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Baker

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March 16, 1994

Commanding Officer
Atlantic Division
Naval Facilities Engineering Command
1510 Gilbert Street (Bldg. N-26)
Norfolk, Virginia 23511-2699

Attn: Mr. Kenneth Walker, RPG
Engineer-in-Charge
Code 1822

Re: Contract N62470-89-D-4814
Navy CLEAN, District III
Contract Task Order (CTO) 0084
Camp Allen Landfill Remedial Investigation/Feasibility Study (RI/FS),
Naval Base, Norfolk, VA
Responses to Technical Review Committee (TRC) Member Comments on the
Draft Final RI/FS Reports

Dear Mr. Walker:

Baker Environmental, Inc. (Baker) is pleased to present revised responses to TRC member comments on the referenced Draft Final RI/FS Reports. In general, the format and content of the responses follow strategies discussed during the December 21, 1993 Camp Allen Meeting held at the Naval Base with LANTDIV Code 18, Naval Base Code N4, and Baker representatives. The responses have been revised based on your telecon with Mr. Gordon Ruggaber of Baker on March 2, 1994.

Attachment I contains responses to the United States Environmental Protection Agency, Region III (USEPA) comments on the Draft Final RI/FS documents. Attachment II contains Soil and Groundwater cleanup levels and backup calculations, requested in several TRC member comments. Responses to Virginia's Department of Environmental Quality (VADEQ) comments are presented in Attachment III. Attachment IV contains responses to the U.S. Fish and Wildlife Service (USFWS) comments.

Baker is pleased to be of continued service in completing RI/FS activities for the Camp Allen Landfill Site. Please call if you have any questions or concerns regarding this submittal.

Sincerely,

BAKER ENVIRONMENTAL, INC.

Stephen J. Kretschman

Stephen J. Kretschman, P.E.
Project Manager

Attachments

TEA/jc

cc: Ms. Lee Anne Rapp, LANTDIV Code 183 (w/attachments)
Ms. Ollie Glodis, LANTDIV Code 02146 (w/attachments)
Mr. Dave Forsythe, NAVBASE Code N4 (w/attachments)

ATTACHMENT I

USEPA COMMENT RESPONSES
CAMP ALLEN LANDFILL
RI/FS

Draft Final RI Report

USEPA Comment 1. Available information indicates that municipal waste incinerator ash does not characteristically contain toxic dioxins. Therefore, soil samples were not analyzed for dioxins. In addition, chlorophenols, which are dioxin precursors, were not detected in site media.

USEPA Comment 2. Yes. This is clearly detailed in Section 2.0 Environmental Setting.

USEPA Comment 3. Yes. See USEPA Comment 2.

USEPA Comment 4. Yes it is. This consideration is noted through out the RI Report.

USEPA Comment 5. The Yorktown Aquifer has the potential to be a future drinking water source. However, the Yorktown Aquifer in the vicinity of the site is not currently being used as a drinking water source, and there are currently no plans to develop the Yorktown Aquifer in the vicinity of the site. Local businesses and residents are connected to public water.

USEPA Comment 6. No. As indicated in Section 2.7.3, available information indicates that the Columbia Aquifer is not suitable as a drinking water source and is limited to non-potable uses.

USEPA Comment 7. Information related to pH is not included in the referenced material. Site-specific pH data will be added to Table 2-2.

USEPA Comment 8. Soil samples were collected as discrete grab samples. This will be clarified in the RI Report.

USEPA Comment 9. Sediment samples were collected as discrete grab samples. This will be clarified in the RI Report.

USEPA Comment 10. Geophysical coverage was based on historical disposal information. Area B disposal was limited to trench and fill operations related to the Salvage Yard fire.

USEPA Comment 11. Agreed. The Navy is considering a future PA/SI effort to address this area.

USEPA Comment 12. This drainage ditch is wholly situated on Navy property and the northern portion of the ditch borders a narrow strip of land owned by the Norfolk & Portsmouth Belt Line Railroad. Please note that the "dumped debris" is truly miscellaneous litter and not landfilled materials. There is no evidence of possible contaminant migration from Navy property to private property via the drainage ditch in this area resulting from the miscellaneous litter noted. Based on surface water flow direction and shallow groundwater discharge points, it appears surface water and shallow groundwater flow would be from private property to Navy property. This section will be revised to reflect this information.

USEPA Comment 13. Based on field observations, sample refusal was due to a boulder or riprap in the drainageway. This will be clarified in the RI Report.

USEPA Comment 14. Pollution tolerant species were observed; however, population abnormalities were not noted at the family level. This information will be added to the RI Report.

USEPA Comment 15. No physical abnormalities were noted in the terrestrial organisms observed. The species observed were those that would be expected to occur in a primarily urban environment. Because they are urban species, they would be somewhat tolerant of pollution.

USEPA Comments 16 & 17. Area A subsurface soils were not analyzed for metals because, based on previous investigation results (Section 1.0), organic constituents were the primary contaminants of concern. Dissolved metal concentrations detected in monitoring wells were generally below MCLs, and suspended solids data indicate that total metals detected in monitoring wells were the result of well turbidity and are not representative of actual conditions.

