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NWS EARLE  
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TRANSMITTAL LETTER FOR THE RESPONSE TO U S NAVY COMMENTS ON OPERABLE  
UNIT 1 (OU 1) CAP DESIGN NWS EARLE NJ  
11/7/1997  
BROWN AND ROOT ENVIRONMENTAL



# Brown & Root Environmental

Foster Plaza VII  
661 Andersen Drive  
Pittsburgh, PA 15220-2745

(412) 921-7090  
FAX: (412) 921-4040

November 7, 1997

Project Number 7602

Mr. Paul Briegel (Code 402A/PB)  
Northern Division  
Naval Facilities Engineering Command  
10 Industrial Highway  
Mail Stop No. 82  
Lester, Pennsylvania 19113-2090

Reference: Clean Contract No. N62472-90-D-1298  
Contract Task Order 0289

Subject: Response to Comments  
Design Development Submission (DDS)  
Operable Unit 1 (OU-1) Cap Design  
Naval Weapons Station Earle (NWS Earle)  
Colts Neck, NJ

Dear Mr. Briegel:

At the design meeting on Thursday, October 9, 1997, Brown & Root (B&R) Environmental received the final comments on the DDS for OU-1 at NWS Earle in Colts Neck, New Jersey. As of Thursday, October 9, 1997, B&R Environmental has received written comments from the following individuals:

- Paul Briegel - Northern Division
- Nick Souchik - Northern Division
- Gregory Goepfert - NWS Earle
- Thomas Gentile - NWS Earle
- Thomas Dunn - NWS Earle

It is our understanding that Northern Division has contacted the United States Environmental Protection Agency (EPA) and the New Jersey Department of Environmental Protection (NJDEP) and that these agencies are in agreement with the DDS and do not intend to forward comments.

This letter provides our responses to the comments. Copies of the comments from each individual are included as an attachment.

## COMMENTS FROM PAUL BRIEGEL - NORTHERN DIVISION

### Comment 1

I have reviewed the 35% design submission for the subject project and am providing the following comments. Please review these comments and advise of intended action to be taken.

### Response 1

The comments have been reviewed and the intended actions are described in the following responses.



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### Comment 2

**The investigative results presented in the design basis reflect limited data along the southern side of Site 4. If the investigations omitted this area, how were limits of wastes and the associated cap delineated?**

### Response 2

The limits of the Site 4 landfill area along the southern edge were not delineated with test pits due to access problems with the backhoe. Therefore, the southern limit of the landfill was determined through a combination of visual observations, the results of other test pit work around Site 4, and interviews with NWS Earle personnel who were knowledgeable about past landfill operations at both Sites 4 and 5.

After Site 4 was closed, the disturbed areas of the landfill were revegetated with pine trees. These pine trees were generally planted in rows and were much smaller than the surrounding woodland vegetation, which was generally composed of a combination of pines and hardwood trees. During the test pit investigation, this difference in tree growth across the site was used to determine the approximate boundary of the landfill and focus the test pit investigation.

Visual observations were also used to determine the limit of waste for the landfill. Along the eastern and southeastern edges of the landfill, waste materials were exposed in a "face" that extended as much as 10 to 15 feet above surrounding grade. Several test pits were excavated east and southeast of this "face" (access permitting) to confirm that no waste materials extended past the visible "face".

The southwestern boundary of the landfill is bounded by a topographic ridge that extends approximately 20 to 30 feet above surrounding grade and is vegetated with older tree growth. A drainage ditch forms the boundary between the southwestern edge of the landfill and this ridge. Test pit excavations and visual observations confirmed that the limit of waste extended to the northern edge of this drainage ditch. The southern side of the ditch appeared to be undisturbed and was vegetated with larger hardwood trees and laurel. The bottom of the drainage ditch was assumed to be the limit of waste material along the southern side of Site 4.

Richard Kovaleski, a NWS Earle employee who was knowledgeable about landfill operations at Sites 4 and 5, provided approximate limits of waste at both sites. Information provided by Mr. Kovaleski was considered when determining the limit of waste at Site 4 and at Site 5.

### Comment 3

**Site 4 exists at about a 3% slope towards the southeastern side on the site, which nearly accommodates sheet flow across the site. The design reflects a significant volume of site grading to provide a traditional conical capping system (in lieu of following existing grades). What is the basis for this decision? What is the additional cost in comparison to following the lay of the land? Consider also the additional detention basin and swales created as a result of modifying existing flow patterns.**



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### **Response 3**

The primary objective of the regrading plan was to achieve a cut/fill balance on the site and minimize expenses related to off-site hauling of excavated soils. Initially, a regrading plan that closely matched the existing site contours was investigated; however, this configuration could not accommodate the excavated waste materials from the southwestern corner of the landfill that were to be consolidated under the cap.

To achieve a more easily constructed cap surface and a cut/fill balance for the site, the grading at Site 4 incorporates excavation of waste along the southwestern corner of the site and consolidation of the waste on top of the main body of waste in the central portion of the site. This regrading plan incorporated the conical capping system and maintains a four percent slope across a majority of the site. This configuration can accommodate the waste to be consolidated and achieve a cut/fill balance. It should be noted that the grading plan presented in the DDS does not completely achieve a cut/fill balance; however, modifications will be made for the final submission to achieve a cut/fill balance.

The current grading plan also limits the amount of surface runoff that drains over the steep slope on the eastern side of the capped area. Regardless of the grading configuration, swales along the perimeter of the landfill will be incorporated into the design to control the amount of surface water run-on (drainage from upgradient area) and runoff (drainage from the capped area). The perimeter drainage swales also collect water from the drainage layer in the cap system.

### **Comment 4**

**The design analysis states that the low density polyethylene (LDPE) liner was selected in part due to the reduced frictional resistance between a geocomposite clay liner (GCL) and the non-woven geotextile which would result in an unstable slope. This needs to be substantiated via calculation. Site grading can be adjusted to accommodate the GCL. Also, stating that vehicular loads will cause a GCL to fail must be substantiated via calculation.**

**A cost comparison shall be presented in the final design confirming the LDPE liner as the cost effective option. Consider also the difficulty which NWS Earle Public Works will have in future repairs with the LDPE liner in comparison to the GCL.**

### **Response 4**

A geomembrane was chosen for the low-permeability layer in the landfill caps at Sites 4 and 5 for NWS Earle over a GCL because of the following issues that may arise with GCLs:

- Slope stability
- Differential settlement
- Thinning of the bentonite layer
- Installed cost

Any one of the above issues could be resolved through design modifications, increased cost, or a willingness to accept a greater possibility of compromise with the low-permeability layer; however, it was felt that a geomembrane was a more suitable material in the landfill cap. Each of the issues listed above is discussed in greater detail below.



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### Slope Stability

Three potential failure modes were of concern in placing a GCL on the side slopes of a cap system, two of which should not be critical at NWS Earle. The first is the internal shear strength of the GCL itself. The GCL is composed of a relatively thin (approximately 3/8 inch thick) layer of bentonite sandwiched between two geotextiles. The standard configuration is for one side of the GCL to be constructed of a non-woven geotextile and the other side to be constructed of a woven geotextile.

When hydrated, the bentonite becomes very weak, with a friction angle of about 8 degrees. This material would not have sufficient shear strength on a 4:1 slopes currently in the proposed regraded cap configurations. GCL manufacturers have developed reinforced GCLs that bind the upper and lower geotextiles together through mechanical means (e.g., stitching or needle punching) to prevent shear failure through the bentonite layer. Preliminary calculations and experience with other landfills indicates that a reinforced GCL would provide adequate shear strength to provide an adequate factor of safety for the cap configurations at NWS Earle.

The second concern with the slope stability of GCLs is the possibility of the hydrated bentonite extruding out of the GCL and forming a thin layer of bentonite between the GCL and whatever material is placed above and below the GCL. Several slope stability failures that have occurred in the last few years have been attributed to bentonite extruding through the woven side of the GCL and forming a weak interface between the GCL and a geomembrane (Reference 1). The proposed cap configurations at NWS Earle do not include both a geomembrane and a GCL, however, it seems possible that this same failure mechanism could occur with any material adjacent to the GCL.

The third potential failure mode is the interface between the GCL and the materials placed next to the GCL, assuming that bentonite has not extruded from the GCL. The proposed cap configuration includes a cushion fabric placed on top of the GCL. The cushion fabric would be needed to protect the GCL from the granular drainage material. Preliminary calculations indicate that this interface will not result in an acceptable factor of safety. The need for the cushion fabric is described below under the discussion of the thinning of the GCL.

The cushion fabric would be a heavy non-woven geotextile. Generally, conservative literature values of interface friction angles are used in the initial slope stability analysis, then site-specific tests are performed prior to construction with the actual materials to be used to confirm that the actual friction angles meet the design requirements. Literature values for friction angles between geotextiles are very limited. A value of 18° between two non-woven geotextiles was obtained from Trevira Literature (Reference 2). CETCO (Reference 3), which manufactures Bentomat and Claymax products, lists an interface friction angle between the non-woven side of a bentomat GCL with a woven geotextile to be 12 degrees. Higher friction angles generally exist with non-woven versus woven geotextiles, so it is assumed that the non-woven side of the GCL would be placed against the cushion fabric. This interface would essentially be a non-woven geotextile to a non-woven geotextile interface.

A simplified infinite slope stability calculation gives a factor of safety against sliding of the cap components with the following equation (Reference 4):

$$FS = \tan(\text{friction angle}) / \tan(\text{slope angle})$$



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This simplified equation does not account for pore water pressure on the geomembrane or GCL, which would lower the factor of safety. A more detailed equation incorporating the pore water pressure is used in the final design calculations.

Based on the above equation, a 4:1 (horizontal to vertical) slope, and a 18 degree interface friction angle, the factor of safety against sliding is approximately 1.3. A factor of safety of 1.5 is generally considered acceptable for slope stability. This interface was judged to be unacceptable.

#### Differential Settlement

Landfill caps can be subjected to differential settlement caused by the decay and collapse of materials within the landfill. This has been described as the "rusted refrigerator" scenario (i.e., localized settlement caused by the collapse of refrigerator or similar material disposed within the landfill). Based on research, it appears that GCLs can withstand large distortions and tensile strain up to 10 to 15 percent without undergoing significant increases in hydraulic conductivity (Reference 5). However, if differential settlement occurs directly beneath a GCL seam (GCLs are seamed by overlapping the GCL and adding granular bentonite along the overlap), the amount of differential settlement that the GCL can accommodate is limited by the amount of overlap. Very flexible polyethylene (VFPE) geomembranes have very good multiaxial stress characteristics which are superior to GCLs (Reference 6). VFPE is a generic term used by several manufacturers and researchers to describe a class of resins used to make liners, including LDPE, very low-density polyethylene (VLDPE), and linear low-density polyethylene (LLDPE). Given this information, it was felt that a VFPE geomembrane provides superior properties with respect to differential settlement as compared to the GCL.

#### Thinning of the GCL

The possibility exists for the bentonite layer to become thinner in the GCL due to various loadings, causing an increase in permeability of the GCL. The thinning can be caused by traffic loads or by the subgrade and cover soil conditions.

