatering basin

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: N/A

b. Initial Phase: N/A

c. Follow-up Phase: N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

Meeting to discuss 20" Steel Pipe on 3-3-98 @ 1pm

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

excavator used 8 hrs

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Sr

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 3-2-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CQC Mgr	1	10									excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4										4		
NO. OF HOURS (SUBTOTALS)		40									40		
											PREVIOUS TOTAL HOURS: 194		
											TOTAL HOURS THROUGH THIS DATE: 234		

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
57
Thursday
26 February 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Attended preparatory inspection for concrete demo. No specific comments.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 27FEB98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 2-26-98 Report No. 54 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. 60 min. ___ max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Site Demolition b. ( ) c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Excavator - Used B Hrs

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:
Ciminelli - Effluent pumps and Station dismantled, electrical demo continued

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

b. Initial Phase:

c. Follow-up Phase:

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

No deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

excavator used 8 hrs

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Jerry Redder from Alliant Tech to fax his opinion on contents of 20" steel pipe

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BG Smith CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 2-26-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CQC Mgr	1	10									excavator	8	2
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4										4		
NO. OF HOURS (SUBTOTALS)		40									40		
											PREVIOUS TOTAL HOURS 154		
											TOTAL HOURS THROUGH THIS DATE 194		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 2-26-98

Title: EQ Basin Closure Spec Section: 02072 3.5.1.2, 3.5.1.3

Drawing No(s):

Definable Feature of Work: Demotion of Concrete Floodwall and Soil/Cement Liner

A. PERSONNEL PRESENT:

	Name	Position	Company	
1.	Brandon Schlemmer		Ciminelli	
2.	Ed Sullivan		"	
3.	Mark Bishop		Army Corps Eng	
4.				
5.				
6.				
7.				
8.				

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO

II. Do all parties have up-to-date drawings and specifications? YES X NO

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.	N/A		
2.			
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES X NO _____

II. Have all materials been checked for contract compliance against approved shop drawings? YES X NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. N/A
2. _____
3. _____
4. _____

E. TESTS required in accordance with contract requirements:

Test/Paragraph	Frequency
1. N/A	
2.	
3.	
4.	
5.	
6.	

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES X NO _____
If yes, attach a copy, if no, explain:

_____

_____

_____

_____

_____

G. EQUIPMENT Requiring Operational Check:

1. Link-Belt 4300
2. _____
3. _____
4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

N/A

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

BGE

Quality Control Representative
Signature

ACTIVITY HAZARD ANALYSIS

ACTIVITY: Demolition of Floodwall and Liner

ANALYZED BY: Ed Sullivan DATE: 2-26-98 REVIEWED BY: Brandon Schlemmer DATE: 2-26-98

COMPANY: Ciminelli COMPANY: Ciminelli

PRINCIPAL STEPS Identify steps involved & sequence of activities.	POTENTIAL HAZARDS Analyze each principal step for potential hazards.	RECOMMENDED CONTROLS Develop specific controls for each potential hazard.
breaking concrete wall and liner	heavy equipment hazards	NO other work to be done in area
loading dump trucks	falling debris	drivers not in truck while being loaded
hauling loads	traffic hazards	trucks will remain on haul route and follow ZARA traffic rules - will not be overloaded
other hazard -	slipping into bottom of layers	operator will not track perpendicular to side slope

ACTIVITY HAZARD ANALYSIS

EQUIPMENT TO BE USED List equipment to be used in the work activity.	INSPECTION REQUIREMENTS List inspection requirements for the work activity.	TRAINING REQUIREMENTS List training requirements, including hazard communication.
Linkbelt 4300	daily maintenance cks	operator w/ 25 yrs exp
dump trucks	Company required maintenance	subcontractor supplies experienced drivers

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day:
56
Wednesday
25 February 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Participated in an initial inspection on clearing & grubbing activity.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 27 Feb 98 DATE — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 2-25-98 Report No. 58 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

EC Basin closure

Weather: [Clear] [~~P~~Cloudy] [Cloudy] [Rain: ___ inches] [Temp. 48 min. ___ max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - electrical demo - testing rip-rap b. ( ) c. ( ) Subcontractor - Jones trucking - trucking d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Linkbelt 4300 - in use
two dump trucks - in use

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - continuing electric demo
Jones - hauling

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

b. Initial Phase: Cleaning + grubbing - satisfactory

c. Follow-up Phase:

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

See #2

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 2-25-98

	PRIME		Jones Trucking									NO. HOURS	
LABOR CLASSIFICATION	#	HRS	#	HRS	#	HRS	#	HRS	#	HRS	**EQUIPMENT DESCRIPTION**	USED	IDLE
CQC mgr	1	10									excavator		
Superintendent	1	10									dump truck		
Operator	1	10									dump truck		
Laborer	1	10											
truck drivers	~~2~~		2	6									

											TOTALS
NO. OF EMPLOYEES (SUBTOTALS)	4		2								8
NO. OF HOURS (SUBTOTALS)		40		12							52
PREVIOUS TOTAL HOURS											112
TOTAL HOURS THROUGH THIS DATE											154

Bio Plant Old Equalization Basin Closure CSC Job No; 9708

INITIAL PHASE CHECKLIST

CONTRACTOR'S NAME: Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Initial Held: 2-25-98

Title: EQ Basin Closure Spec Section: _____

Drawing No(s).: C-2, C-4, T-2

Definable Feature of Work: Clearing & Grubbing / Silt Fence & restage of gravel and rip-rap

A. PERSONNEL PRESENT:

Name	Position	Company
1. Brandon Schlemmer,	CQC Mgr,	Ciminelli
2. Mark Bishop,	Field Engineer,	Army Corps of Eng
3.		
4.		
5.		
6.		