USEPA Comment 18. Beryllium was analyzed for in the surface soils (See Appendix Q). Table 5-13 will be revised accordingly.USEPA Comments 19 & 20. The Federal MCL for beryllium is 4 µg/L. No State equivalent currently exists. Therefore, the detection limit of 2 µg/L is appropriate.

USEPA Comments 21, 22, & 23. General comments regarding maximum constituent concentrations per site media (RI Report, Section 6.0 and FS Report, Section 1.0); The EPA's tables are in agreement with the report tables.

USEPA Comment 24. Yes, "ambient" air samples are considered to be background locations. Based on surface water and sediment sample analytical results, which do not correspond to those detected in the air, background air sample results are more likely to be the result of surrounding area land use. The site is adjacent to the Naval Air Field, Interstate Highway 64, and various maintenance operations.

USEPA Comment 25. General comments regarding maximum constituent concentrations in residential well No. 22 (RW-22) (RI Report, Section 6.0 and FS Report, Section 1.0). Contaminant concentrations were not detected in residential wells between RW-22 and the site.

USEPA Comment 26. Site-specific background soil data were not collected because most soils investigated during the RI are not natural soils, but are fill material. Location-specific background data collected from other areas of the Base, would in all likelihood, not be representative of site conditions. Subsequent comparisons to site data would, therefore, not be statistically defensible. Given this situation, published soil data related to regional inorganic concentration ranges were used to adequately characterize background conditions for purposes of the RI Report. Please note that ultimate conclusions presented in the Baseline Risk Assessment take this situation into account, as the COPC selection process retained the primary toxic/heavy metals for a conservative evaluation.

USEPA Comment 27. See USEPA Comment 26.

USEPA Comment 28. Although several inorganic constituents detected in site sediment samples exceeded applicable sediment quality criteria, no direct trend is apparent between sample locations and inorganic constituents/concentrations. Based on results of the Baseline Risk Assessment (including modification of COPCs and exposure input values resulting from agency review), ICR and HI values for current potential receptors and exposure pathways fall within acceptable ranges.

USEPA Comment 29. See USEPA Comments 26, 27, and 28.

USEPA Comment 30. In general, primary conclusions presented in the RI Report hold true. Site background information does not impact remedial alternative considerations. RI conclusions are not "standalone" as FS considerations are based on conservative assumptions used in the baseline risk assessment.

Draft Final Baseline Risk Assessment Report

USEPA Comment 1. Risk Based Screening was developed by USEPA Region III toxicologists to replace the relative toxicity screening approach presented in the Data Evaluation Section (Section 5.0) of Risk Assessment Guidance for Superfund (RAGS 1A). The Risk Based Screening approach provides an absolute determination of single chemical risk which must be used in conjunction with the other selection criteria presented in RAGS 1A, Section 5.0. Region III toxicologists have stated that the Risk Screening Approach is not to be used as a standalone decision making tool for any application. Use of RBC values should, therefore, be used in conjunction with other chemicals of potential concern (COPC) selection criteria presented in the baseline risk assessment. The selection criteria presented in the baseline risk assessment for evaluating COPCs will revised to include the use of Region III RBCs as directed by USEPA.

USEPA Comment 2. COPCs were selected based primarily on Site history and prevalence (frequency of detection and concentration) in environmental media. Site specific background data for the Camp Allen Landfill Site is not available. Site specific background soil data was not collected because soils investigated during the RI are not natural soils, but fill material. Location specific background data would in all likelihood, not be representative. Subsequent comparisons to site data would, therefore, not be statistically defensible. Other considerations for the selection of COPCs include blank data, literature background concentrations, comparison to RBCs and comparisons to federal and State standards or criteria.

Chemicals detected in blanks were qualified appropriately as "B" by the data validator. These chemicals were not considered as COPCs for quantitative evaluation in the baseline risk assessment. Chemicals not qualified by the data validator on an SDG basis were evaluated using the blank evaluation procedure in RAGS 1A, which states that:

> Blanks should be compared with results from samples with which blanks are associated. It is often impossible, however, to determine the association between certain blanks and certain data. In this case, compare the blank data with results from the entire data set.

Chemicals which were eliminated from consideration include methylene chloride, acetone, 2-butanone, toluene bromodichloromethane, dibromochloromethane, phenol, di-n-butylphthalate and bis(2-ethylhexyl)phthalate. This criterion was not, however, applied globally to the data. Best professional judgement was used to determine which comparisons made sense. For example, trichloroethene (TCE) was detected in rinsate samples RSA303 and RSA301 at 1 µg/L. Site samples containing less than or equal to 5 µg/L of this chemical (not considered to be a common laboratory contaminant) were not globally eliminated from consideration in the baseline risk assessment because of TCEs potential as a site related contaminant. Text will be clarified to better reflect the elimination of blank related contaminants.

Another factor contributing to the elimination of a chemical as a COPC was chemical ubiquity in the environment. For example, PAHs which occur from the incomplete combustion of all organic matter should be detected with frequencies warranting their inclusion as COPCs given the sensitivity of the analytical methods. PAHs were detected frequently in environmental media at CAL, but were not retained as COPCs because maximum detected values did not exceed their respective RBCs in either Area A or B. Text will be revised to better address the elimination of PAHs as COPCs.