The CETCO installation guidelines (Reference 7) suggest that a minimum of 1 foot of soil should be maintained between the GCL and the tires/tracks of equipment on the cap. In addition a minimum of 2 feet is required for frequently trafficked areas and roadways. The current cap design included a minimum of 2.5 feet of cover between the GCL and the top of the gravel roadways and paved surfaces. The thinning of the GCL due to wheel loads would therefore be more of a construction concern, which can be eliminated with proper construction techniques.

The CETCO installation guidelines also indicate that the subgrade should possess a particle size distribution such that at least 80 percent of the soil is finer than a #60 sieve (0.25 mm). The current cap design includes a sand bedding/gas management layer; however, it was felt that it would be difficult to locate a local supply of material that meets the GCL requirements and also provide adequate permeability for gas flow.

Finally, the CETCO installation guidelines suggest using only cover soils with particle size ranging from fines to 1 inch diameter. Soils with minimal fines or a high concentration of aggregate larger than 1 inch should be assessed with a field scale test. The drainage layer to be placed above the low-permeability



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layer would include minimal fines ( $D_{20} > 0.1$  inch) based on New Jersey sanitary landfill regulations. To avoid a very narrow gradation (which may be costly) but also to avoid large stones that could damage the GCL or geomembrane, the drainage material would be limited to 1 inch diameter. To protect the GCL from the granular drainage material, it was decided to include a cushion fabric in the design. It was felt that a cushion fabric was also appropriate to protect a geomembrane.

#### Installed Cost

Vendors were contacted to estimate the installed cost of the low-permeability layer in the cap systems:

Material	Installed Cost (dollars/square foot)
GCL (non-woven /woven geotextiles)	\$0.43-0.52 / sf
40 mil smooth VFPE	\$0.35-0.39 / sf
40 mil textured VFPE	\$0.38-0.45 / sf

The geomembrane generally has a lower installed cost than the GCL. The engineering price quotes are attached to this letter.

Since Sites 4 and 5 are relatively remote and are located at least partly within explosive safety arcs, it was assumed that future development work at each site would be minimal. In addition, the waste materials at each site appear to be relatively stable, with little evidence of differential settlement. Therefore, long-term maintenance activities associated with the individual caps are assumed to be minimal.

#### Conclusions

Several issues concerning the use of GCL have been discussed in this letter. With proper design and careful installation, the landfill caps at Sites 4 and 5 can be designed to meet all the technical requirements of the cap system and incorporate a GCL material as the low-permeability layer; however, the design would need to be changed to accommodate the GCL. These changes would increase the construction cost of the cap system (e.g., laying back the steep slopes at Site 4 flatter than 4 to 1, which would in turn require more grading of the waste material and more cost).

The geomembrane material is better suited to the application of a single low-permeability layer cap at Sites 4 and 5 with respect to the slope stability, differential settlement, bedding material restrictions, and installed cost. In a published cost/benefit analysis of cap components for single-layer caps, geomembranes outperformed GCLs (Reference 8). Therefore, the geomembrane was selected as the low-permeability layer in the caps for Sites 4 and 5.

#### Comment 5

**The design basis states that cap cross sections will be provided at 50' intervals in the final design. The 100' intervals reflected in the 35% submission should be adequate for construction.**

#### Response 5

Cross sections spaced at 100-foot intervals will be presented in all subsequent submissions.



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**Comment 6**

**The cost estimate reflects import of common fill. Why? The design basis states a nearly balanced cut/fill has been achieved.**

**Response 6**

Common fill is required for the vegetative layer in the cap system.

**Comment 7**

- A) Drawing T-2, General Note #14: Change verification sampling and chemical analysis to a RAC performed function.**
- B) Note #16: Has UXO been found at the site?**
- C) Note #17: Considering the investment in the remedial investigation phase, how could lateral increases occur?**

**Response 7**

- A) References to verification sampling should be deleted. The presence/absence of waste materials will be determined through visual inspection by the RAC.
- B) Unexploded ordnance (UXO) has not been found at the site; however, ordnance-related components were found during the test pit investigation. In order to ensure the safety of the construction workers, it was felt that the possibility of UXO must be considered during construction activities. Explosive Ordnance Disposal (EOD) personnel at NWS Earle will be involved during cap installation activities at each site.
- C) While a considerable effort has been made to delineate the limits of the landfills (test pit investigation and analysis of historical aerial photographs), everywhere a test pit was not excavated the limit of the landfill is not known with complete certainty. It is not anticipated that any major deviation from the landfill limit shown on the drawings will be discovered during the construction; however, the possibility exists that some changes could be identified.

**Comment 8**

**Drawing C-1, Note 27: Site 5.**

**Response 8**

The note will be corrected.



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#### **Comment 9**

**Drawing C-2:** The erosion control plan appears to be formatted iaw (sic: in accordance with) NJDEP requirements. However, reference is made to documents which are not part of the Navy nor RAC spec/criteria system. For example:

- A) What is "Standard for land grading, p. 4.11"?
- B) Notes and site specific drawings do not reflect consistent nomenclature or details. Coordinate with drawings/specs.
- C) Permanent seed based on excessively drained soils. Since sites will be capped and topsoil provided, why was this category selected?

If NJDEP, SCS or Rutgers University criteria is required for this aspect of the project, provide NORTHDIV Code 402 with a copy of this criteria.

#### **Response 9**

- A) The standard for land grading is referring to the Standards for Soil and Erosion and Sediment Control in New Jersey, 1987 (page 4.1.1). These standards will be called out on the drawings.
- B) Notes, drawings, and details will be coordinated.
- C) The permanent seed mix is listed for excessively drained soils in the Standards for Soil and Erosion and Sediment Control in New Jersey; however, seed mixes for the next category of soils, "moderately to well drained", also include the excessively drained soil seed mixes. The selected seed mix should then perform adequately for conditions from excessively drained to moderately drained. Since the cap system will be engineered to drain with the incorporation of drainage layers and the minimum slopes, it is felt that cap soils will be at least moderately drained. Using a seed mix that is acceptable for excessively drained conditions should provide an added factor of safety against grass dying off during unusual dry periods.
- D) The only additional criterion required for this aspect of the project was the Standards for Soil and Erosion and Sediment Control in New Jersey. A copy of this document can be provided to NORTHDIV Code 402 if required.

#### **Comment 10**

**Drawing C-6:** The new drainage channel cuts off vehicular access to the site during and after construction.

#### **Response 10**

At the drainage divide in the perimeter ditch surrounding the Site 4 landfill cap, an earthen ramp will be incorporated into the final design. This ramp will provide vehicular access to the cap surface (such as



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grass mowing equipment). A culvert will not be required if the ramp is placed in the high point of the perimeter drainage ditch.

#### **Comment 11**

**Drawing C-20: Need benchmarks near permanent structures identified.**

#### **Response 11**

Nearly the entire site, as depicted on Drawing C-20, will be regraded during the construction of the cap system. Permanent benchmarks will therefore be located outside the limit of the capped area and will not be shown on this drawing. Benchmark information for Site 5 will be shown on Drawing C-12.

#### **Comment 12**

**Drawing C-21: The impermeable bound should extend beneath the drainage swale and keyed via anchor trench outside the swale to minimize seepage back into the site.**

#### **Response 12**

It is felt that extending the low-permeability layer beneath the perimeter drainage swale is not necessary for the following reasons:

- There is only occasional flow in the ditch so a large volume of water will not infiltrate out of the bottom of the ditch.
- Water that does infiltrate through the bottom of the ditch will likely travel primarily downward and not laterally into the waste material.
- While a liner could be constructed beneath the ditch, it would be more difficult and would increase the cost for a relatively small benefit.

#### **Comment 13**

**Drawing C-23: The decon pad appears to exceed project requirements. Since wastes are being repositioned and the site capped, there appears to be no need to collect and dispose of decon waters. Also, vehicles entering/exiting the site could easily be rinsed on a gravel pad within the bounds of the cap and waters allowed to percolate back into the site. If decon water requires collection, confirm perforated pipe material which will withstand heavy construction loads.**

#### **Response 13**

We agree that the decontamination pad does exceed project requirements. The pad will be modified so that the decontamination waters are not collected but are allowed to percolate into the surrounding soil within the bounds of the cap.



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**Comment 14**

**Drawing C-25: Gas vents in skeet range paved areas should be protected.**

**Response 14**

The gas vent detail provided in the DDS will be modified for use in the line of fire of the skeet range. The gas vents in the skeet range will likely be made shorter to present a smaller profile to the shooters. Also, as discussed in the October 9, 1997 meeting, the gas vents will be constructed so that they are detachable and can be removed during shooting events or during mowing activities.

**Comment 15**

**Drawing E-2: Does NEC allow electrical cables to be run inside water pipes/culverts?**

**Response 15:**

The NEC does not specifically address installation of electric lines in drainage pipes. Installation of the electric cable in the culvert was judged to be suitable as long as the cable is installed in a watertight conduit and attached to the top of the pipe, thereby keeping the cable protected from water.

Based on comments from others, the electric service will not be routed through the existing 24-inch-diameter RCP as indicated on Sheets E-1 and E-2. The electric service will be routed through the railroad berm via horizontal drilling and electrical conduit. The electric conduit installed beneath the railroad berm will be terminated on each side with an electrical pull box to allow access.

**Comment 16**

**Drawings E-1, E-2 & C-12. Requires removal of all conduit. Drawing C-12 states to seal in place. Coordinate.**

**Response 16**

The drawings will be coordinated. The existing conduit will be abandoned in place or will be removed only if it interferes with construction activities.

**Comment 17**

**MIL-HDBK 1037/3 states the shotfall area should be a turf surface. For the record, NORTHDIV concurs with the design intent of paving in this area. Due to the environmental need to minimize percolation, the additional environmental controls with shot collection and the elimination of potential liner damage during soil surface scraping; the shotfall area shall be paved as previously agreed.**



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### **Response 17**

This comment is acknowledged. As discussed in the October 9, 1997 meeting, due to site-related constraints, only a portion of the shotfall area will be paved. The paved area is expected to capture the majority of target fragments and wadding.

### **COMMENTS FROM NICK SOUCHIK - NORTHERN DIVISION**

#### **Comment 1**

**Very little information on the scope of electrical work. Understand lighting will be required.**

#### **Response 1**

The scope of electrical work in the DDS is limited, partly because of the uncertainties in electrical requirements to the new clubhouse, which was not selected at the time the DDS was submitted. More detail will be included with the final design submittal, although it appears that information on the new clubhouse will not be available prior to the final design submittal. A 400-amp electric service will be provided to the new clubhouse location, consistent with the requirements of the Shooter's Club. Since the new clubhouse is likely to be a mobile home or office trailer, the new clubhouse is presumed to be supplied as a prewired unit. Therefore, only interface between the electric panel (detailed in the final design) and the new clubhouse (provided as a separate item) will be required; this can be accomplished by the RAC.

Lighting will be provided to the shooting range similar to that currently provided. The military handbook and other available references to shooting ranges will be consulted to determine required lighting levels.

#### **Comment 2**

**Provide foot-candle calculations.**

#### **Response 2**

We assume that this refers to the range lights. See the response to comment no. 1.

#### **Comment 3**

**Provide point of connection and details how lighting will be powered, voltage drop, trench details, etc.**

#### **Response 3**

Appropriate details and notes will be provided in the final design.