B. MATERIALS being used are in strict accordance with the contract plans and specifications? YES X NO _____

If not, explain: _____

C. WORKMANSHIP:

I. Procedures and/or work methods witnessed are in strict compliance with the requirement of the contract specifications? YES X NO _____

If not, explain: _____

II. Workmanship is acceptable? YES X NO _____

State area where improvement is needed: _____

less dirt with rip-rap

D. SAFETY violations and corrective action taken: _____

No violation; No CA needed

E. COMMENTS: _____

BG Sell

Quality Control Representative Signature

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 55
Tuesday
24 February 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ■ No ✓ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Attended preparatory inspection for electrical demolition. Following comments noted:
- Electrical demo had not been addressed in demo work plan submitted by Ciminelli. Discussed electrical demo in detail and agreed to allow limited work
- Some minor exterior circuits (not shown on drawing but visible during bid period site visits) discussed. Advised Ciminelli to expose power source prior to demo.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 27 FEB 98 DATE — SUPV. INT — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 2-24-98 Report No. 47-57 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. ___ min. 45 max.] Other Weather Conditions
windy

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Ciminelli - Oversight, Clearing & Grubbing b. ( ) Subcontractor - Current Electric - Electrical Demo c. ( )
d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

Linkbelt 4300 excavator - not used

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Current Electric - electrical demolition
Ciminelli - Complete silt fence, dewatering in process

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: Electrical Demolition

b. Initial Phase:

c. Follow-up Phase:

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:
2-24-98 @ 1500 hrs Mark Bishop requested hand digging of unidentified conduits around abandoned inlet channel

7. Job Safety (Include deficiencies and corrective action taken:

NO deficiencies

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

excavator not used

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays): Electrical outlets discoved not on print. Extra investigation work by Cunningt Electric to identify circuits involved - Also discrepancies on labeling of existing RD circuits.

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

BGE [illegible] CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 2-24-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Current Electric #	Current Electric HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CQC Mgr	1	10									excavator		4
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
electrician			2	8									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4		2								6		
NO. OF HOURS (SUBTOTALS)		40		16							56		
											PREVIOUS TOTAL HOURS 56		
											TOTAL HOURS THROUGH THIS DATE 112		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 2-24-98

Title: EQ Basin Closure Spec Section:

Drawing No(s): C-2

Definable Feature of Work: Electrical Demolition

A. PERSONNEL PRESENT:

	Name	Position	Company	
1.	Mark Bishop		Henry Corp Eng	
2.	Brandon Schlemmer		Ciminelli	
3.	Ed Sullivan		"	
4.	Barton Leignel		Current Elec	
5.	Frank Foster		"	
6.	Jim Eastman		Ciminelli	
7.	Barry Bravo		"	
8.	Joe ~~Ed~~ Loveday / Crystal Compton		Alliant	

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO ____

II. Do all parties have up-to-date drawings and specifications? YES X NO ____

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.	N/A		
2.			
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES X NO _____

II. Have all materials been checked for contract compliance against approved shop drawings? YES N/A NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. N/A
2. _____
3. _____
4. _____

E. TESTS required in accordance with contract requirements:

Test/Paragraph	Frequency
1. N/A	
2.	
3.	
4.	
5.	
6.	

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES X NO _____
If yes, attach a copy, if no, explain:

_____

_____

_____

_____

_____

G. EQUIPMENT Requiring Operational Check:

1. N/A

2. _____

3. _____

4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

_____

_____

_____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: _____

_____

_____

_____

Quality Control Representative
Signature

ACTIVITY HAZARD ANALYSIS

ACTIVITY: Electrical Demolition

ANALYZED BY: Brandon Schlenmer **DATE:** 2-24-98 **REVIEWED BY:** [signature] **DATE:** 2-24-98

COMPANY: Ciminelli **COMPANY:** Ciminelli

PRINCIPAL STEPS Identify steps involved & sequence of activities.	POTENTIAL HAZARDS Analyze each principal step for potential hazards.	RECOMMENDED CONTROLS Develop specific controls for each potential hazard.
Remove Conduit and wire from MCC	Electrical Shock	Identify, Lock and tag circuits to be removed. Qualified elatrician to perform work
Remove exterior conduit and wire	Cuts and abraisions to hands	gloves will be worn
Remove EQ pumps	lifting heavy objects	use excavator with ANST rated chain for lift

ACTIVITY HAZARD ANALYSIS

EQUIPMENT TO BE USED List equipment to be used in the work activity.	INSPECTION REQUIREMENTS List inspection requirements for the work activity.	TRAINING REQUIREMENTS List training requirements, including hazard communication.
Linkbelt 4300	daily equip inspection	operator w/ 25 yrs. experience
demo/chop saw	daily operation check	read operation Manual hot work permit in place

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 54
Monday
23 February 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ✓ No ___ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

Discussions held regarding Enviromental Protection Plan; see file for details.

Attended preparatory inspection for clearing & grubbing

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 27 FEB 98 (DATE) — SUPV. INT — DATE

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 2-23-98 Report No. 54-96 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches] [Temp. ___ min. 35 max.] Other Weather Conditions wet snow

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. ( ) Contractor - Clearing & Grubbing / Silt fence b. ( )
c. ( )
d. ( )
e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Ciminelli - Silt fence installation

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase: completed for Clearing and Grubbing

b. Initial Phase:

c. Follow-up Phase:

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

All Safety procedure followed

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

N/A

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate:

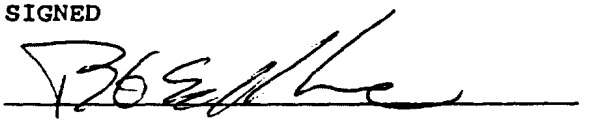
N/A

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED



CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 2-23-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	#	HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CQC Mgr	1	10									N/A		
Superintendent	1	10											
Operator	1	10											
Laborer	1	10											
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	4										4		
NO. OF HOURS (SUBTOTALS)		40									40		
											PREVIOUS TOTAL HOURS 16		
											TOTAL HOURS THROUGH THIS DATE 56		

Bio Plant Old Equalization Basin Closure CSC Job No: 9708

PREPARATORY PHASE CHECKLIST

CONTRACTOR'S NAME Ciminelli Services Corp.

Contract No.: DACA65-98-C-0015 Date Preparatory Held: 2-23-98

Title: EQ Basin Closure Spec Section: _____

_____ Drawing No(s): C-2, C-4, & T-2

Definable Feature of Work: Clearing & Grubbing (silt fence, Rip-rap restaging, gravel restaging)

A. PERSONNEL PRESENT:

	Name	Position	Company	
1.	Brandon Schlemmer		Ciminelli	
2.	Ed Sullivan		"	
3.	Mark Bishop		Army Corps	
4.	Jim Eastman		Ciminelli	
5.	Barry Bravo		Ciminelli	
6.				
7.				
8.				

(List additional personnel on reverse side)

B. DRAWINGS AND SPECS:

I. Has each spec paragraph, contract drawing, and shop drawing been studied? YES X NO _____

II. Do all parties have up-to-date drawings and specifications? YES X NO _____

C. SHOP DRAWINGS INVOLVED:

	Transmittal/Item	Code	Contractor or Gov't Approval
1.	N/A		
2.			
3.			
4.			