Pesticides and PCBs were frequently detected in surface soils, subsurface soils, shallow and deep groundwater, surface waters and sediments. A reexamination of the analytical data, led to the conclusion that certain pesticides and PCBs exceed their respective RBC values.

After a preliminary reexamination of the data, the following pesticides and PCBs will be retained as COPCs in their corresponding environmental media because of RBC exceedances:

AREA A

- Shallow Groundwater
  - Aldrin

- Surface Soil
  - PCB-1260

- Subsurface Soils
  - PCB-1254
  - PCB-1260

- Shallow Sediments
  - PCB-1260

AREA B

- Shallow Groundwater
  - Dieldrin

- Deep Groundwater
  - Dieldrin

- Surface Soil (Pond)
  - PCB-1260

- Subsurface Soil (Pond)
  - PCB-1260
  - Dieldrin

- Shallow Sediments (Pond)
  - 4,4'-DDD

For the purposes of this evaluation, residential soil RBC values were used to evaluate shallow soils and sediments. Commercial/industrial soil RBCs were used to evaluate deep soils and sediments.

All analytical data will be reevaluated in the Final Baseline Risk Assessment to ensure that COPCs have not been overlooked and potential health risks underestimated. Text and risk calculations will be revised to reflect the addition of new COPCs.

USEPA Comment 3. PAHs were not eliminated solely on the basis of their ubiquitous nature. Please see USEPA Comment 2 response.

USEPA Comment 4. The selection of all COPCs will be reevaluated using the most recent selection criteria. Please see USEPA Comment 2 response.

USEPA Comment 5. A comparison to background soil inorganic concentrations is not possible because background soil data is not currently available and soil samples taken from the landfill are not native soils but fill material. Inorganic contaminant concentrations will be evaluated using the most recent USEPA COPC selection criteria including a comparison to RBCs. Please see USEPA Comment 2 response.

USEPA Comment 6. Please see USEPA Comment 5 response.

USEPA Comment 7. Justification for eliminating methylene chloride and 2-butanone will be provided.
USEPA Comment 8. Assumptions about the elimination of PAHs will be clarified.

USEPA Comment 9. Please see USEPA Comment 2 response.USEPA Comment 10. Comparisons of semivolatile data for surface waters to applicable criteria and standard is presented in the Remedial Investigation report. A limited comparison of data to standards and criteria will be added to the Baseline Risk Assessment Report.

USEPA Comment 11. Please see USEPA Comment 2 response.

USEPA Comment 12. Agreed. Documentation will be provided if available or text will be appropriately modified to clarify the statement about pesticides in sediments.

USEPA Comment 13. Please see USEPA Comment 2 response.

USEPA Comment 14. Selection of COPCs in deep sediments will be reevaluated in subsequent versions of the baseline risk assessment.

USEPA Comment 15. Pesticides will be reevaluated using the most recent USEPA Region III COPC selection criteria. Please see USEPA Comments 2 and 12 responses.

USEPA Comment 16. Volatile organic chemicals (VOCs) were detected in several surface water samples in Area A and B, but not in the ditch behind the Camp Allen Elementary School (RI Report, Section 6.0). If VOCs (which are relatively water soluble) are not detected in surface water samples they are not likely to be present in sediments. In general, sediment sample VOC results correlate to corresponding surface water sample locations.

USEPA Comment 17. Please see USEPA Comment 1 response.

USEPA Comment 18. Agreed. Individual well samples (not average concentrations) will be evaluated in both shallow and deep aquifers throughout the site. Care will be taken to define each potential contaminant plume. Text and calculations will be revised to reflect this.

USEPA Comment 19. Organic contaminants are generally the most environmentally mobile contaminants at any hazardous waste site. It is reasonable to assume that if volatile organics are not detected in a manner consistent with known plumes at the site, their presence is probably not site related. Therefore, other less mobile contaminants (i.e. PCBs, pesticides, semivolatiles and inorganics) should not be present due to site activities. Additionally, it must be noted that a shallow groundwater hydrogeologic barrier (drainage ditch) exists between

Area A of the Camp Allen Landfill and Glenwood Park. Analytical results from shallow groundwater monitoring wells in this area further support that detected constituents in noted residential well groundwater samples are not site related. This rationale will be clarified in Section 2.3.2.

USEPA Comment 20. Comment acknowledged. Raw analytical data are presented in Section 5.0 of the Remedial Investigation Report.

USEPA Comment 21. Agreed. Documentation will be provided to support the elimination of 2-butanone as a COPC.

USEPA Comment 22. Justification will be provided. The potential for these contaminants to be site related will be discussed.

USEPA Comment 23. COPC selection criteria will also be applied to the groundwater data.

USEPA Comment 24. Methylene chloride was identified as a laboratory contaminant. Its presence in any environmental sample at any hazardous waste site must always be viewed with suspicion because of its use as a common laboratory solvent.