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## **COMMENTS FROM GREGORY GOEPFERT - NWS EARLE**

### **Comment 1**

**Pg. 3-1 "1960" is "1968"**

### **Response 1**

Previous documents for Site 4 such as the RI and the FS have indicated that this landfill closed in 1960. Based on discussions with John Kolicus, B&R Environmental suggests replacing "1960" with "the late 1960s".

### **Comment 2**

**Pg. 4-3, pg. 4-5ff, Geology: it appears that "Quirked" formation should be "Kirkwood" formation.**

### **Response 2**

B&R Environmental agrees.

### **Comment 3**

**Pg. 4-6/4-7 drainage lines traversing drainage basins does not appear to be correct.**

### **Response 3**

Drainage lines depicted in these drawings are based on regional mapping and are sometimes not accurate at the site level. Site-specific surface water divides were developed as part of the design for each site.

### **Comment 4**

**Pg. 4-10, last sentence: "landslide" should be "landfill".**

### **Response 4**

B&R Environmental agrees.

### **Comment 5**

**Page 6-2, para. 6.1.2: where will the wastes go?**

### **Response 5**

Waste materials excavated at Site 5 during cap installation activities will be placed under the cap and will not be transported off site.



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#### Comment 6

**Pg. 6-2 (General): Site approval from NAVAL ORDNANCE CENTER and NAVAL FACILITIES ENGINEERING COMMAND must be obtained based on the redesign of the Shooter's Club area.**

#### Response 6

B&R Environmental suggests rewording the second paragraph of Section 6.1.2, second sentence, as follows: "The location and orientation of the trap/skeet range after cap installation will remain the same as the existing range. Site approval from the Naval Ordnance Center and Naval Facilities Engineering Command must be obtained after installation of the cap and after the new trap/skeet range is complete."

#### Comment 7

**Pps. 6-2 and 6-3: Appears a fair amount of fill must be trucked in to Site 5. We need to further discuss the material balance presented for fill material.**

#### Response 7

Site 5 will require fill to achieve minimum required slopes for the cap. It was assumed that, if excess fill was generated at Site 4, this material would be transported to Site 5 to be used as fill material.

#### Comment 8

**Pg. 6-5 "12 thick drainage layer" should be "12 inch thick" drainage layer?**

#### Response 8

B&R Environmental agrees.

#### Comment 9

**Pg. 6-5 The source of fill needs to be identified.**

#### Response 9

Fill materials required to attain rough-grade contours (subbase) prior to cap installation can probably be obtained from either on-Station sources or from off Station. Fill materials required for cap construction (drainage, gas management, and vegetative layer) will likely need to be obtained from off Station sources, since the gradation requirements are much more stringent than the material required to form the subbase (rough grade of the cap).

As discussed in the August 4, 1997 meeting, potential fill sources at NWS Earle include a borrow area near F-Group and the earthen barricade at the old MK8 ordnance stripping area west of Highway 34 (forklift training area). Potential off-Station sources of fill have not been identified at this time.



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B&R Environmental would suggest letting the RAC (Foster Wheeler) propose which sources of fill they intend to use. The RAC will be required to provide documentation (laboratory results) that the materials conform to the project specifications. As requested by NWS Earle, acid-producing soils and recycled soils will not be considered suitable for the project.

**Comment 10**

**Pg. 6-10 Responsibility for the removal of vaults must be established.**

**Response 10**

At the October 9, 1997 meeting, it was decided that movement of the existing vaults would be performed by the RAC (Foster Wheeler) as part of the clubhouse replacement activity.

**Comment 11**

**Pg. 6-12 The use of propane heat at the shooter's club building needs to be examined by the explosives safety personnel.**

**Response 11**

At the October 9, 1997 meeting, it was decided that this item would be handled internally between the Shooter's Club and NWS Earle. Depending on the manufacturer of the new clubhouse, electric heat may also be an option.

**Comment 12**

**Pg. 6-12 Is the sewerage holding tank to be below grade?**

**Response 12**

Yes.

**Comment 13**

**Pg. 6-13 Re: maintenance and repair of landfill cap: Does the manufacturer of the geomembrane offer a warranty? Is the installation contractor an approved installer?**

**Response 13**

Most manufacturers of geomembrane materials offer warranties and these warranties vary by manufacturer. It is our understanding that the RAC (Foster Wheeler) has experienced personnel and the specialized equipment required to install geomembrane material. Generally, geomembrane manufacturers have licensed/certified installers for their products. At this time, Foster Wheeler has not revealed which geomembrane manufacturer and product they intend to use.



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**Comment 14**

**Pg. 6-14 Destruction of wetlands is not intended. Revise IAW (sic: in accordance with) visit of NJDEP on 3 Oct 1997.**

**Response 14**

B&R Environmental agrees.

**Comment 15**

**General: Will National Environmental Policy Act (NEPA) documentation be issued for this project (e.g.: will a finding of no significant impact be drafted, signed and issued for this project (FONSI))?**

**Response 15**

Remedial actions performed under CERCLA are exempt from this requirement as long as the actions are performed on site.

**Comment 16**

**General: Do not see a confirmatory analysis (with the Clean Air Act) as part of this submission.**

**Response 16**

See the response to comment no. 15. Landfill gas emissions from these vents will be monitored as part of maintenance activities.

**Comment 17**

**I believe that calculations need to be run to assure that threshold air contaminant levels are not exceeded during or after construction of the caps?**

**Response 17**

Engineered controls will be implemented during construction of each cap to minimize dust generation and contaminant migration. During the predesign investigation, numerous soil borings and test pits were completed, and no detectable vapors were generated during these activities. Therefore, significant vapor generation is not expected during construction. Vapor and dust generation will be monitored during construction as part of the site-specific health and safety plan.

Since the caps will be vegetated, significant dust generation is not expected to occur. Although gas vents are included with each cap, vapor release from these vents (assumed to be primarily methane) is expected to be minimal.



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**Comment 18**

**General: Has any modeling been done to estimate when remedial objectives will be achieved?**

**Response 18**

Groundwater modeling was performed at each site as part of the RI/FS activities. The modeling results determined that, after cap installation at each site, groundwater quality standards would be achieved within a relatively short distance downgradient of each site. The contaminant levels in groundwater beneath each site were assumed to remain above applicable standards for the duration of the modeling period (1,000 years). Therefore, a Classification Exception Area (CEA) will be required for an indefinite period of time for the groundwater plume area.

**Comment 19**

**General: Has the U.S. EPA and the NJDEP been forwarded copies of the design?**

**Response 19**

Yes.

**Comment 20**

**pg. 2-2: Who will be preparing the documentation for the Classification Exception Area, and when?**

**Response 20**

The Navy has requested that the A&E (B&R Environmental) submit necessary information to the regulatory agencies through the Resident Officer in Charge of Construction (ROICC). The A&E has assumed that preparation of the CEA is included in this task unless directed by the Navy. Preparation of the CEA will likely begin this fall.

**Comment 21**

**pg. 3-1: Who will prepare and submit permit application to the Freehold Soil Conservation district for this project?**

**Response 21**

Based on the October 9, 1997 meeting, B&R Environmental will submit the Erosion and Sediment (E&S) Control Plan to the Freehold Soil Conservation District (through the NWS Earle ROICC) when the final E&S Control Plan is completed. We do not plan to prepare/submit an application unless directed by the Navy and the Conservation District.



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**Comment 22**

**General: Need concurrence from regulatory agencies regarding Navy position on necessary permits. Objective is to get into construction phase with all regulatory/permit issues resolved.**

**Response 22**

B&R Environmental agrees.

**COMMENTS FROM THOMAS GENTILE - NWS EARLE**

**Comment 1**

**The subject plans have been reviewed and comments are provided directly on the copies of the applicable pages which are attached as enclosure (1). Nearly all items noted are very minor, except for the question of the Soil and Erosion Control Plan Certification and Storm Water Permit. If these are necessary, they should be submitted as soon as possible to avoid delays in finalizing the specification. It may be necessary to have the A&E revise contract drawings so that the Soil and Erosion Control Plan will be certified by the Freehold Soil Conservation District. Also, the stormwater permit may require significant changes in detention basin plans.**

**Response 1**

A draft E&S Control Plan was included with the DDS. The E&S Control Plan also addresses stormwater issues before, during, and after construction of the caps for each site. Information on erosion and sediment control, as well as stormwater control, is included in the drawings for each site. After the final design package is generated and approved by the Navy, B&R Environmental will coordinate with the NWS Earle ROICC office to submit necessary information to the appropriate agencies.

**Comment 2**

**One general comment or question; has the future use of a farm size tractor on the entire cap area been considered, since maintenance mowing would require such equipment? Approximately two cuttings per year would be required to keep the area in a grassland vegetation type. (This is recognized on page 6-13 under maintenance, however should there be mention of any equipment limitations/tractor size or weight?)**

**Response 2**

B&R Environmental assumed that the grassed areas of each cap would be mowed twice per year using a small tractor. Small to mid-size tractors with mowers should not pose a problem on each cap. The steeper slopes on the cap at Site 4 may limit the size of tractor for this site, at least on the steep slopes.



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**Comment 3**

**Also, when is the actual construction work scheduled to start and would we at Earle be reviewing the Contract Specification before it is finalized? The concern here is the topsoil and fill soil specification. The maintenance establishment and the guarantee period is also a concern.**

**Response 3**

The final design submission for the OU-1 landfill caps is scheduled for delivery to the Navy on November 10, 1997. The final design submission will include detailed specifications for the work. Based on discussions at the October 9, 1997 meeting, clearing and grubbing of each site are scheduled to begin early in 1998 (possibly February). With these dates in mind, there should be time for review and comment on the detailed specifications prior to the start of site work. At the October 9, 1997 meeting, it was decided that the RAC would maintain the vegetative layer at each site for a period of 1 year.

**Comment 4**

**Page 2-5, Section 2.2: Knieskern's beaked-rush and swamp pink are listed on both the federal as well the New Jersey endangered species list.**

**Response 4**

Correction will be noted.

**Comment 5**

**Page 3-1, Section 3.1: The Site 4 landfill was operated until approximately 1968.**

**Response 5**

Refer to "comment no. 1 from Greg Goepfert".

**Comment 6**

**Page 3-1, Section 3.1 (third paragraph): Does this intend to mean that this water line is still in service to the fire hydrant.**

**Response 6**

B&R Environmental will change wording as follows: It is likely that this line is no longer in service.

**Comment 7**

**Page 3-5, Figure 3-2: groundwater flow direction and surface water divides.**



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**Response 7**

Figure 3-2 provides general groundwater flow direction under Site 4. Groundwater contours near Lake Earle most likely wrap around this water body but sufficient water elevation data were not available to allow more detail.

The regional surface water boundary is listed on Figure 3-3, page 3-6. As explained in a previous comment, these regional surface water divides are not entirely accurate at the site level. Local surface water divides are shown in the design drawings and the E&S Plan.

**Comment 8**

**Page 4-1, Section 4.1: Landslide.**

**Response 8**

"Landslide" will be changed to "Landfill". See Greg Goepfert's comment no. 4.