D. MATERIALS:

I. Are all materials on hand? YES X NO _____

II. Have all materials been checked for contract compliance against approved shop drawings? YES X NO _____

III. Items not on hand or not in accordance with transmittals (if not on hand, check during initial phase):

1. N/A
2. _____
3. _____
4. _____

E. TESTS required in accordance with contract requirements:

Test/Paragraph	Frequency
1. N/A	
2.	
3.	
4.	
5.	
6.	

F. ACCIDENT PREVENTION: Has Hazard Analysis been completed?
YES ~~X~~ NO ~~X~~
If yes, attach a copy, if no, explain:

~~AHA not required for this~~
AHA turned in with Daily QC report 1-43.

G. EQUIPMENT Requiring Operational Check:

1. Link belt 4300
2. _____
3. _____
4. _____

H. WORKMANSHIP: Have procedures for accomplishing work been reviewed with appropriate people? YES X NO _____

I. PREVIOUS WORK: Has all preliminary work been accomplished in accordance with contract requirements and is this feature of work ready to start? YES X NO _____

Explain any problems: _____

J. HI-LIGHTING SPECIFIC ITEMS: Hi-light specific items noted during the Preparatory Phase inspection. ie, (Med. Voltage cable shall be hi-pot tested).

K. OTHER COMMENTS: Silt fence will be staked 5' on center. Restaging area for Rip-rap may change.

BGS

Quality Control Representative Signature

ACTIVITY HAZARD ANALYSIS

ACTIVITY: Clearing + Grubbing - Silt Fence, Rip-rap, + gravel

ANALYZED BY: Brandon Schlemmer DATE: 2-23-98 REVIEWED BY: Ed Sullivan DATE: 2-23-98

COMPANY: Cimirelli Services COMPANY: Cimirelli Services

PRINCIPAL STEPS Identify steps involved & sequence of activities.	POTENTIAL HAZARDS Analyze each principal step for potential hazards.	RECOMMENDED CONTROLS Develop specific controls for each potential hazard.
Installation of Silt Fence	personal injury to hands + eyes, etc	hard hats, safety glasses, gloves + steel toe shoes will be worn
Restage Rip-rap	working around heavy equip	1) NO other work to be conducted in area
		2) Site safety policies to be reviewed with trucking subcontractor
Restage Gravel	working around heavy equip	No other work done in area

ACTIVITY HAZARD ANALYSIS

EQUIPMENT TO BE USED List equipment to be used in the work activity.	INSPECTION REQUIREMENTS List inspection requirements for the work activity.	TRAINING REQUIREMENTS List training requirements, including hazard communication.
Linkbelt 4300 excavator	daily equipment inspections	Operator has 25 yrs. experience
dump trucks	daily equipment inspections	Subcontractor to provide experienced operators
		hand signals will be reviewed with excavator operator

QUALITY ASSURANCE REPORT

BIO PLANT EQUALIZATION BASIN CLOSURE
Radford Army Ammunition Plant
Contract No. DACA65-98-C-0015
CIMINELLI SERVICES CORP.

Contr. Day: 51
Friday
20 February 1998

Concur with the contractor's report for this period? ✓ Yes ___ No*

Was any QC testing/inspection observed or were any specific QA evaluations or verifications performed? ✓ No ___ Yes*

Were any instructions given to or information received from the Contractor? ___ No ✓ Yes*

Did anything develop on the work which might lead to a change order or contract claim? ✓ No ___ Yes*

Safety Observations and General Comments/Remarks:
(Also includes explanation of answers to Items 1-4 above which are identified with an asterisk [*].)

No work activity (progress) through this date. This week, climaxing with installation of electrical service for trailer, ~~#~~ used to mobilize on-site.

Mutual Understanding Meeting held this date; see file for details.

Tentative plans arranged for PREPARATORY on preliminary site work (silt fence, ~~[illegible]~~ rip-rap removal) Monday AM.

See contract files for weather information on the date(s) covered by this report.

The Government Quality Assurance Report is complete and accurate to the best of my knowledge.

MARK A. BISHOP — 23FEB98 DATE — SUPV. INT — DATE

DAILY CONSTRUCTION QUALITY CONTROL REPORT

CONTRACTORS NAME: Ciminelli Services Corp.

Date 2-20-98 Report No. 1-53 Contract No. DAC(A) 65-98-C-0015 Project Name and Location of work:
EQ Basin Closure

Weather: [Clear] [P.Cloudy] [Cloudy] [Rain: ___ inches]
[Temp. ___ min. 45 max.] Other Weather Conditions

1. Contractor (C) or Sub-contractor (S), and Area of Responsibility:

a. (C) Supervision b. ( ) S - electrical c. ( ) d. ( ) e. ( )

2. Equipment Data. (Indicate items of construction equipment, other than hand tools, at the job site and whether or not used):

N/A

3. Work Performed Today (Indicate identity of Contractor and Sub-contractors, location , and description of work:

Sub-Contractor - Current Electric - wire field office

4. Results of Surveillance: (Include satisfactory work completed, or deficiencies with action to be taken):

a. Preparatory Phase:

N/A

b. Initial Phase:

N/A

c. Follow-up Phase:

N/A

DAILY CONSTRUCTION QUALITY CONTROL REPORT

5. Tests performed as required by plans and specifications and the results:

N/A

6. Verbal instructions received (List instructions given by Government personnel on construction deficiencies, retesting required, etc. Include the name of Government person, time and place instructions given, and action taken to comply:

N/A

7. Job Safety (Include deficiencies and corrective action taken:

All workers wearing hard hats, safety glasses, and steel toe Boot.

8. Equipment Data (Indicate items of construction equipment, other than hand tools, at the job site, and whether or not used):

N/A

9. Material and equipment items that arrived at the job site. Indicate compliance or non-compliance of these items with approved shop drawings, the contract plans and specifications, and the storage of the item is required prior to the time of installation, indicate how this storage was provided and whether or not it is adequate: electrical work perfored to code with code approved material

10. Remarks (Cover any conflicts in the plans and specifications, instructions, or delays):

N/A

CONTRACTOR'S VERIFICATION: THE ABOVE REPORT IS COMPLETE AND ALL DATA LISTED IS CORRECT. ALL MATERIALS PROVIDED, EQUIPMENT USED, AND WORKMANSHIP FOR THIS REPORTING PERIOD ARE IN COMPLIANCE WITH THE CONTRACT PLANS AND SPECIFICATIONS EXCEPT AS NOTED ABOVE.