The ubiquitous nature of freons (chloro-fluoro methanes, ethanes) and chlorinated solvents used as propellants and solvents in numerous commercial products must be recognized by the Agency.
Furthermore, these chemicals were not detected in other environmental media investigated at the landfill (particularly soils and groundwater). However, air data will be reevaluated in response to Agency comments to determine whether it is necessary to include air COPCs in the baseline risk assessment.

USEPA Comment 25. Methylene chloride was detected in laboratory blanks. This will be explained in the Final Baseline Risk Assessment.

USEPA Comment 26. Air data will be reevaluated in the Final Baseline Risk Assessment.

USEPA Comment 27. Air data will be reevaluated in the Final Baseline Risk Assessment.

USEPA Comment 28. Agreed. Air data will be reevaluated in the Final Baseline Risk Assessment.

USEPA Comment 29. Air data will be reevaluated in the Final Baseline Risk Assessment. A comparison to RBCs will also be applied to air data to select COPCs.

USEPA Comment 30. Agreed. This statement will be clarified to reflect the fact that volatilization as a removal mechanism is not as important when evaluating groundwater and subsurface soils.

USEPA Comment 31. A more detailed numerical evaluation of potential exposure to volatiles and fugitive dusts via the air pathway will be included in the baseline risk assessment. It is doubtful, however, that outdoor exposure to volatiles emanating from hoses used in watering lawns and washing cars will be significant given the concentrations of contaminants and the infinite dilution potential of outdoor air.

USEPA Comment 32. Please see USEPA Comment 31 response.

USEPA Comment 33. Agreed. Please see USEPA Comment 31 response.

USEPA Comment 34. Excavation and home building would result if the landfill areas were developed for residential purpose, however, the nature of the landfill areas makes future residential development a remote possibility. If homes are constructed in the future, backfilling around foundations and landscaping (planting trees, grass flowers and shrubs) would be necessary for esthetic purposes and limit the potential for fugitive dust emissions by residents. Potential dust emissions will, however, be evaluated in the Final Baseline Risk Assessment.

USEPA Comment 35. Comment acknowledged. Please see USEPA Comment 31 and 34 response.

USEPA Comment 36. Please see USEPA Comment 19 response.

USEPA Comment 37. Assuming that future residential property use is itself not a true no action scenario in that houses would be constructed, additional roads cut, existing buildings and steam lines dismantled. It is reasonable to assume that certain exposure scenarios such as residential exposure to fugitive dusts would be limited. All other soil exposure pathways (dermal contact and accidental ingestion) will be evaluated.

USEPA Comment 38. A discussion of the future potential use of groundwater and the potential discharge of groundwater to the ditches will be included in text.

USEPA Comment 39. Subsurface soils will be evaluated using a potential construction worker scenario. Because of the nature of the site, such exposure is highly unlikely. Future potential resident exposure to subsurface soils will not be evaluated at the Camp Allen Landfill Site.

USEPA Comment 40. Agreed. Statements concerning the use of certain non-detect values will be revisited and these data will be included in the derivation of the 95 % upper confidence interval of the data.

USEPA Comment 41. Agreed. Groundwater will be reevaluated in subsequent versions of the baseline risk assessment.

USEPA Comment 42. State Comment 44. Potential dermal contact with contaminants in groundwater was evaluated as per RAGS 1A. The 1992 Dermal Guidance Document was used as a source for permeability constants. The use of non-steady state approximations presented in the document are experimental. The use of steady state techniques currently presented in RAGS provide the most conservative estimates of dermal intake. Therefore, steady state approximations will be used in the baseline risk assessment.

USEPA Comment 43. Please see USEPA Comment 31 response.

USEPA Comment 44. Please see USEPA Comment 42 response.

USEPA Comment 45. State Comment 47. Latest available RfDs and CSFs will be addressed in the Final Baseline Risk Assessment.

USEPA Comment 46. Please see USEPA Comment 45 response.

USEPA Comment 47. An explanation will be provided that discusses the mobility of the VOCs and the relative immobility of the semivolatiles, pesticides, PCBs and inorganics. The discussion will also evaluate the data obtained from the newest monitoring wells and the residential well data. Logically, the more mobile contaminants would be detected in these wells before the less mobile constituents. This discussion will be presented in detail in the Final Baseline Risk Assessment.

USEPA Comment 48. Agreed. Text in the Baseline Risk Assessment will reflect this potential.

USEPA Comment 49. Data validation qualifiers should be presented in the Remedial Investigation Report and not the risk assessment.

USEPA Comment 50. Agreed. Please see USEPA Comment 41 response.

USEPA Comment 51. PAHs will be reevaluated using RBCs in the Final Risk Assessment. If they are retained as COPCs, potential human health risks will be derived using USEPA approved equations.

USEPA Comment 52. Comment acknowledged. It is believed that indoor air quality in the Brig and the Camp Allen Elementary School is unaffected by contamination at the Camp Allen Landfill. However, the relationship between indoor air data and chemical concentrations in environmental media in the vicinity of the Brig and Elementary School will be further evaluated in subsequent versions of the baseline risk assessment. This evaluation will include an examination of all potential contaminant migration pathways from the Landfill to the Brig and the School. Pathways in the evaluation will include potential intrusion of vapors (emanating from potentially affected underlying groundwater) through cracked foundations, volatilization from soils to ambient air and a more thorough review of the types of cleaning products and solvents used in either building to explain other possible sources of indoor air contamination.