**Comment 9**

**Figure 4-2 and 4-3, Pages 4-6 and 4-7: Surface water divides and drainage.**

**Response 9**

As discussed in comment no. 7, drainage water divides on these figures are not very accurate at the site level. Refer to the design drawings and the E&S Plan for more accurate site information.

**Comment 10**

**Figure 5-2, Page 5-9: Location of wetlands.**

**Response 10**

The boundary of this wetlands is being surveyed and will be included in the final design submittal.

**Comment 11**

**Page 5-11, first paragraph, second sentence: Due tot he presence. . . .**

**Response 11**

The typographical error will be corrected. Revise text to read: Due to the presence.....

**Comment 12**

**Page 5-11, Section 5.3.3: Location of Wetland Area C.**



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**Response 12**

Wetland Area C is not depicted on Figure 5-2 (located west of Wetland Area B - off the drawing)

**Comment 13**

**Page 6-1, Section 6.1.1: Westland A**

**Response 13**

The typographical error will be changed from "Westland A" to "Wetland A".

**Comment 14**

**Page 6-5, second paragraph from bottom: Is the New Jersey Natural Resources Conservation Service the same as the USDA Natural Resource Conservation Service (formerly the US Soil Conservation Service)?**

**Response 14**

Yes. This sentence will be revised to reference the United States Department of Agriculture (USDA) Natural Resource Conservation Service (formerly the United States Soil Conservation Service).

**Comment 15**

**Page 6-8: If submission is required to Soil Conservation District, who will submit plan and redo drawings until accepted.**

**Response 15:**

See Greg Goepfert's comment no. 21.

**Comment 17**

**Page 6-8, Section 6.6.2: If applicable, a stormwater permit would be required.**

**Response 17**

B&R Environmental Agrees.

**Comment 18**

**Page 6-9, Section 6.6 last paragraph: Were the locations of detention basins outside the limits of the topographic mapping and outside the wetlands area?**



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### **Response 18**

Additional topographic survey information is required in specific areas to allow for design of sedimentation ponds. Wetlands are located in the vicinity of some of these detention ponds. The boundaries of the wetlands will be depicted as will the topographic information.

### **Comment 19**

The subject plans were reviewed by 092TG and comments were provided dated 19 Sept 1997. The following are additional comments:

- A) Drawing notes pertaining to the required Soil Conservation District notifications should be deleted, unless this is a requirement.
- B) On drawing C-15, and other drawings, the dirt road that branches to the south off the entrance road is shown to end abruptly, when it actually continues to the southeast to the perimeter fence.
- C) Has this design taken into consideration that, in the future, a wildfire could occur on the landfill cap? Is there any risk of flammable gases igniting and causing an underground landfill fire?

### **Response 19**

- A) Notifications are included as a courtesy and are not required under CERCLA. These notifications are optional and can be deleted at the discretion of the Navy.
- B) The dirt road exists on the drawing and is intended to extend to the perimeter road along the fence. This road is shown on the drawings but is difficult to see.
- C) A grass fire on top of the cap should have no impact on the integrity of the cap. Due to the nature of the waste types in the respective landfills, methane generation is likely to be minimal. There do not appear to be sufficient combustible materials in the respective landfills to present a fire hazard.

## **COMMENTS FROM THOMAS DUNN - NWS EARLE**

### **Comment 1**

Sheet T-2: Note 7: Erosion Control Plans should be prepared, submitted, approved and made part of these contract documents. Make reference to it in this note.

### **Response 1**

A draft E&S Control Plan was prepared as part of the DDS. Per the distribution schedule for CTO 289, the ROICC office received two copies of the drawings and specification outline only and did not include copies



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of the draft E&S Control Plan. B&R Environmental suggests adding the following to Note 7, second sentence:

The RAC. . . during the course of construction in accordance with the final Erosion and Sediment Control Plan.

**Comment 2**

**Sheet T-2, Note 12: The Grading Plans included in these documents should allow proper drainage. Make reference to them in this note.**

**Response 2**

B&R Environmental suggests revising Note 12 as follows: All areas shall be graded to drain in accordance with the contract drawings.

**Comment 3**

**Sheet T-2, Note 16: UXO procedures should be discussed now.**

**Response 3**

B&R Environmental suggests revising Note 16 as follows: All intrusive activities shall be conducted in accordance with the RAC-approved standard operating procedures. Coordinate with NWS Earle Explosive Ordnance Disposal personnel.

**Comment 4**

**Sheet T-2, Note 17: Clarify the events which will change the limits of excavation.**

**Response 4**

B&R Environmental suggests rewording Note 17 as follows:

In the event that the proposed limits of the cap require modification due to one of the following, the RAC shall notify the ROICC to allow reevaluation of the capping system:

- Waste materials are located outside the established limit of waste and these waste materials are of sufficient quantity that excavation and consolidation of these materials under the respective cap is not feasible.
- The quantity of waste materials to be consolidated under the respective cap exceeds the available storage capacity under the cap.

**Comment 5**

**Sheet C-1, Note 2: Verify that Freehold Soil Conservation District needs to inspect the site.**



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**Response 5**

The Freehold Conservation would be notified as a courtesy.

**Comment 6**

**Sheet C-1, Note 26: The total cut exceeds the total fill by 1,600 yd<sup>3</sup>. Verify that this material is to be disposed off site. It is, what are the disposal requirements?**

**Response 6**

To the extent possible, the grades at Site 4 will be adjusted in the Final Design Submission to achieve a cut/fill balance. If excess fill is generated during rough grading at Site 4, this material will be consolidated under the cap at Site 5, since there is expected to be a deficit of fill materials. Since this material will be transported on the base property and within the operable unit, no special disposal requirements are anticipated.

**Comment 7**

**Sheet C-1, Note 27: Add "5" to note. Verify that asphalt is measured in cubic yards.**

**Response 7**

Note 27 relates to Site 5 information. The quantity of asphalt for Site 5 is incorrectly stated on the drawing. Approximately 3,560 square yards of asphalt paving are required, which equates to approximately 200 cubic yards of asphalt (assuming a nominal thickness of 2 inches).

**Comment 8**

**Sheet C-21, Detail 3: Clarify the requirements for a curb at the pavement edge.**

**Response 8**

The 8-inch-high curb at the pavement edge will be formed asphalt.

**Comment 9**

**Sheet C-21, Detail 4: What is the material used for the "Bedding Gas Management Layer"?**

**Response 9**

A poorly graded sand (SP Soil) would be used for this layer.

**Comment 10**

**Sheet C-23, Detail 10: Add the missing dimension to the CMP.**



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Naval Facilities Engineering Command  
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**Response 10**

Dimension will be included in final design. This dimension varies with the individual sediment basin and will be included in the table for surface water management details (Sheet C-23).

**Comment 11**

**Sheet C-23, Section B: Does the wash in the Decontamination Basin need to be tested and disposed of?**

**Response 11**

Wash water from the decontamination basin will be allowed to infiltrate into the ground.

**Comment 12**

**Sheet E-2. A structure of some sort is required where the 4" conduits meet the existing 24" RCP. Add details for the connection to the existing service.**

**Response 12**

Based on comments from others, the electric service will not be routed through the existing 24-inch-diameter RCP as indicated on Sheets E-1 and E-2. The electric service will be routed through the railroad berm via horizontal drilling and electrical conduit. The electric conduit installed beneath the railroad berm will be terminated on each side with an electrical pull box to allow access.

Please call if you have any questions or require further information.

Sincerely,

Michael J. Wierman, P.E.  
Project Manager

ATTACHMENTS:      References  
                              Comments

## REFERENCES



## REFERENCES

1. Macky, R.E., January-February 1997, Geosynthetics Clay Liners, Part 5: Design Permitting and Installation Concerns, Geotechnical Fabrics Report.
2. Trevira Tech Note 006.
3. Colliod Environmental Technologies, Bentomat Shear Testing Summary.
4. Dunn, I.S., L.R. Anderson, and F.W. Kiefe 1980, Fundamentals of Geotechnical Analysis, John Wiley & Sons, New York.
5. Koerner, R.M., December 1993, Technical Equivalency Assessments of GCLs to CCLs, Proceedings of the 7<sup>th</sup> GRI Seminar, Geosynthetic Liner Systems, Concerns and Designs, Philadelphia.
6. GSE Lining Technology, table of minimum test values for GSE UntraFrictionFlex VFPE Geomembrane.
7. Colliod Environmental Technologies July 24, 1997, Bentomat, Claymax Geosynthetic Clay Liner Installation Guidelines.
8. Koerner, R.M., and D.E. Daniel May, 1992, Better Cover-Ups, Civil Engineering.

**COMMENTS FROM PAUL BRIEGEL  
(NORTHDIV)**

9 September 1997

MEMORANDUM

From: NORTHDIV, Code 402A  
To: Brown & Root, M. Wierman

Subj: CONTRACT N62472-90-D-1298, CTO #289  
SITES 4/5, NWS EARLE

1. I have reviewed the 35% design submission for the subject project and am providing the following comments. Please review these comments and advise of intended action to be taken.
2. The investigative results presented in the design basis reflect limited data along the southern side of site 4. If the investigations omitted this area, how were limits of wastes and the associated cap delineated?
3. Site 4 exists at about a 3% slope towards the southeastern side on the site, which nearly accommodates sheet flow across the site. The design reflects a significant volume of site grading to provide a traditional conical capping system (in lieu of following existing grades). What is the basis for this decision? What is the additional cost in comparison to following the lay of the land? Consider also the additional detention basin and swales created as a result of modifying existing flow patterns.
4. The design analysis states that the low density polyethylene (LDPE) liner was selected in part due to the reduced frictional resistance between a geocomposite clay (GCL) liner and the non-woven geotextile which would result in an unstable slope. This needs to be substantiated via calculation. Site grading can be adjusted to accommodate the GCL. Also, stating that vehicular loads will cause a GCL to fail must be substantiated via calculation.  
  
A cost comparison shall be presented in the final design confirming the LDPE liner as the cost effective option. Consider also the difficulty which NWS Earle Public Works will have in future repairs with the LDPE liner in comparison to the GCL.
5. The design basis states that cap cross sections will be provided at 50' intervals in the final design. The 100' intervals reflected in the 35% submission should be adequate for construction.
6. The cost estimate reflects import of common fill. Why? The design basis states a nearly balanced cut/fill has been achieved.

7. Drawing T-2, General Note #14: Change verification sampling and chemical analysis to a RAC performed function.

Note #16: Has UXO been found at the site?

Note #17: Considering the investment in the remedial investigation phase, how could lateral increases occur?

8. Drawing C-1, Note 27: Site 5.

9. Drawing C-2: The erosion control plan appears to be formatted iaw NJDEP requirements. However, reference is made to documents which are not part of the Navy nor RAC spec/criteria system. For example:

- What is "Standard for land grading, P 4.11"?
- Notes and site specific drawings do not reflect consistent nomenclature or details. Coordinate with drawings/specs.
- Permanent seed based on excessively drained soils. Since sites will be capped and topsoil provided, why was this category selected?

If NJDEP, SCS or Rutgers University criteria is required for this aspect of the project, provide NORTHDIV Code 402 with a copy of this criteria.

10. Drawing C-6: The new drainage channel cuts off vehicular access to the site during and after construction.

11. Drawing C-20: Need benchmarks near permanent structures identified.

12. Drawing C-21: The impermeable bound should extend beneath then drainage swale and keyed via anchor trench outside the swale to minimize seepage back into the site.