SIGNED

RGEnk CONTRACTOR'S QC SYSTEM MANAGER

CONSTRUCTION MANPOWER AND EQUIPMENT REPORT

CONTRACT NO. DACA65-98-C-0015

DATE 2-20-98

LABOR CLASSIFICATION	PRIME #	PRIME HRS	Current Electric #	Current Electric HRS	#	HRS	#	HRS	#	HRS	EQUIPMENT DESCRIPTION	NO. HOURS USED	NO. HOURS IDLE
CQC Mgr	1	8									N/A		
Electrician			2	4									
											TOTALS		
NO. OF EMPLOYEES (SUBTOTALS)	1		2								3		
NO. OF HOURS (SUBTOTALS)		8		8							16		
											PREVIOUS TOTAL HOURS: 0		
											TOTAL HOURS THROUGH THIS DATE: 16		

Attachment 5
Final Site Investigation Tables

TABLE 3-1
Analytical Results and Critical Values for the Background Samples

CONSTITUENT	#1	#2	#3	#4	#5	#6	#7	#8	Critical Value
METHOD D2216 (%)									
Moisture Content	15	14	16	17	16	16	16	17	NC
VOLATILES									
METHOD 8021A (ug/kg)									
Benzene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Bromomethane	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Carbon tetrachloride	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Chlorobenzene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Chloroform	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Chloromethane	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
trans-1,2-Dichloroethene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Hexachlorobutadiene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Methylene chloride (Dichloromethane)	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Naphthalene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Tetrachloroethene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Toluene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
1,2,4-Trichlorobenzene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
1,1,1-Trichloroethane	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
1,1,2-Trichloroethane	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Trichloroethene	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Trichlorofluoromethane	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
Vinyl chloride	<5.9	<5.8	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	NC
METHOD 8240B (ug/kg)									
Acrolein	<120	<120	<120	<120	<120	<120	<120	<120	NC
Carbon disulfide	<5.8	<5.8	<5.9	<6.1	<6.0	<6.0	<6.0	<6.1	NC
2-Butanone (MEK)	<29	<29	<29	<30	<30	<30	<30	<30	NC
SEMIVOLATILES									
METHOD 8070 (ug/kg)									
N-Nitrosodimethylamine	<100	<78	<80	<81	<80	<80	<80	<81	NC
METHOD 8090 (ug/kg)									
2,4-Dinitrotoluene	<12	2.4 J	<12	<12	<12	<12	<12	<12	NC
2,6-Dinitrotoluene	<12	<12	<12	<12	<12	<12	<12	<12	NC
METHOD 8110 (ug/kg)									
Bis(2-Chloroethoxy) methane	<35	<35	<36	<36	<36	<36	<36	<36	NC

Reporting limits and concentrations are presented on a dry weight basis.
J - Estimated value; constituents present below the reporting limit.
NC - Critical value not calculated; see Section 3.2.

TABLE 3-1
Analytical Results and Critical Values for the Background Samples

CONSTITUENT	#1	#2	#3	#4	#5	#6	#7	#8	Critical Value
Bis(2-Chloroethyl) ether	<35	<35	<36	<36	<36	<36	<36	<36	NC
Bis(2-Chloroisopropyl) ether	<35	<35	<36	<36	<36	<36	<36	<36	NC
METHOD 8121 (ug/kg)									
Hexachlorobenzene	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC
Hexachlorocyclopentadiene	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC
SEMIVOLATILES Continued									
Hexachloroethane	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC
METHOD 8151 (ug/kg)									
Pentachlorophenol	<20	<20	<20	<20	<20	<20	<20	<20	NC
METHOD 8270B (ug/kg)									
Bis(2-Ethylhexyl)phthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
Butylbenzylphthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
4-Chloro-3-methylphenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
2-Chlorophenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
Di-n-butylphthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
Di-n-octylphthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
Diethylphthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
2,4-Dimethylphenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
Dimethylphthalate	<390	<380	<390	<400	<390	<390	<390	<400	NC
2-Methyl-4,6-dinitrophenol	<2000	<2000	<2000	<2000	<2000	<2000	<2000	<2000	NC
Phenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
2,4,5-Trichlorophenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
2,4,6-Trichlorophenol	<390	<380	<390	<400	<390	<390	<390	<400	NC
METHOD 8310 (ug/kg)									
Fluoranthene	<12	<12	<12	<12	<12	<12	<12	<12	6.0
Fluorene	<12	<12	<12	<12	<12	<12	<12	<12	NC
METHOD 8330 (ug/kg)									
Nitrobenzene	<290	<290	<300	<300	<300	<300	<300	<300	NC
PESTICIDES/PCBs									
METHOD 8080A (ug/kg)									
Aldrin	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC
Chlordane	<20	<20	<20	<20	<20	<20	<20	<20	NC
Dieldrin	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC

Reporting limits and concentrations are presented on a dry weight basis.
J - Estimated value; constituents present below the reporting limit.
NC - Critical value not calculated; see Section 3.2.

TABLE 3-1
Analytical Results and Critical Values for the Background Samples

CONSTITUENT	#1	#2	#3	#4	#5	#6	#7	#8	Critical Value
Endosulfan I	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC
Endosulfan II	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC
Endrin	<3.9	<3.8	<3.9	<4.0	<3.9	<3.9	<3.9	<4.0	NC
Heptachlor	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC
Heptachlor epoxide	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	NC
Methoxychlor	<20	<20	<20	<20	<20	<20	<20	<20	NC
Aroclor-1016	<39	<38	<39	<40	<39	<39	<39	<40	NC
Aroclor-1221	<79	<78	<80	<81	<80	<80	<80	<81	NC
Aroclor-1232	<39	<38	<39	<40	<39	<39	<39	<40	NC
PESTICIDES/PCBs Continued									
Aroclor-1242	<39	<38	<39	<40	<39	<39	<39	<40	NC
Aroclor-1248	<39	<38	<39	<40	<39	<39	<39	<40	NC
Aroclor-1254	<39	17 J	<39	<40	<39	<39	46	<40	NC
Aroclor-1260	<39	<38	<39	<40	<39	<39	<39	<40	NC
Toxaphene	<200	<200	<200	<200	<200	<200	<200	<200	NC
METALS									
METHOD 6020 (mg/kg)									
Arsenic	2	2.5	2.9	1.6	2.1	1.2	3.2	0.95	5.5
Barium	172	157	139	187	169	108	165	93	292
Beryllium	0.85	0.99	0.87	1.2	1.1	0.72	1.1	0.76	1.71
Cadmium	<0.24	<0.24	<0.24	< 0.27	<0.24	<0.22	<0.24	<0.24	NC
Chromium	27.3	28.1	25.9	26	28.6	18.4	34.4	19.1	48.6
Lead	11.6	26.6	16.8	16.7	20.2	8.6	22	7.9	45.1
Nickel	15.2	14.3	13.9	17.2	17	11.8	20.5	11.7	28.1
Selenium	<0.24	<0.24	<0.24	<0.27	<0.24	<0.22	<0.24	<0.24	NC
Silver	<0.12	<0.12	<0.12	<0.13	<0.12	<0.11	<0.12	<0.12	NC
Thallium	0.29	0.23	0.22	<0.21	0.25	0.16	0.41	0.17	0.63
METHOD 7471A (mg/kg)									
Mercury	<0.12	<0.12	<0.12	<0.13	<0.12	<0.11	<0.12	<0.12	NC
METHOD 9010A (mg/kg)									
Cyanide, Total	<0.59	<0.60	<0.60	<0.67	<0.59	<0.55	<0.60	<0.60	NC
Chromium	27.3	28.1	25.9	26	28.6	18.4	34.4	19.1	NC
Lead	11.6	26.6	16.8	16.7	20.2	8.6	22	7.9	NC