USEPA Comment 53. Comment acknowledged.

USEPA Comment 54. Residential well summary data are presented in Section 6.5.3 of the Remedial Investigation Report.

USEPA Comment 55. Agreed. The shower model will be corrected to reflect the USEPA suggested inputs. Use of these new inputs, however, will not have a significant effect on the total site risk values presented in the Final Baseline Risk Assessment.

USEPA Comment 56. Air data will be reevaluated in the Final Baseline Risk Assessment. 1,1,1-Trichloroethane will be assessed, and other potential sources of this chemical in indoor air will be addressed.

USEPA Comment 57. Vinyl chloride was retained as a COPC in surface water at the site and was evaluated quantitatively in the Baseline Risk Assessment. The concentration of a chemical in any medium is not, by itself, an indication of the magnitude of risk. Risk is the result of exposure to the chemical in a given medium. Surface water risks at Camp Allen fell within USEPA's target risk range of 10^{-6} to 10^{-4}.

USEPA Comment 58. More comprehensive air monitoring is not necessary based on the first round of air monitoring results. Outdoor air samples did not contain significant levels of COPCs and indoor air sampling suggested that the site was not affecting indoor air quality (no vinyl chloride or TCE).

USEPA Comment 59. The linear regression will be presented in the revised baseline risk assessment.

USEPA Comment 60. Comment acknowledged.

USEPA Comment 61. Risk calculations will be revised to reflect the inclusion of additional COPCs in certain media and quantitative evaluation of the air exposure pathway. All appropriate summary tables and supporting documentation for the addition of these items will be provided. The results of the Baseline Risk Assessment will not be significantly affected given the magnitude of the risk associated with contamination in groundwater.

Draft Final Feasibility Study Report

USEPA Comment 1. The assumptions upon which the FS is based will be reviewed following resolution of comments on the Remedial Investigation and Risk Assessment.

USEPA Comment 2. Since direct remediation of surface water is impractical, vinyl chloride and other VOCs detected in the Area B Pond must be addressed by addressing the source of this contamination, which is the Area B Landfill. The removal action at Area B will address the source of contamination. A No Action surface water alternative can be included in the FS that would include periodic monitoring of the surface water to determine if contaminant levels gradually decrease as a result of the removal action. If contaminant levels in the surface water do not decrease, other remedial measures could be considered, such as expanding the shallow groundwater extraction system in Area B to intercept groundwater discharging to the pond.

USEPA Comment 3. No references to cleanup levels are made in Section 5.2. Soil and groundwater cleanup levels will be developed as discussed in the responses to Comments 7 and 8, respectively.

USEPA Comment 4. The potential risks to human health associated with the sediments are currently within acceptable levels. If necessary, the sediment alternatives will be reevaluated following resolution of comments on the Remedial Investigation and Risk Assessment. The sediment alternatives will not be revised if the revised risk levels are within acceptable levels.

USEPA Comment 5. The potential for off-site contaminant migration via the upper (water table) and lower (Yorktown) aquifers was addressed in the FS through development of the groundwater extraction and treatment alternatives. Interconnection and associated potential for downward contaminant migration between the upper and lower aquifers is discussed in Sections 1.1 and 1.3 in the FS.

USEPA Comment 6. Volatile organic compounds (VOCs) were detected in four out of 55 residential wells sampled in Glenwood Park. The detections appear to be isolated occurrences that are unrelated to disposal activities at Area A. Although 1,2-dichloroethane, a constituent of concern at Area A, was detected in residential well 55, no VOCs have been detected in monitoring wells A-MW8A, A-MW9A, A-MW10A located between Area A and residential well 55. These results do not indicate a connection between site contamination and the 1,2-dichloroethane detected in well 55. Furthermore, for the water table aquifer, the drainage ditch located between Area A and Glenwood Park serves as a hydrogeologic boundary between these areas. The discussion in the FS concerning the residential well sampling results will be expanded to include this information.

USEPA Comment 7. Soil cleanup levels were not developed in the FS because little data were available on the nature and extent of contamination within the "hot spot" area assumed for Area A. Soil cleanup goals have now been developed based on the results of the subsurface soil pre-design investigation. The soil cleanup goals and supporting calculations are provided in Attachment II. Following regulatory review, these goals will be incorporated into the FS.

The soil cleanup goals were developed based on attainment of Maximum Contaminant Levels (MCLs) in shallow groundwater immediately below the source area in order to protect the lower Yorktown Aquifer to its potential future beneficial use (i.e., drinking water supply). Since the MCLs for the contaminants of concern are less than the federal Ambient Water Quality Criteria and Virginia Water Quality Standards, the soil cleanup goals are also protective of surface water.