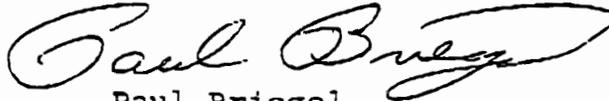
13. Drawing C-23: The decon pad appears to exceed project requirements. Since wastes are being repositioned and the site capped, there appears to be no need to collect and dispose of decon waters. Also, vehicles entering/exiting the site could easily be rinsed on a gravel pad within the bounds of the cap and waters allowed to percolate back into the site. If decon water requires collection, confirm perforated pipe material which will withstand heavy construction loads.

14. Drawing C-25: Gas vents in skeet range paved areas should be protected.

15. Drawing E-2: Does NEC allow electrical cables to be run inside water pipes/culverts?

16. Drawings E-1, E-2 & E-12: Requires removal of all conduit. Drawing C-12 states to seal in place. Coordinate.

17. MIL-HDBK 1037/3 states the shotfall area should be a turf surface. For the record, NORTHDIV concurs with the design intent of paving in this area. Due to the environmental need to minimize percolation, the additional environmental controls with shot collection and the elimination of potential liner damage during soil surface scraping; the shotfall area shall be paved as previously agreed.

  
Paul Briegel

Copy to:  
NWS Earle (G. Goepfert)  
FWENC (A. Holcomb)  
Code 182 (J. Koliccius)

**COMMENTS FROM NICK SOUCHIK  
(NORTHDIV)**



**COMMENTS FROM GREG GOEPFERT  
(NWS EARLE)**

**Design of Landfill Caps, Sites 4 and 5**

**Comments:**

***General Section***

pg. 3-1 "1960" is "1968"

pg. 4-3, pg. 4-5ff, Geology: it appears that "Quirked" formation should be "Kirkwood" formation.

pg. 4-6/4-7 drainage lines traversing drainage basins does not appear to be correct.

pg. 4-10, last sentence: "landslide" should be "landfill" (?)

pg. 6-2, para. 6.1.2: where will excavated wastes go?

pg. 6-2 (General): Site approval from NAVAL ORDNANCE CENTER and NAVAL FACILITIES ENGINEERING COMMAND must be obtained based on the redesign of the Shooter's Club area.

pps. 6-2 and 6-3: Appears a fair amount of fill must be trucked in to Site 5. We need to further discuss the material balance presented for fill material.

pg. 6-5 "12 thick drainage layer" shouldn't be "12 inch thick" drainage layer?

pg. 6-5 The source of fill needs to be identified.

pg. 6-10 Responsibility for the removal of vaults must be established.

pg. 6-12 The use of propane heat at the shooter's club building needs to be examined by the explosives safety personnel.

pg. 6-12 Is sewerage holding tank to be below grade?

pg. 6-13 Re: maintenance and repair of landfill cap: Does the manufacturer of the geomembrane offer a warranty? Is the installation contractor an approved installer?

pg. 6-14 Destruction of wetlands is not intended. Revise LAW visit of NJDEP on 3 Oct 1997.

General: Will National Environmental Policy Act (NEPA) documentation be issued for this project (e.g.: will a finding of no significant impact be drafted, signed and issued for this project (FONSI))?

General: Do not see a conformity analysis (with the Clean Air Act) as part of this submission.

**I believe that calculations need to be run to assure that threshold air contaminant levels are not exceeded during or after construction of the caps?**

10/07/97

**DESIGN OF LANDFILL CAPS AT SITES 4 and 5**

**General: Has any modeling been done to estimate when remedial objectives will be achieved?**

**General: Has the U.S. EPA and NJDEP been forwarded copies of the design.**

***Permits Section***

**pg. 2-2: Who will be preparing the documentation for the Classification Exception Area, and when?**

**pg. 3-1: Who will prepare and submit permit application to the Freehold Soil Conservation district for this project?**

**General: Need concurrence from regulatory agencies regarding Navy position on necessary permits. Objective is to get into construction phase with all regulatory/permit issues resolved.**

**\*\*\*\*Specific Comments from Messrs. Tom Gentile and Paul Briegel have been forwarded under separate cover.**

**// Gregory J. Goepfert, P.E.//  
7 October 1997**

**COMMENTS FROM TOM GENTILE  
(NWS EARLE)**

MEMORANDUM

19 SEPT 1997

From: TOM GENTILE  
To: GREG GOEPFERT

Subj: REVIEW OF DESIGN DEVELOPMENT SUBMISSION REMEDIAL ACTION AT  
OPERABLE UNIT 1 (SITES 4 AND 5), SEPT 1997

Encl: (1) Copy of selected pages of Capping Plans where comments are  
noted

1. The subject plans have been reviewed and comments are provided directly on the copies of the applicable pages which are attached as enclosure (1). Nearly all items noted are very minor, except for the question of the Soil and Erosion Control Plan Certification and Storm Water Permit. If these are necessary, they should be submitted as soon as possible to avoid delays in finalizing the specification. It may be necessary to have the A & E revise contract drawings so that the Soil and Erosion Control Plan will be certified by the Freehold Soil Conservation District. Also, the Stormwater permit may require significant changes in detention basin plans.
2. One general comment or question; has the future use of a farm size tractor on the entire cap area been considered, since maintenance mowing would require such equipment? Approximately two cuttings per year would be required to keep the area in a grassland vegetation type. (This is recognized on page 6-13 under maintenance, however should there be mention of any equipment limitations/tractor size or weight?)
3. Also, when is the actual construction work scheduled to start and would we at Earle be reviewing the Contract Specification before it is finalized? The concern here is the topsoil and fill soil specification. The maintenance establishment and the guarantee period is also a concern.

All facilities located in the Mainside Administration area are connected to a public water supply (New Jersey American Water Company). Water for the public supply network comes from surface water intakes, reservoirs, and deep wells. No public water supply wells or surface water intakes are located on the NWS Earle facility. A combination of private wells and public water supply from the New Jersey American Water Company serves businesses and residences in areas surrounding the Mainside facilities. There are a number of private wells located within a 1-mile radius of NWS Earle and several within the NWS Earle boundaries. The majority of these wells are used for potable supplies; previous testing for drinking water parameters indicates these wells have not been adversely impacted.

There is a rich diversity of ecological systems and habitats at NWS Earle. Knieskern's beaked-rush (*Rynchospora knieskernii*), a sedge species on the federal endangered list, has been seen on the station, and some species on the New Jersey endangered list, such as the swamp pink (*Helonias bullata*), may be present. An osprey has visited Mainside and may nest in another area at NWS Earle. The Mingamahone Brook supports bog turtles downstream of the Mainside area and provides an appropriate habitat for them at the Mainside area.

*This is a Federal Species  
Both species are  
also State listed*

### 2.3 SUMMARY OF REMEDIAL INVESTIGATIONS

Potential hazardous substance releases at NWS Earle were addressed in an Initial Assessment Study (IAS) in 1982, a Site Inspection Study (SI) in 1986, and a Phase I Remedial Investigation (RI) in 1993. These were preliminary investigations to determine the number of sources, compile histories of waste-handling and disposal practices at the sites, and acquire data on the types of contaminants present and potential human health and/or environmental receptors. The RI at Sites 4 and 5 included the installation and sampling of monitoring wells, collection of surface water and sediment samples, and excavation of test pits to observe wastes and sample subsurface soils.

In 1990, NWS Earle was placed on the National Priorities List (NPL), which is a list of sites where uncontrolled hazardous substance releases may potentially present serious threats to human health and the environment. The sites at NWS Earle were then addressed by Phase II RI activities to determine the nature and extent of contamination at these sites. Activities included installation and sampling of groundwater monitoring wells, surface water and sediment sampling, and surface and subsurface soil sampling. The Phase II RI was initiated in 1995 and completed in July 1996, when the final Phase II RI report was released.

The results of the RI were used as the basis for performing a feasibility study (FS) of potential remedial alternatives. The Navy and EPA, in consultation with NJDEP, developed the proposed remedial action

### 3.0 SITE 4 - LANDFILL WEST OF "D" GROUP

#### 3.1 SITE DESCRIPTION

*1968? When I started working in 1968, this landfill was in use.*

Site 4 is a 5-acre landfill that received approximately 10,200 tons of mixed domestic and industrial wastes from 1943 until 1960. Disposed materials include metal scrap, construction debris, pesticide and herbicide containers, paint residues, and rinsewaters. It has been reported that containers of paint, paint thinners, varnishes, shellacs, acids, alcohols, caustics, and asbestos may have been disposed. The landfilled materials are currently covered by a thin layer of sandy soil.

Figure 3-1 depicts the location of Site 4 as well as other features such as monitoring wells and sampling locations. Figure 3-1 depicts the approximate boundary of the landfill, based on review of aerial photographs and other historical information.

An eight inch water line parallels the dirt road to the east of Site 4. An six inch lateral extends from this water line into the Site 4 landfill area. Historic drawings indicate that this lateral line serviced a fire hydrant located in Site 4. The historical drawings also indicate an elevation of the fire hydrant well above present ground surface elevation of the landfill. It is unlikely that this line is no longer in service. The exact location of the lateral water line is not known although part of the line is exposed east of the landfill.