Reporting limits and concentrations are presented on a dry weight basis.
J - Estimated value, constituents present below the reporting limit.
NC - Critical value not calculated, see Section 3.2

TABLE 3-1
Analytical Results and Critical Values for the Background Samples

CONSTITUENT	#1	#2	#3	#4	#5	#6	#7	#8	Critical Value
Nickel	15.2	14.3	13.9	17.2	17	11.8	20.5	11.7	NC
Selenium	<0.24	<0.24	<0.24	<0.27	<0.24	<0.22	<0.24	<0.24	NC
Silver	<0.12	<0.12	<0.12	<0.13	<0.12	<0.11	<0.12	<0.12	NC
Thallium	0.29	0.23	0.22	<0.21	0.25	0.16	0.41	0.17	NC
METHOD 7471A (mg/kg)									
Mercury	<0.12	<0.12	<0.12	<0.13	<0.12	<0.11	<0.12	<0.12	NC
METHOD 9010A (mg/kg)									
Cyanide, Total	<0.59	<0.60	<0.60	<0.67	<0.59	<0.55	<0.60	<0.60	NC

Reporting limits and concentrations are presented on a dry weight basis.
J - Estimated value; constituents present below the reporting limit.
NC - Critical value not calculated, see Section 3.2

Table 3-2
Analytical Results and Critical Values for the Basin Subsoil Samples

ANALYTE	BASIN #1	BASIN #5	BASIN #6	BASIN #9	BASIN #10	BASIN #14	BASIN #15	Critical Value
METHOD D2216 (%)								
Percent Water	16	20	16	32	20	15	20	- -
VOLATILES								
METHOD 8021A (ug/kg)								
Benzene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Carbon tetrachloride	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Chlorobenzene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Chloroform	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
trans-1,2-Dichloroethylene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Hexachlorobutadiene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Bromomethane	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Chloromethane	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Methylene chloride (Dichloromethane)	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Naphthalene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Tetrachloroethene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Toluene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
1,2,4-Trichlorobenzene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
1,1,1-Trichloroethane	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
1,1,2-Trichloroethane	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Trichloroethlene	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Trichlorofluoromethane	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
Vinyl chloride	<6.0	<6.2	<5.9	<7.4	<6.3	<5.8	<6.2	NC
METHOD 8240B (ug/kg)								
Acrolein	<120	<120	<120	<150	<120	<120	<120	NC
Carbon disulfide	<5.9	<6.2	<6.0	<7.3	<6.2	<5.9	<6.2	NC
2-Butanone (MEK)	<30	<31	<30	<36	<31	<30	<32	NC
SEMIVOLATILES								
METHOD 8070 (ug/kg)								
N-Nitrosodimethylamine	<80	<84	<80	<99	<84	<79	<84	NC
METHOD 8090 (ug/kg)								
2,4-Dinitrotoluene	<180 a	<11	<12	<15	<2500 b	<35 c	<12	NC
2,6-Dinitrotoluene	<180 a	<11	<12	<15	<2500 b	<35 c	<12	NC
METHOD 8121 (ug/kg)								
Hexachlorobenzene	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC
Hexachlorocyclopentadiene	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC

Table 3-2
Analytical Results and Critical Values for the Basin Subsoil Samples

ANALYTE	BASIN #1	BASIN #5	BASIN #6	BASIN #9	BASIN #10	BASIN #14	BASIN #15	Critical Value
Hexachloroethane	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC
METHOD 8151 (ug/kg)								
Pentachlorophenol	<20	<21	<20	<25	<21	<20	<21	NC
METHOD 8110 (ug/kg)								
bis(2-Chloroethoxy) methane	<30	<30	<30	<44	<30	<30	<30	NC
bis(2-Chloroethyl) ether	<30	<30	<30	<44	<30	<30	<30	NC
bis(2-Chloroisopropyl) ether	<30	<30	<30	<44	<30	<30	<30	NC
METHOD 8270B (ug/kg)								
bis(2-Ethylhexyl)phthalate	<390	<410	<390	<490	<410	<390	<410	NC
Butylbenzylphthalate	<390	<410	<390	<490	<410	<390	<410	NC
4-Chloro-3-methylphenol	<390	<410	<390	<490	<410	<390	<410	NC
2-Chlorophenol	<390	<410	<390	<490	<410	<390	<410	NC
Di-n-butylphthalate	<390	<410	<390	<490	<410	<390	<410	NC
Diethylphthalate	<390	<410	<390	<490	<410	<390	<410	NC
2,4-Dimethylphenol	<390	<410	<390	<490	<410	<390	<410	NC
Dimethylphthalate	<390	<410	<390	<490	<410	<390	<410	NC
2-Methyl-4,6-dinitrophenol	<2000	<2100	<2000	<2500	<2100	<2000	<2100	NC
Di-n-octylphthalate	<390	<410	<390	<490	<410	<390	<410	NC
Phenol	<390	<410	<390	<490	<410	<390	<410	NC
2,4,5-Trichlorophenol	<390	<410	<390	<490	<410	<390	<410	NC
2,4,6-Trichlorophenol	<390	<410	<390	<490	<410	<390	<410	NC
METHOD 8310 (ug/kg)								
Fluoranthene	<12	<12	<12	330	<12	<12	<12	6.0
Fluorene	<12	<12	<12	<12	<12	<12	<12	NC
METHOD 8330 (ug/kg)								
Nitrobenzene	<320	<310	<300	<370	<310	<290	<310	NC
PESTICIDES/PCBs								
METHOD 8080A (ug/kg)								
Aldrin	<30 a	<1.9	<2.0	<2.5	<420 b	<6.0 c	<2.1	NC
Chlordane	<300 a	<19	<20	<25	<4200 b	<6.0 c	<21	NC
Dieldrin	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC
Endosulfan I	<30 a	<1.9	<2.0	<2.5	<420 b	<6.0 c	<2.1	NC
Endosulfan II	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC
Endrin	<59 a	<3.7	<3.9	<4.9	<820 b	<12 c	<4.1	NC
Heptachlor	<30 a	<1.9	<2.0	<2.5	<420 b	<6.0 c	<2.1	NC

Reporting limits and concentrations are presented on a dry weight basis.