The developed soil cleanup goals will be used to estimate remediation areas of concern for the Feasibility Study and Remedial Design. It should be noted that since Area A is a landfill, the remedial action objective (RAO) for the soils is groundwater protection rather than soil cleanup. Therefore, achievement of this RAO will not necessarily be based on attainment of the developed soil cleanup goals since they represent theoretical values calculated through modeling. The cleanup goals were developed using conservative assumptions (see Attachment II) and may not be representative of actual site conditions. Therefore, achievement of groundwater protection will be determined through development of treatment system performance curves and through evaluation of actual environmental monitoring results (i.e., via ongoing monitoring of contaminant levels in groundwater and in the extracted vapors from the in situ vacuum extraction system, the preferred treatment alternative for the soils). Soil contaminant concentrations may eventually reach asymptotic levels below which contaminant levels cannot be reduced via in situ vacuum extraction. If treatment system performance curves indicate that the cleanup goals for some or all of the contaminants cannot be achieved, then the soil cleanup goals will be reevaluated.

USEPA Comment 8. The groundwater cleanup goals were based on attainment of federal Maximum Contaminant Levels (MCLs) in order to protect the Yorktown Aquifer to its potential future beneficial use (i.e., potential future drinking water supply). The cleanup goals, shown in Attachment II, are protective of an incremental cancer risk of 1×10^{-4} and a hazard index of 1. MCLs may be impossible to achieve since it has been demonstrated that groundwater contaminant levels typically reach asymptotic levels, which may exceed MCLs. Performance curves will be periodically (e.g., annually) developed to monitor the effectiveness of the groundwater remediation system. If the performance curves indicate that asymptotic levels have been reached, which exceed MCLs, then the cleanup goals will be reevaluated at that time.

Unlike the Yorktown Aquifer, the beneficial use of the shallow aquifer is non-potable use. Non-potable use cleanup goals were developed for the shallow aquifer, which are based on a 1×10^{-6} cancer risk level and the exposure pathways of incidental ingestion and dermal absorption of contaminants during outdoor activities, such as car washing and lawn watering. However, since contaminants have the potential to migrate vertically from the shallow (water table) to the Yorktown aquifer, the groundwater cleanup goals developed for the Yorktown Aquifer will initially be used for the shallow (water table) aquifer to protect the Yorktown Aquifer to its potential beneficial use. Higher cleanup goals for the shallow aquifer will be adopted in the future if it can be demonstrated, through ongoing groundwater monitoring, that they are protective of the Yorktown Aquifer and adjacent surface waters. These higher cleanup goals will be equal to or less than the non-potable use cleanup levels to ensure that they are protective of the shallow aquifer's beneficial use.

USEPA Comment 9. For each area of contamination (Areas A1, A2, and B), the potable-use and non-potable-use groundwater cleanup alternatives included in the FS (Alternatives 3 and 4) will be combined into one alternative entitled "Protection of Water Table and Yorktown Aquifers to Their Beneficial Uses through Extraction and Treatment." Under this alternative, the remedial action objective will be to protect the water table aquifer to its potential future beneficial use (non-potable use) and the Yorktown Aquifer to its potential future beneficial use (potable use). As discussed in the response to Comment 8, the same cleanup goals will initially be used for both aquifers; however, higher cleanup goals for the shallow aquifer will be adopted in the future if ongoing monitoring indicates that they are protective of the Yorktown Aquifer and adjacent surface water.

USEPA Comment 10. If necessary, air risks will be reevaluated in the FS following resolution of comments on the Remedial Investigation and Risk Assessment.

USEPA Comment 11. As discussed in response to Comment 6, the few detections of VOCs in residential wells appear to be isolated occurrences that are unrelated to disposal activities at Area A. The residential well samples were only analyzed for VOCs because these compounds are the primary contaminants of concern at Area A. The semivolatile and inorganic contaminants were detected less frequently in the shallow groundwater than the VOCs and are significantly less mobile in the environment. Therefore, given the few isolated detections of VOCs in the residential wells and the absence of VOCs in monitoring wells A-MW8A, A-MW9A, A-MW10A, there is no reason to suspect site-related semivolatile or inorganic contaminants in the residential wells.

USEPA Comment 12. EPA has not provided specific comments on the Risk Assessment concerning inorganics in groundwater. As discussed in Section 1.3.2, the inorganics detected in certain wells are believed to be associated with turbidity present in the wells. This conclusion is based on comparisons of total versus dissolved inorganic concentrations and the results of linear regression correlations developed between inorganic contaminants and naturally occurring elements (i.e., iron and manganese). Furthermore, inorganic contaminants detected at elevated concentrations did not correlate with the VOC detections.

USEPA Comment 13. If necessary, appropriate sections of the FS will be revised following resolution of comments on the Remedial Investigation and Risk Assessment.

USEPA Comment 14. All cleanup level calculations will be included in the appendices to the FS.