*Does this intend to mean line is still in service. probably not*

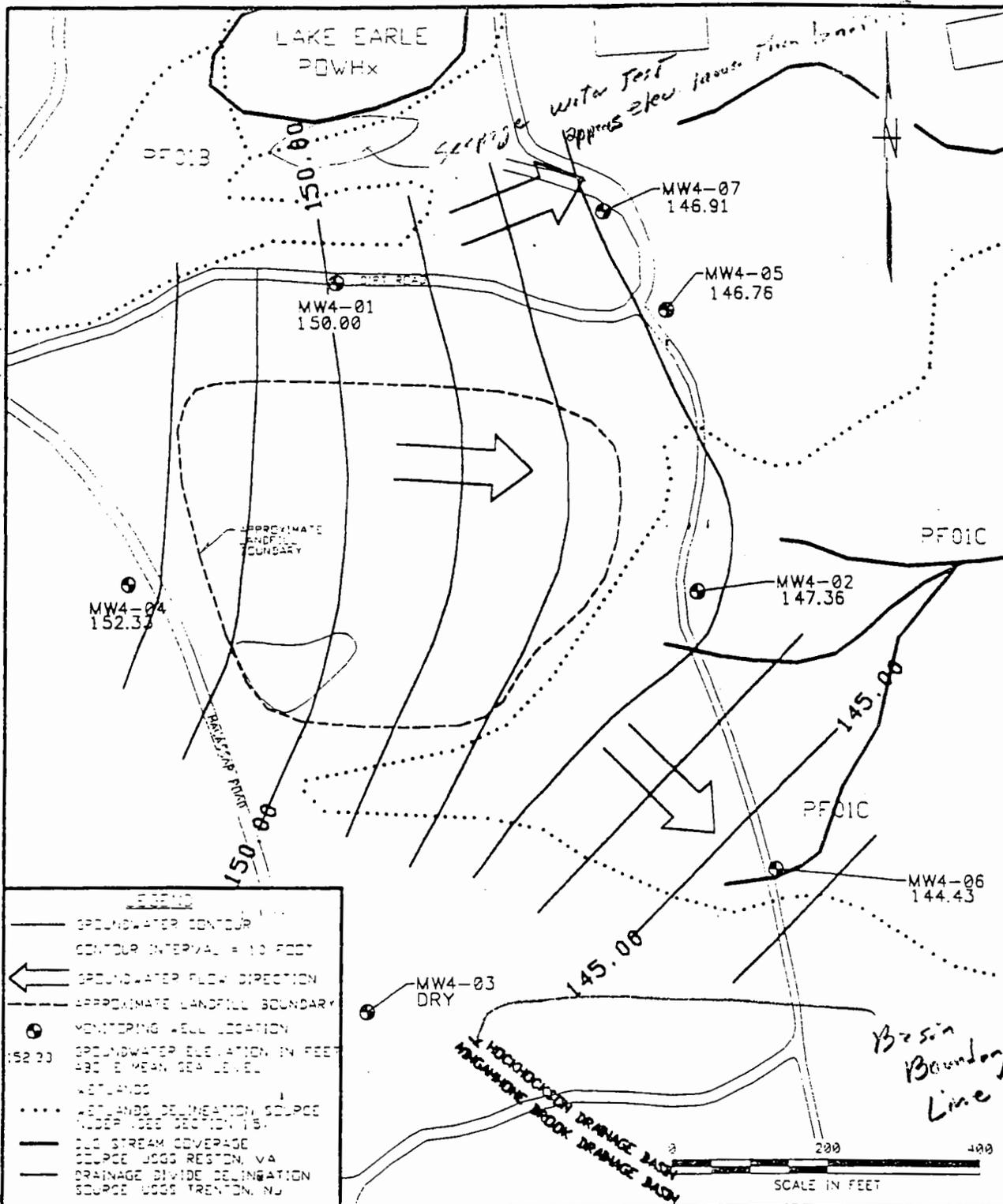
#### 3.2 GEOLOGY

Regional mapping places Site 4 within the outcrop area of the Cohansey Sand. The Cohansey Sand ranges between 0 and 30 feet in thickness and the soil borings are no more than 35 feet deep. The lithology of the sediments encountered in the on-site borings generally agrees with the published description of the Cohansey Sand. The thickness of the sediments penetrated in the on-site borings indicates the Cohansey Sand may have a regional thickness of greater than 30 feet. In general, the borings encountered alternating beds of light-colored, silty, fine- to coarse-grained sand with varying amounts of gravel. A 0.5-foot reddish-yellow clay seam was penetrated in one of the borings

#### 3.3 SOILS

The soils covering Site 4 are mapped as PT or Pits, sand and gravel, according to the April 1989 Soil Survey of Monmouth County, New Jersey. This unit consists of areas that have been excavated for sand and gravel. Typically, these areas consist of sandy material and differing amounts of gravel and

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DRAWN BY HJP 8/25/97	<b>Brown &amp; Root Environmental</b>	CONTRACT NO. 7602	OWNER NO.
CHECKED BY DATE	<b>GROUNDWATER CONTOURS MAP</b> <b>AUGUST 7, 1995</b> <b>SITE 4 - LANDFILL WEST OF "D" GROUP</b> <b>NAVAL WEAPONS STATION EARLE</b> <b>COLTS NECK, NEW JERSEY</b>	APPROVED BY DATE	DATE
COST/SCHED-AREA		APPROVED BY DATE	DATE
SCALE AS NOTED		DRAWING NO. <b>FIGURE 3-2</b>	REV. 0

## 4.0 SITE 5 - LANDFILL WEST OF ARMY BARRICADES

### 4.1 SITE DESCRIPTION

The Site 5 landfill received approximately 6,600 tons of mixed domestic and industrial wastes between 1968 and 1978 (Figure 4-1). The landfill covers an aerial extent of approximately 8 acres. Figure 4-1 depicts the approximate boundary of the landfill, based on review of aerial photographs and other historical information.

Wastes which were disposed of at Site 5 included paper, glass, plastics, construction debris, pesticide and herbicide containers, containers of paint, paint thinners, varnishes, shellacs, acids, alcohols, caustics, and small amounts of asbestos. The landslide materials are currently covered by a sand and vegetated soil layer ranging in depth from 1 to 3 feet. Approximately 2.5 acres of the site is used as a skeet shooting range. ✓

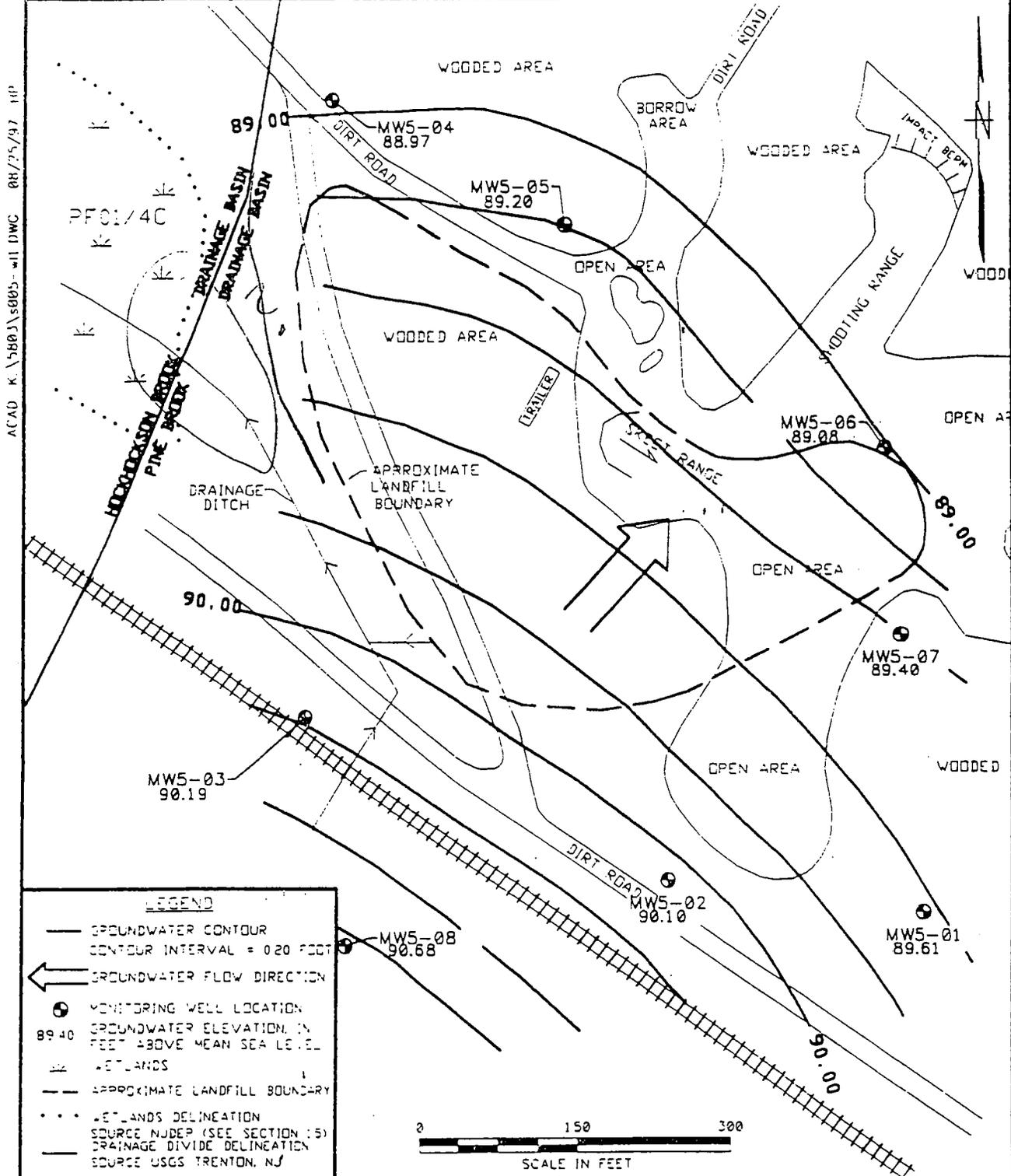
As shown on Figure 4-1 a trap/skeet shooting facility (Shooters Club) is located on top of the landfill at Site 5. The Shooters Club consists of concrete walkways to shooting stations, various small structures which house target throwing equipment, wooden light standards with the associated lights for night shooting, and other small ancillary items (gun racks, flagpole, etc. ).

Also included at the facility is a clubhouse which consists of a mobile home ("Trailer" on Figure 4-1), approximately 60 feet by 12 feet and a wooden deck approximately the same size. Two large vaults are installed within the clubhouse and are used to store guns, ammunition, and related equipment used during shooting events. The clubhouse includes a sink and restroom facilities.

Electric service to the shooters club is provided by an underground electric line (100 Amp, single phase) which was trenched through the landfill and passes beneath the railroad tracks south west of the clubhouse. Underground electric lines run to the light poles and range equipment.

The clubhouse is also serviced by an underground telephone line which follow the main road into Site 5 (from the north west). The telephone line from the clubhouse extends to the explosive ordinance disposal (EOD) bunker, located to the north.

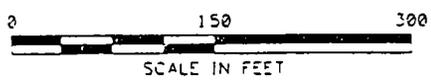
Potable water is supplied to the clubhouse by 5-gallon carboys from a local bottled water supplier. Water for non-potable uses is also available via a portable tank ("Water Buffalo") located adjacent to the clubhouse.