Table 3-2
Analytical Results and Critical Values for the Basin Subsoil Samples

ANALYTE	BASIN #1	BASIN #5	BASIN #6	BASIN #9	BASIN #10	BASIN #14	BASIN #15	Critical Value
Heptachlor epoxide	<30 a	<1.9	<2.0	<2.5	<420 b	<6.0 c	<2.1	NC
Methoxychlor	<300 a	<19	<20	<25	<4200 b	<60 c	<21	NC
Aroclor-1016	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Aroclor-1221	<1200 a	<74	<80	<99	<17000 b	<240 c	<84	NC
Aroclor-1232	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Aroclor-1242	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Aroclor-1248	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Aroclor-1254	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Aroclor-1260	<590 a	<37	<39	<49	<8200 b	<120 c	<41	NC
Toxaphene	<3000 a	<190	<200	<250	<42000 b	<600 c	<210	NC
METALS								
METHOD 6020 (mg/kg)								
Arsenic	2.2	2.1	2.4	4.6	3	2.3	4.3	5.5
Barium	91.2	86	45	72.7	51.4	67.2	94.6	29.2
Beryllium	0.42	0.58	0.23	0.5	0.34	0.27	0.4	1.71
Cadmium	<0.23	<0.25	<0.23	<0.30	<0.25	<0.24	<0.24	NC
Chromium	21.9	25	14.8	33.4	22.5	16.5	37.1	48.6
Lead	12.5	12.1	6.7	11.9	14.8	12.9	26.2	45.1
Nickel	6.5	11.6	5.9	14.1	8.4	5.4	14	28.1
Selenium	<0.23	<0.49	<0.23	<0.30	<0.25	<0.24	<1.2	NC
Silver	<0.11	<0.12	<0.12	<0.15	<0.13	<0.12	<0.12	NC
Thallium	0.18	0.21	0.14	0.26	0.21	0.15	0.5	0.63
METHOD 7471A (mg/kg)								
Mercury	<0.11	<0.12	<0.12	<0.15	<0.13	<0.12	<0.12	NC
METHOD 9010A (mg/kg)								
Cyanide, Total	<0.57	<0.62	<0.58	<0.75	<0.63	<0.60	<0.61	NC

Reporting limits and concentrations are presented on a dry weight basis.

a - Due to matrix interference, this sample was analyzed at a 15-fold dilution.

b - Due to matrix interference, this sample was analyzed at a 200-fold dilution.

c - Due to matrix interference, this sample was analyzed at a 3-fold dilution.

TABLE 3-3
ANALYTICAL TCLP RESULTS

ANALYTE	REGULATORY LEVEL	BL-01-01	WC-01-01	WC-02-01	WC-03-01	WC-04-01
METALS, TOTAL (MG/L)						
Arsenic	5.0	0.00804	0.00299	0.00442	0.00497	0.00525
Barium	100.0	0.071	0.332	0.248	0.233	0.255
Cadmium	1.0	0.0002	0.0002	0.0002	0.0002	0.0002
Chromium	5.0	0.00263	0.017	0.0138	0.0201	0.0124
Lead	5.0	<0.00129	<0.00129	<0.00129	<0.00129	<0.00129
Mercury	0.2	<0.000039	<0.000039	<0.000039	<0.000039	<0.000039
Selenium	1.0	0.00715	0.00972	0.00992	0.00877	0.00933
Silver	5.0	<0.00187	<0.00187	<0.00187	<0.00187	<0.00187
VOLATILE ORGANICS (UG/L)						
Benzene	500	1.70 B	<0.940	<0.940	<0.940	<0.940
2-Butanone(MEK)	200,000	<5.78	<5.78	<5.78	<5.78	<5.78
Carbon tetrachloride	500	<2.26	<2.26	<2.26	<2.26	<2.26
Chlorobenzene	100,000	<1.38	<1.38	<1.38	<1.38	<1.38
Chloroform	6,000	<2.44	<2.44	<2.44	<2.44	<2.44
1,2-Dichloroethane	500	<2.50	<2.50	<2.50	<2.50	<2.50
1,1-Dichloroethene	700	<1.53	<1.53	<1.53	<1.53	<1.53
Tetrachloroethene	700	<3.34	<3.34	<3.34	<3.34	<3.34
Trichloroethene	500	<1.86	<1.86	<1.86	<1.86	<1.86
Vinyl chloride	200	<4.64	<4.64	<4.64	<4.64	<4.64
SEMIVOLATILE ORGANICS (UG/L)						
1,4-Dichlorobenzene	7,500	<5.71	<5.71	<5.71	<4.86	<5.71
2,4-Dinitrotoluene	130	<3.47	<3.47	<3.47	<2.32	<3.47
Hexachlorobenzene	130	<2.55	<2.55	<2.55	<2.06	<2.55
Hexachlorobutadiene	500	<15.0	<15.0	<15.0	<14.5	<15.0
Hexachloroethane	3,000	<13.6	<13.6	<13.6	<17.1	<13.6
2-Methylphenol (o-cresol)	200,000	<2.46	<2.46	<2.46	<2.78	<2.46
4-Methylphenol/3-Methylphenol	200,000	<2.00	<2.00	<2.00	<2.59	<2.00
Nitrobenzene	2,000	<3.57	<3.57	<3.57	<4.14	<3.57
Pentachlorophenol	100,000	<4.11	<4.11	<4.11	<4.79	<4.11
Pyridine	5,000	<5.29	<5.29	<5.29	<24.6	<5.29
2,4,5-Trichlorophenol	400,000	<2.74	<2.74	<2.74	<2.17	<2.74
2,4,6-Trichlorophenol	2,000	<7.25	<7.25	<7.25	<3.41	<7.25
ORGANOCHLORINE PESTICIDES (UG/L)						
gamma-BHC(Lindane)	400	<0.0346	<0.0346	<0.0346	<0.0346	<0.0346
Chlordane	30	<0.338	<0.338	<0.338	<0.338	<0.338
Endrin	20	<0.0762	<0.0762	<0.0762	<0.0762	<0.0762
Heptachlor	8	<0.0462	<0.0462	<0.0462	<0.0462	<0.0462
Heptachlor epoxide	8	<0.0138	<0.0138	<0.0138	<0.0138	<0.0138
Methoxychlor	10,000	<0.448	<0.448	<0.448	<0.448	<0.448
Toxaphene	500	<0.923	<0.923	<0.923	<0.923	<0.923
PHENOXYACID HERBICIDES (UG/L)						
2,4-D	10,000	<1.06	<1.06	<1.06	<1.06	<1.06
2,4,5-TP (Silvex)	1,000	<0.1000	<0.1000	<0.1000	<0.1000	<0.1000

B - Benzene detected in laboratory blank at 1.22 ug/L.