ATTACHMENT II

SOIL AND GROUNDWATER CLEANUP GOALS AND CALCULATIONS

INTRODUCTION

Soil analytical data obtained during the Camp Allen Landfill predesign investigation (Baker, 1994) indicate the presence of the volatile organic compounds (VOCs) in subsurface soils in Areas A1 and A2. The VOCs detected in test pit samples collected during the predesign investigation include: toluene, ethylbenzene, xylenes, vinyl chloride, trichloroethene, tetrachloroethene and 1,2-dichloroethenes. Under the influence of infiltrating precipitation, these VOCs may migrate through the unsaturated zone soils to the shallow aquifer. Thus, under current conditions, the contaminated subsurface soils in Areas A1 and A2 could potentially act as sources of continuing contamination to underlying groundwater.

OBJECTIVE

The objective of the cleanup level development is to determine subsurface soil cleanup goals for the Feasibility Study based on the potential for the VOCs to vertically migrate (i.e., leach) to the water table aquifer in Areas A1 and A2 at the Camp Allen Landfill. The modeling approach used to determine the soils cleanup goals for the Feasibility Study is presented in the following section.

MODELING APPROACH

Soil cleanup goals have been developed based on the results of the subsurface soil (i.e., test pit) pre-design investigation (Baker, 1994). Test pit locations and analytical results for the VOCs in Areas A1 and A2 are provided in Figures 2-3 and 2-4, respectively, in the Draft Final Remedial Design Work Plan (Baker, 1994).

Soil remediation areas for Areas A1 and A2 are provided in Figures 2-5 and 2-6, respectively, in the Draft Final Remedial Design Work Plan (Baker, 1994). As shown in Figure 2-5, the source area for Area A1 was determined to encompass an area of approximately 152 meters in length by 53 meters in width, producing a total area of approximately 8,100 m^2. As shown in Figure 2-6, the potential source area for area A2 was estimated to be approximately 787 m^2, which corresponds to the area around test pits A2-TPW05 and A2-TPW07.

A spreadsheet-based transport model described by Summers et. al (USEPA, 1980) was developed to determine the potential soil cleanup goals. The Summers Model is a one-dimensional advective transport model that estimates the potential contaminant concentration in leachate (emanating from the source area) at the top of the shallow aquifer. The general input data for the spreadsheet model include: contaminant characteristics; unsaturated zone characteristics; hydrogeological properties of the shallow aquifer; and annual precipitation data. Site-specific data were obtained from the predesign investigation as well as from previous field investigations. Site data not available were obtained from USEPA source documents.

A more detailed description of the Summers Model is included in Attachment I. The specific modeling inputs and their sources used in the spreadsheet calculation of soils cleanup goals are also provided in Attachment I.

SOIL CLEANUP GOALS

The soil cleanup goals developed using the Summers Model for the contaminants of concern in Areas A1 and A2 are listed below:

Contaminant	Groundwater Goal* (ppm)	Soil Cleanup Goal (ppm)
Vinyl Chloride	0.002	0.004
Trichloroethene	0.005	0.065
1,2-Dichloroethene	0.005	0.480
1,1,1-Trichloroethene	0.200	3.000
1,1-Dichloroethene	0.007	0.052
Tetrachloroethene	0.005	0.175
Benzene	0.005	0.037
Toluene	1.000	29.20
Ethylbenzene	0.700	72.00
Xylenes	10.00	650.0

* Groundwater goals are the Maximum Contaminant Goals.

Spreadsheet outputs from the Summers Model are presented in Attachment II.

The soil cleanup goals shown above were based on attainment of Maximum Contaminant Levels (MCLs) in shallow groundwater immediately below the source area in order to protect the lower Yorktown Aquifer to its potential future beneficial use (i.e., drinking water supply). Since the MCLs for the contaminants of concern are less than the federal Ambient Water Quality Criteria and Virginia Water Quality Standards, soil cleanup goals are also protective of surface water.

The developed soil cleanup goals will be used to estimate remediation areas of concern for the Feasibility Study and Remedial Design. It should be noted that since Area A is a landfill, the remedial action objective (RAO) for the soils is groundwater protection rather than soil cleanup. Therefore, achievement of this RAO will not necessarily be based on attainment of the developed soil cleanup goals since they represent theoretical values calculated through modeling. The cleanup goals were developed using conservative assumptions (see Attachment I) and may not be representative of actual site conditions. Therefore, achievement of groundwater protection will be determined through evaluation of actual environmental monitoring results (i.e., via ongoing monitoring of contaminant goals in groundwater and in the extracted vapors from the in situ vacuum extraction system, the preferred treatment alternative for the soils).

Attachment I

POTENTIAL CONTAMINANT LEACHING

The potential concentration of a contaminant in source area soil leachate eminating from the unsaturated zone was estimated using a one-dimensional advective transport model described by Summers et. al (USEPA 1980). The Summers model utilizes a saturated flow equation to approximate flow in the unsaturated zone. The governing equation describing one dimensional advective transport with dispersion and adsorption is:

$$D \frac{\delta^2 c}{\delta z^2} - V_S \frac{\delta c}{\delta z} = \frac{\delta c}{\delta t} + \left(\frac{1}{s}\right) \frac{\delta n}{\delta t}$$