ACAD K:\580\5805-11 DWG 08/25/97 14P

**LEGEND**

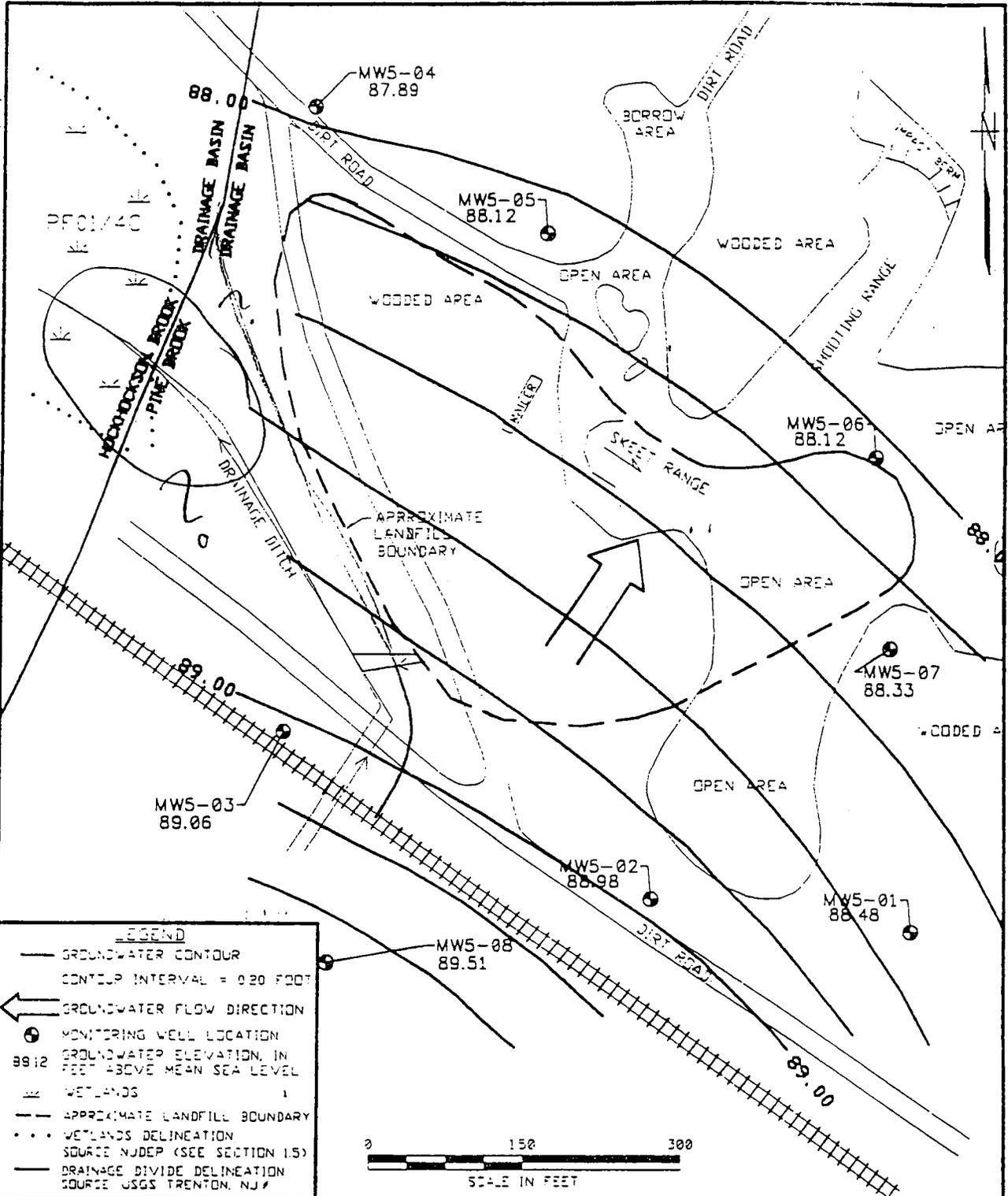
- GROUNDWATER CONTOUR  
CONTOUR INTERVAL = 0.20 FEET
- ← GROUNDWATER FLOW DIRECTION
- ⊙ MONITORING WELL LOCATION  
GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL
- ▨ WETLANDS
- - - APPROXIMATE LANDFILL BOUNDARY
- ⋯ WETLANDS DELINEATION
- SOURCE NJDEP (SEE SECTION 5)
- DRAINAGE DIVIDE DELINEATION
- SOURCE USGS TRENTON, NJ



DRAWN BY HJP	DATE 08/25/97	<b>Brown &amp; Root Environmental</b>	CONTRACT NO. 7602	OWNER NO.
CHECKED BY	DATE	<b>GROUNDWATER CONTOUR MAP AUGUST 7, 1995 SITE 5 LANDFILL WEST OF ARMY BARRICADES NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY</b>	APPROVED BY	DATE
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 4-2	REV. 0

(THIS CASE NO. 0821544.DWG) REV. 0 - 08/27/97

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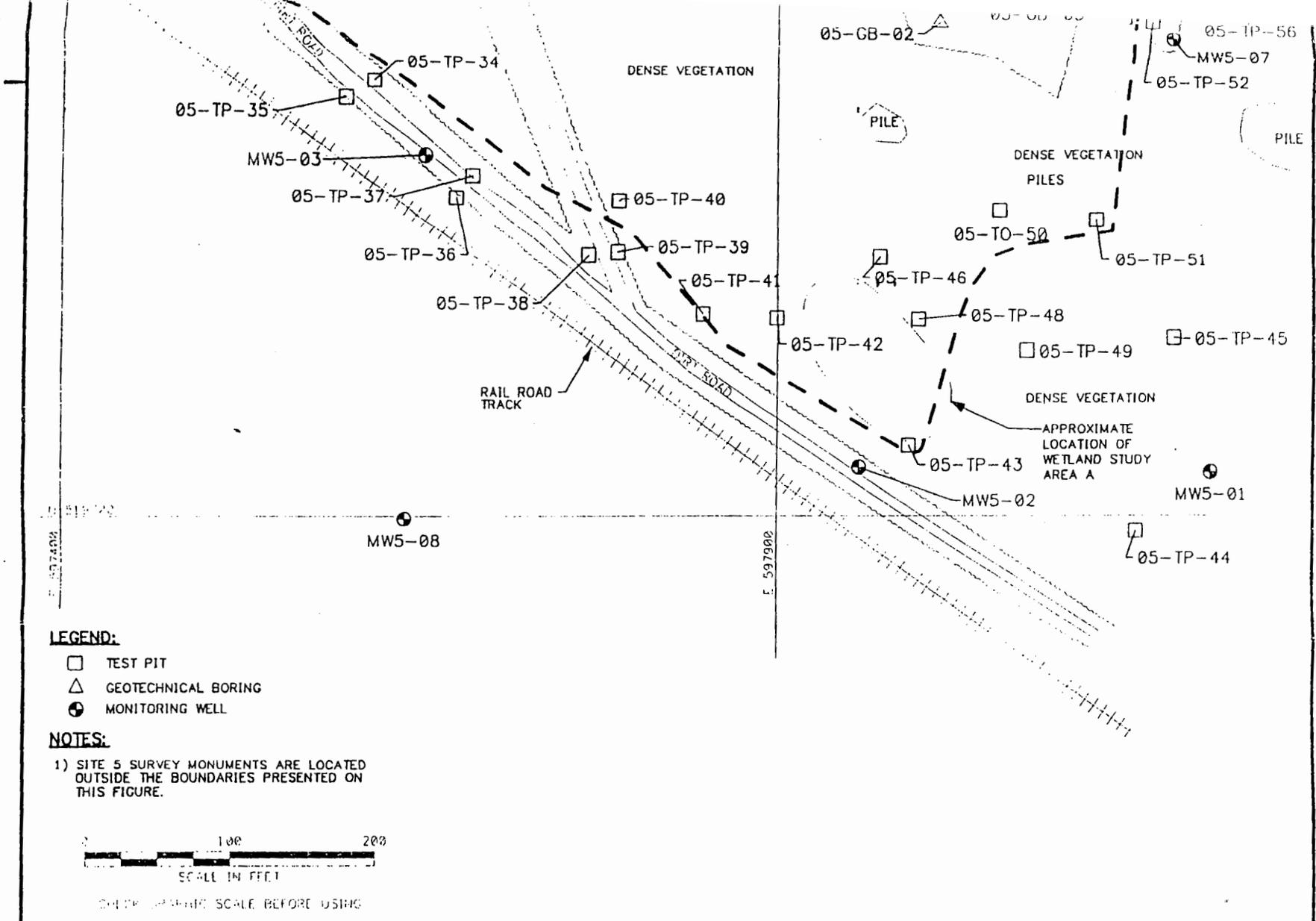
<p><b>LEGEND</b></p> <p>— GROUNDWATER CONTOUR CONTOUR INTERVAL = 0.20 FOOT</p> <p>← GROUNDWATER FLOW DIRECTION</p> <p>⊕ MONITORING WELL LOCATION</p> <p>89.12 GROUNDWATER ELEVATION, IN FEET ABOVE MEAN SEA LEVEL</p> <p>W WETLANDS</p> <p>- - - APPROXIMATE LANDFILL BOUNDARY</p> <p>... WETLANDS DELINEATION SOURCE NJDEP (SEE SECTION 1.5)</p> <p>— DRAINAGE DIVIDE DELINEATION SOURCE USGS TRENTON, NJ</p>	<p>SCALE IN FEET</p> <p>0 150 300</p>		
<p>DRAWN BY DATE HJP 08/26/97</p>	<p> <b>Brown &amp; Root Environmental</b></p>	<p>CONTRACT NO. 7602</p>	<p>OWNER NO.</p>
<p>CHECKED BY DATE</p>	<p><b>GROUNDWATER CONTOUR MAP OCTOBER 17, 1995 SITE 5 - LANDFILL WEST OF ARMY BARRICADES NAVAL WEAPONS STATION EARLE COLTS NECK, NEW JERSEY</b></p>	<p>APPROVED BY</p>	<p>DATE</p>
<p>COST/SCHED-AREA</p>		<p>APPROVED BY</p>	<p>DATE</p>
<p>SCALE AS NOTED</p>		<p>DRAWING NO. <b>FIGURE 4-3</b></p>	<p>REV. 0</p>

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5-9

CTO 0289



DRAWN BY TAD	DATE 8/28/97	 <b>Brown &amp; Root Environmental</b>  <b>SITE 5</b> <b>PRE-DESIGN</b> <b>EXISTING CONDITIONS PLAN</b> <b>NAVAL WEAPONS STATION EARLE</b> <b>COLTS NECK, NEW JERSEY</b>	CONTRACT NO. 7602	OWNER NO. _____
CHECKED BY	DATE		APPROVED BY	DATE
COST/SCHED-AREA			APPROVED BY	DATE
SCALE AS NOTED			DRAWING NO. FIGURE 5-2	REV. 0

FORM CADD NO. SOUTH\_BV.DWG - REV 0 - 04/16/97

Rev: 0  
September 1997

005695017



Natural moisture contents ranged from 9 to 22.6 percent. Due to the presence of significant odors, laboratory testing of Site 5 soil samples was performed using personal protective equipment (PPE) Level C.

### 5.3.2 Test Pit Investigation

A total of 59 test pits were excavated to delineate the approximate limits of fill areas at Site 5. The locations of these test pits are included on Figure 5-2. The logs for each test pit are included in Appendix I. It should be noted that Test Pit 47 (05-TP-47) was never excavated and represents a skipped number in the test pit numbering sequence.

A mix of waste materials was encountered in the test pits within the former landfill boundaries and was composed mainly of municipal/industrial waste materials. Ordnance-type materials were encountered at 05-TP-29 and included three empty depth charges.

### 5.3.3 Wetlands Delineation

A total of three suspected wetlands areas were identified in the immediate area of Site 5 which could be impacted by site-related activities. These areas were identified as:

- Area A - Within the landfill boundary
- Area B - West of the landfill boundary
- Area C - West of Area B ← Is this OFF The Map?

The locations of these areas are included on Figure 5-2. Of the three potential wetlands areas studied, only Area B and Area C were confirmed as wetlands. These two wetlands are located to the west of the landfill boundary. Area B appears to be the only wetland which could potentially be affected by site remedial activities.

Area A (not identified as a wetland) is a small depression located near the south end of the landfill, within the landfill boundary and will likely be affected during installation of the cap and related appurtenances. Appendix E provides additional information on the delineation of each area.

## 6.0 DESIGN REQUIREMENTS

### 6.1 APPROACH

The proposed caps for Sites 4 and 5 are intended to provide a cover over waste materials disposed of at the respective Sites. A brief summary of the approach to each site is provided.