Table 3-4

Statistics for Calculating the Critical Values

Constituent	Mean, $\bar{x}$	Standard Deviations, s	Tolerance Factor, K	Upper Tolerance Limit, UTL
Arsenic	2.0563	0.7917	4.3539	5.5031
Barium	148.7500	32.9708	4.3539	292.3000
Beryllium	0.9488	0.1750	4.3539	1.7109
Chromium	25.9750	5.1933	4.3539	48.5860
Lead	16.3000	6.6132	4.3539	45.0929
Nickel	15.2000	2.9674	4.3539	28.1198
Thallium	0.2294	0.0931	4.3539	0.6345
Fluoranthene	6.0	0	4.3539	6.0

Attachment 6
DEQ Letter - 22 October 1997

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

George Allen
Governor

Becky Norton Dunlop
Secretary of Natural Resources

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
Fax (804) 698-4500 TDD (804) 698-4021
http://www.deq.state.va.us

Thomas L. Hopkins
Director

(804) 698-4000
1-800-592-5482

October 22, 1997

C.A. Jake
Environmental Manager, Alliant Techsystems Inc.
Radford Army Ammunition Plant
P.O. Box 1
Radford, VA 24141-0100

RE: Radford Army Ammunition Plant (RAAP), EPA ID# VA12100207306
Equalization Basin/Background Data Approval

Dear Ms. Jake:

RAAP's revision to the Site Investigation Evaluation report was received by the Department of Environmental Quality (DEQ) on April 3, 1997. Please forgive the delay in this response.

Based on the information provided, the background data, as presented in this report, is acceptable. By this letter, the DEQ approves the background data for the hazardous constituents of concern. Please note, however, that the compliance sampling and statistical comparisons, as presented in the report, are still under review and no decision regarding their acceptability has yet been made. Once this review is completed, a separate letter addressing any concerns or accepting the data presented will be sent to RAAP. If there are any questions regarding these comments or the background data review, please contact me at (804) 698-4206.

Sincerely,

Debra A. Miller
Environmental Engineer Senior

cc: Jerry Redder, Alliant Techsystems/RAAP
Lisa Ellis, DEQ
Claire Ballard, DEQ
Aziz Farahmand, DEQ-RRO

Attachment 7
DEQ Letter - 10 March 1998

COMMONWEALTH of VIRGINIA

James S. Gilmore, III
Governor

John Paul Woodley, Jr.
Secretary of Natural Resources

DEPARTMENT OF ENVIRONMENTAL QUALITY
Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 10009, Richmond, Virginia 23240
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Thomas L. Hopkins
Director

(804) 698-4000
1-800-592-5482

March 10, 1998

C.A. Jake
Alliant Techsystems Inc.
Environmental Manager
Radford Army Ammunition Plant
P.O. Box 1
Radford, VA 24141-0100

RE: Radford Army Ammunition Plant (RAAP)
EPA ID# VA1210020730
Equalization Basin Revised Sampling

Dear Ms. Jake:

Revised analytical results for the Equalization Basin's confirmatory sampling were received by the Department of Environmental Quality (DEQ) on December 17, 1997. The data submitted was for the resampling of Grids #1 and #10. RAAP decided to resample these grids because of the high practical quantitation limits (PQLs) achieved during the first round of sampling. These high PQLs were due to the dilution of the samples.

Based on the information submitted, use of the November 11, 1997, data for Grid #1 and Grid #10 is acceptable since the quantitation limits achieved with the resampling are within an appropriate range for background comparison. At this time, RAAP should complete the closure in accordance with their approved plan and, when completed, submit the required certifications and closure report, including the information necessary for background closure and risk-based closure of the unit. The following information shall be included in the closure report, at a minimum:

- a summary of all closure activities;
- a summary of results for background and unit sampling including the depth of samples for soil sampling results;
- the depth of excavation;
- results of all statistical calculations (i.e., for background closure demonstration) and an example calculation demonstrating compliance with relevant guidance;
- all risk assessment reports including calculations and conclusions;

- all sampling results as an appendix to this report (please note, this sample data is currently in-house at DEQ and will not need to be resubmitted);
- all applicable explanation/justification for the data used or conclusion reached during closure activities, including a summary of QA/QC findings;
- a synopsis on the proper disposal of waste generated during closure activities.

It is noted that much of this information has already been submitted. However, a detailed closure report which includes both the background and risk-based closure information should be submitted in support of the certifications and may reference previous submittals or repeat the information in the closure report, whichever is more convenient.

Once received, the certifications and closure report will be subject to DEQ review. Closure of the units will not occur until the DEQ has verified closure in accordance with this approved closure plan. If you should have any questions, concerning this matter, please contact me at (804) 698-4206.

Sincerely,

Debra A. Miller

Debra A. Miller
Environmental Engineer Senior
Office of Waste Permitting

cc: Jerry Redder, Alliant Techsystems-RAAP
Robert Greaves, EPA Region III
Glenn VonGonten, DEQ
Aziz Farahmand, DEQ/RRO-Compliance
CENTRAL HW FILES

Attachment 8
Risk Tables

On-site Resident (Adult) Exposure - Non-carcinogen

Ingestion of COPCs in On-site Soils

Radford Army Ammunition Plant

Radford, Virginia

Equations: Intake (mg/kg-day) = $\frac{CS \times IRS_a \times CF \times FI \times EF \times ED_a}{BW_a \times AT_a}$

Hazard Quotient = Intake / Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
CS	Chemical Concentration in Soil (mg/Kg)	~	0.333*
IRS_a	Ingestion Rate - Adult (mg/soil/day)	100	
CF	Conversion Factor (1.0E-06 kg/mg)	0.000001	
FI	Fraction Ingested from Contaminated Source Residential (unitless)	1.0	
EF	Exposure Frequency (days/year)	350	
ED_a	Exposure Duration (years)	30	
BW_a	Adult Body Weight (kg)	70	
AT_n	Averaging Time (period over which exposure is averaged - days)	10,950	