#### 6.1.1 Site 4

As indicated on Figure 5-1, the results of the test pit investigation indicated a somewhat irregular area for waste deposition. The limit of waste extends to the bottom of a relatively steep slope along the south east side of the landfill. At the bottom of the steep slope a wetland (Westland A) <sup>SP.</sup> has been identified. In order to minimize the surface area of the cap, and to improve the constructability of the landfill, two areas of waste material will be excavated and regraded under the cap. These areas include:

- The narrow area trending in an east-west direction at the southwest corner of the landfill. Based on the test pits which were excavated in this area, most of this area consists of a relatively thin layer of waste (1 to 2 feet) with deeper portions (5-6 feet) toward the main body of the landfill. In calculating the volume of waste to be removed from this area it was conservatively assumed that the waste thickness was a uniform 6 feet thick.
- A smaller protruding area near the southeast corner of the landfill, adjacent to Wetland Area A (Site 4). In order to calculate the volume of this excavation area it was assumed that the waste material does not extend deeper than the existing relatively flat natural grade at the bottom of the slope.

In addition to the areas of excavation, the existing limit of waste will be moved in two places. The regraded waste would be extended from the existing limit of waste to improve the constructability of the cap system on the west side of the landfill and along a indentation in the existing limit of waste along the south east corner. The filling of this indentation will impact a small portion of the wetland, however, the excavation of the waste area adjacent to this indentation will result in an area which could be established as new wetland.

The remainder of the landfill would be graded to establish uniform slopes in preparation for installation of the cap. With respect to the southeast corner of the landfill it was decided to hold the existing limit of waste over most of the slope for the regrading of the waste material. This will result in filling a strip of the

Based on the potential disadvantages of both a GCL and a compacted clay liner, the geomembrane liner was chosen to be used in the cap systems. The N.J.A.C. 7:26-2A.7 requires a minimum of 30 mil geomembrane to be used in a landfill cap. A 40 mil geomembrane was chosen because of better survivability during placement of the geomembrane. An LDPE membrane was chosen because of its greater ability to handle differential settlement as opposed to a high density polyethylene (HDPE) material.

A granular drainage layer is placed above the cushion fabric protecting the geomembrane. The drainage layer's intent is to reduce the head which will develop on the geomembrane due to water infiltrating into the cap system. The New Jersey regulations require a 12 thick drainage layer above a geomembrane in a landfill cap. Based on the New Jersey sanitary landfill regulations, the drainage material must meet the following gradation:

$$D2 > 0.1 \text{ inch (2.54 mm)}$$

$$D85 > 4 D15$$

This material would correspond to a clean graded aggregate.

Above the drainage layer a non-woven geotextile is included to separate the vegetative layer from the drainage layer. This will prevent the vegetative layer from clogging the drainage layer. Above the drainage layer the vegetative layer consists of 12 inches of select fill material covered by 6 inches of topsoil. The select fill material will be materials similar existing soil at the sites such as silty sands. The Rutgers University Agricultural Extension and the New Jersey Natural Resources Conservation Service were contacted to determine if the vegetative layers possessed enough thickness to support grasses on the landfill cap (specifically hard fescue). The indication from these agencies was that the thickness of the vegetative support layer is adequate.

*Is this The USDA Natural Resource Conservation Service (Formerly The SCS) U.S. Soil Conservation Service*

All of the referenced regulations require grading to promote run-off, to prevent run-on, and to accommodate settling. The state sanitary landfill regulations require that, after allowing for settlement, the top surface of a landfill cap can be between 3 percent and 5 percent. To be conservative, a minimum slope of 3.5 percent slope was used as a design parameter to determine the regraded surface of the landfill. This allows 0.5 percent for settlement, although the settlement calculations indicate that settlement will be negligible. The New Jersey sanitary landfill regulations state that the maximum side slopes allowed are 3 horizontal to 1 vertical. To be conservative and to ensure a stable cap system, a maximum slope of 4 horizontal to 1 vertical were considered when configuring the final cap surfaces. The proposed design promotes the run-off of precipitation.

In addition, specific stability calculations were performed to verify that the proposed materials of construction for the cover system will provide adequate interface friction to maintain system stability. An infinite slope analysis was performed for the various critical interfaces between cap materials, using interface friction values from published literature. It was concluded that the minimum factor of safety exceeds 1.5 for both sites. Infinite slope stability analyses are also included in Appendix J of this report.

### 6.5.2 Settlement Analysis

Settlement analyses were performed for the landfills at Sites 4 and 5, based upon stratigraphic cross sections that were similar to those used for the slope stability analyses. The anticipated grades of the cover system were assumed based upon the final design configuration (e.g., the worst-case condition that was assumed for the slope stability analyses was not required for these calculations). Settlement within the sand layers is expected to be elastic, such that settlement would occur concurrently with placement of overlying backfill and the cover system. Therefore, it was judged that elastic settlement will not affect the final design grades of the landfill.

The results of the settlement analyses indicate that the proposed minimum grades are acceptable because, following consolidation settlement, the final grades will exceed the minimum slope requirement of 3.0 percent. Settlement calculations are included in Appendix J of this report.

## 6.6 EROSION, SEDIMENT, AND STORMWATER MANAGEMENT REQUIREMENTS

### 6.6.1 Erosion and Sediment Control

An erosion and sediment control plan (E&S Plan) has been prepared for this project and is submitted under separate cover. The plan was prepared in accordance with the State of New Jersey regulations as set forth in the Standards for Soil and Erosion Control in New Jersey 1987. Runoff quality during the remedial action will be addressed via temporary erosion and sediment control devices located around the perimeter of the disturbed area. Refer to the draft E&S Plan for detailed information regarding the planned controls as well as runoff calculations.

### 6.6.2 Stormwater Management

The final cover of the cap system at Site 4 will include topsoil and a vegetated layer. Because of the poor cover soil now present at Site 4 and relatively poor vegetation, the post construction runoff from the cap area will be less than the pre construction runoff. The pre and post construction runoff calculations for both Sites 4 and 5 are presented in Erosion and Sediment Control Plan submitted under a separate cover. The

*IF Submission is required to Soil Conserv. Dist.  
Who will submit plan & redo  
draws. until accepted.*

*IF applicable, a Stormwater Perm. 7  
would be required.*

permanent surface water controls at Site 4 include perimeter ditches to control run-on and runoff from the cap system. The perimeter ditches are design to collect flow from the drainage layer in the cap system. Because the post-construction runoff from Site 4 is less than the pre-construction runoff, permanent detention basins are not required. Temporary sediment basins will be required during construction.

It should be noted that runoff from the landfill area at Site 4 does not have a positive drainage outlet from the wetlands located at the base of the landfill (the wetlands are a low point with no outlet across the dirt road to the east of the site). Under the post construction conditions this situation is not changed so that water will continue to pond in the wetland area. It was felt that creating a positive drainage across this dirt road could potentially drain the wetland.

The channel linings for the perimeter ditches were not evaluated for this submission. It is anticipated that some channel lining other than grass may be required at Site 4. These requirements will be evaluated and finalized for the next submission.

The final cover of the cap system at Site 5 will include top soil and grass vegetation. Portions of Site 5 will be paved for the trap/skeet range. The runoff for Site 5 will increase from pre-construction to post-construction conditions due primarily to the pavement installation at the trap/skeet range. Detention basins will be required for Site 5 to control the post-construction runoff to pre-construction levels. Perimeter ditches similar to Site 4 will also be constructed at Site 5 to control run-on and run-off and to collect water from the drainage layer in the cap system. As with Site 4, the channel lining requirements for the perimeter ditches will be evaluated and finalized in the next submission.

During the test pit investigation, the limits of the landfill at Site 5 increased substantially from the areas estimated in the RI/FS stages of the investigation. In several locations the limit of the landfill extends nearly to the edge of the topographic survey. Additional topographic information will be obtained prior to completion of the final design. The location of the detention basins are outside the limit of the topographic mapping. Rough sizes of the detention basins and sedimentation basin are provided in the Erosion and Sediment Control Plan based on assumed ground elevations. This calculations will be revised once additional topographic information is available.

#### 6.7 TRAP/SKEET RANGE REQUIREMENTS

*was this outside  
Wetlands mapped  
area also?*

The existing trap/skeet range will be replaced with a new trap/skeet range with similar location, orientation, and configuration.

MEMORANDUM

2 OCT 1997

From: TOM GENTILE  
To: GREG GOEPFERT

Subj: ADDITIONAL REVIEW OF DESIGN DEVELOPMENT SUBMISSION REMEDIAL  
ACTION AT OPERABLE UNIT 1 (SITES 4 AND 5), SEPT 1997

1. The subject plans were reviewed by 092TG and comments were provided dated 19 Sept 1997. The following are additional comments:

a. Drawing notes pertaining to the required Soil Conservation District notifications should be deleted, unless this is a requirement.

b. On drawing C-15, and other drawings, the dirt road that branches to the south off the entrance road is shown to end abruptly, when it actually continues to the southeast to the perimeter fence.

c. Has this design taken into consideration that, in the future, a wildfire could occur on the landfill cap? Is there any risk of flammable gases igniting and causing an underground landfill fire?

**COMMENTS FROM TOM DUNN  
(NWS EARLE)**



**DEPARTMENT OF THE NAVY**

RESIDENT OFFICER IN CHARGE  
NAVFAC CONTRACTS  
NAVAL WEAPONS STATION, EARLE  
BLDG., C-23  
COLTS NECK, NJ 07722-5000

IN REPLY REFER TO

F110:09A1TD:ted  
9 Oct 1997  
fwrac04.ltr

BROWN & ROOT ENVIRONMENTAL  
Foster Plaza VII  
Pittsburgh, Pa. 15220-2745

Att: Mr. Michael Wierman

RE: Contract N62472-90-D-1298, Task Order 0289, Remedial  
Action at Sites 4 and 5.

Dear Mr. Wierman:

Per your request of 29 August 1997, review comments are as follows:

**Sheet T-2.**

*Note 7.* Erosion Control Plans should be prepared, submitted, approved and made part of these contract documents. Make reference to it in this note.

*Note 12.* The Grading Plans included in these documents should allow proper drainage. Make reference to them in this note.

*Note 16.* UXO procedures should be discussed now.

*Note 17.* Clarify the events which will change the limits of excavation.

**Sheet C-1.**

*Note 2.* Verify that Freehold Soil Conservation District needs to inspect the site.

*Note 26.* The total cut exceeds the total fill by 1,600 yd<sup>3</sup>. Verify that this material is to be disposed off site. It is, what are the disposal requirements?

*Note 27.* Add "5" to note. Verify that asphalt is measured in cubic yards.

**Sheet C-21.**

*Detail 3.* Clarify the requirements for a curb at the pavement edge.

*Detail 4.* What is the material used for the "Bedding Gas Management Layer" ?

**Sheet C-23.**

*Detail 10.* Add the missing dimension to the CMP.

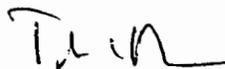
*Section B.* Does the wash in the Decontamination Basin need to be tested and disposed of?

**Sheet E-2.**

A structure of some sort is required where the 4" conduits meet the existing 24" RCP. Add details for the connection to the existing service.

I can be reached at (908) 866-2048 if you need to discuss this further.

Sincerely,

A handwritten signature in black ink, appearing to read 'T.E. Dunn', with a stylized flourish at the end.

T.E. Dunn  
Project Manager, by direction of the  
Officer in Charge, NAVFAC Contracts