Notes:

* Maximum Detected Concentration

On-site Resident (Child) Exposure - Non-carcinogen

Ingestion of COPCs in On-site Soils

Radford Army Ammunition Plant

Radford, Virginia

Equations: Intake (mg/kg-day) = $\frac{CS \times IRS_c \times CF \times FI \times EF \times ED_c}{BW_c \times AT_c}$

Hazard Quotient = Intake / Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
CS	Chemical Concentration in Soil (mg/Kg)	~	0.333*
IRS_c	Ingestion Rate - Child (mg/soil/day)	200	
CF	Conversion Factor (1.0E-06 kg/mg)	0.000001	
FI	Fraction Ingested from Contaminated Source Residential (unitless)	1.0	
EF	Exposure Frequency (days/year)	350	
ED_c	Exposure Duration (years)	6	
BW_c	Child Body Weight (kg)	15	
AT_n	Averaging Time (period over which exposure is averaged - days)	2,190	

Notes:

* Maximum Detected Concentration

On-site Resident (Adult) Exposure - Non-carcinogen

Dermal Contact with COPCs in Soils

Radford Army Ammunition Plant

Radford, Virginia

Equations: Absorbed Dose (mg/kg-day) = $\frac{CS \times CF \times SA_a \times AF \times ABS \times EF \times ED_a}{BW_a \times AT_n}$

Hazard Quotient = Intake / Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
CS	Chemical Concentration in Soils (mg/Kg)	~	0.333*
CF	Volumetric Conversion Factor for Soil (1.0E-06 kg/mg)	0.000001	
SA_a	Skin Surface Area Available for Contact (Adult - cm2/event)	~	4,860 (Given)
AF	Soil Adherence Factor (mg/cm2)	~	1.45 (Given)
ABS	Chemical-specific Absorption Factor (unitless)	~	0.10**
EF	Exposure Frequency (days/year)	350	
ED_a	Exposure Duration (years)	30	
BW_a	Adult Body Weight (kg)	70	
AT_n	Averaging Time (period over which exposure is averaged - days)	10,950	

Notes:

* Maximum Soil Concentration

** Value from "Assessing Dermal Exposure From Soil" (USEPA, 1995)

On-site Resident (Child) Exposure - Non-carcinogen

Dermal Contact with COPCs in Soils

Radford Army Ammunition Plant

Radford, Virginia

Equations: Absorbed Dose (mg/kg-day) = $\frac{CS \times CF \times SA_c \times AF \times ABS \times EF \times ED_c}{BW_c \times AT_n}$

Hazard Quotient = Intake / Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
CS	Chemical Concentration in Soil (mg/Kg)	~	0.333*
CF	Volumetric Conversion Factor for Soil (1.0E-06 kg/mg)	0.000001	
SA_c	Skin Surface Area Available for Contact (Child - cm2/event)	1,875	
AF	Soil Adherence Factor (mg/cm2)	~	1.45 (Given)
ABS	Chemical-specific Absorption Factor (unitless)	~	0.10**
EF	Exposure Frequency (days/year)	350	
ED_c	Exposure Duration (years)	6	
BW_c	Adult Body Weight (kg)	15	
AT_n	Averaging Time (period over which exposure is averaged - days)	2,190	

Notes:

* Maximum Soil Concentration

** Value from "Assessing Dermal Exposure From Soil" (USEPA, 1995)

On-site Residential (Adult) Exposure - Non-carcinogen

Inhalation of COPCs from Soil Particles

Radford Army Ammunition Plant

Radford, Virginia

Equations: Intake (mg/kg-day) = $\frac{PEF \times IRA_a \times ET \times EF \times ED}{BW_a \times AT_n}$

Hazard Quotient = Intake/Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
PEF	Particulate Emission Factor in Air (kg/m3)	1.47E-09	
IRA_a	Inhalation Rate (m3/hour)	0.833	
ET	Exposure Time (hours/day)	24	
EF	Exposure Frequency (days/year)	350	
ED	Exposure Duration (years)	30	
BW_a	Adult Body Weight (kg)	70	
AT_n	Averaging Time (period over which exposure is averaged - days)	10,950	

On-site Residential (Child) Exposure - Non-carcinogen

Inhalation of COPCs from Soil Particles

Radford Army Ammunition Plant

Radford, Virginia

Equations: Intake (mg/kg-day) = $\frac{PEF \times IRA_c \times ET \times EF \times ED}{BW_c \times AT_n}$

Hazard Quotient = Intake/Reference Dose (RfD-Chemical Specific)

Variable Abbreviation	Variable	REAMS Default Value	User Defined Value
PEF	Particulate Emission Factor in Air (kg/m3)	1.47E-09	
IRA_c	Inhalation Rate (m3/hour)	0.5	
ET	Exposure Time (hours/day)	24	
EF	Exposure Frequency (days/year)	350	
ED	Exposure Duration (years)	6	
BW_c	Child Body Weight (kg)	15	
AT_n	Averaging Time (period over which exposure is averaged - days)	2,190	

ALLIANT TECHSYSTEMS

Alliant Techsystems Inc.
Radford Army Ammunition Plant
Route 114
P.O. Box 1
Radford, VA 24141-0100

July 28, 1998 98-815-164

Ms. Debra Miller
Virginia Department of Environmental Quality
Office of Permitting Management
629 East Main Street
Richmond, VA 23219

Subject: Risk Assessment and Closure Certification
Bioplant Equalization Basin (HWMU 10)
Radford Army Ammunition Plant
EPA ID# VA1210020730

Dear Ms. Miller:

Enclosed are two copies of the "Risk Assessment and Closure Certification for the Former Bioplant Equalization Basin Radford Army Ammunition Plant." This report has been prepared in accordance with the "Closure, Contingent Closure & Contingent Post-Closure Plans Equalization Basin HWMU-10 & SWMU-10, Radford Army Ammunition Plant."

If you have questions or comments please contact Jerry Redder at (540) 639-7536 or Arne Olsen at (540) 639-8220.

Very Truly Yours,

C. A. Jake

C. A. Jake, Supervisor
Environmental Affairs

Enclosure

cc: Mike Jacobi, USEPA Region III
Rob Thompson, USEPA Region III
Devlin Harris, DEQ West Central Regional Office - Roanoke
Mike Scott, DEQ West Central Regional Office - Roanoke
R. L. Richardson, RFAAP ACO