Where:

c = contaminant concentration in the fluid stream

n = amount of contaminant adsorbed by the soil

V_s = the seepage velocity of leachate through soil

t = time

z = depth of the unsaturated soil column

D = the dispersion coefficient

s = the fractional soil voids volume

The terms in the governing equation represent, from left to right, transport because of dispersion, transport associated with advection, the time rate of change in contaminant concentration and the last term describes contaminant adsorption by the soil matrix. The n term is derived by multiplying c by an emperically derived adsorption coefficient (k). The use of a linear estimate of n implies that the assumption of equilibrium exists between solute in leachate and adsorbed solute. This approximation approaches actual adsorption conditions when typically unsaturated soils are saturated during precipitation events or when seepage velocities are low. When n = kc the general solution for the governing equation becomes:

$$\frac{C(z,t)}{Co} = \frac{1}{2}\left[1 + erf\left(\frac{R - y}{(4\ RyS)^{0.5}}\right) + e^{1/s}\ erfc\left(\frac{R + y}{(4\ RyS)^{0.5}}\right)\right]$$

Where:

$C_{(z,t)}$ = the contaminant concentration at depth z, and time t

C_o = initial contaminant concentration at z = 0

y = a dimensionless adsorption factor

R = a dimensionless time variable

S = a dimensionless mixing factor

z = distance to the saturated zone

erf(x) = the error function of x

erfc(x) = the complementary error function

If dispersion is considered negligable with respect to seepage velocity, the following equation is used:

$$\frac{C(z,t)}{C_o} = \frac{1}{2}\left[1 + erf\left(\frac{R-y}{(4RyS)^{0.5}}\right)\right]$$

This equation was used to calculate leachate concentrations at specific depths below the surface. The initial concentration term, C_o, was modified to account for source strength decay using the following equation:

$$C = C_o * e^{-k*t}$$

Where:

k = source decay factor

Source decay was assumed to be equivalent to the thirty year time frame for soil treatability.

A spreadsheet based Summers model was developed to determine the potential soil cleanup goal protective of leaching to the saturated zone under the influence of infiltrating precipitation. Spreadsheet output is presented in Attachment II. Mixing in the shallow zone was also considered in the form of a mass balance equation, however, relatively low estimates of seepage velocity and the limited thickness of the shallow aquifer does not provide significant dilution for either area A1 or A2. Therefore, mass balance mixing in the shallow aquifer is only presented on the first Attatchment II spreadsheet.

<u>Modeling Inputs</u>

The general input data for the spreadsheet included contaminant characteristics, unsaturated zone characteristics, hydrogeological properties of the shallow aquifer and annual precipitation data. Site specific data were obtained from the most recent RI report. Site data not available in the RI was obtained from USEPA source documents.

The model was used to predict potential leaching over a ten year duration. A source area decay value of 30 years was used to represent the amount of time necessary for the completion of potential remediation activities. Table A1-1 presents the modeling inputs and their respective sources used in the spreadsheet calculation of soils cleanup goals.

Table A1-1
Inputs to the Summers Model
Camp Allen Landfill Site
Norfolk, Virginia

INPUTS	VALUE	REFERENCE
Source Area (m2)	8100/787	1
Yearly Precipitation (cm)	111	2
Unsaturated Zone Depth (m)	3	2
Fraction Organic Carbon	0.01	1
Soil Bulk Density (Kg/L)	2	3,5
Porosity	0.3	3,5
Vertical Hydraulic Cond. (m/d)	0.05	3,5
Soil Decay Coeff. (d-1)	*	4
Water Decay Coeff. (d-1)	*	4
Time (d)	3650	5
Source Decay (d-1)	0.00009	5

References:

1 - Draft Test Pit Data (Baker, 1994)

2 - Draft Final Remedial Investigation Report (Baker, 1993)

3 - USEPA Water Quality Assessment. EPA/600/6-85/002a

4 - USEPA Handbook of Environmental Degredation Rates. Howard et al., 1991

5 - Predesign Investigations and Field Observations

* - Chemical dependent value. See Attatchment II

MCL values were selected as attainment standards for shallow zone groundwater. Shallow groundwater is not currently being used as a potable supply in the vicinity of the Camp Allen Landfill. The use of MCLs as attainment standards in conjunction with shallow groundwater remediation strategies should protect the shallow aquifer from further degredation when site remediation is complete. Protecting the shallow zone from further degredation will also assure that the deeper Yorktown aquifer (which could be used for potable purposes) is not adversely affected upon completion of remediation activities.

Contamination detected in the shallow aquifer is, in general, significantly higher than contaminant concentrations detected in the underlying Yorktown aquifer. This attenuation is probably afforded by the discontinuous clay layer between the two water bearing units in addition to simple dilution in the larger Yorktown water bearing unit. Attenuation of contaminant concentrations by migration from the shallow aquifer to the Yorktown aquifer was not considered in this modeling effort.

Uncertainties

Uncertainties are inherent in determining soil cleanup goals through the use of spreadsheet based models. These uncertainties stem from the assumption that a model can represent the physical transport system throughout an entire source area using generalized inputs such as vertical seepage velocities and porosities. To prevent an underestimation of contaminant leaching at the site, conservative inputs were used. These inputs may overestimate the potential for contaminant leaching in the unsaturated zone.

The use of a one-dimensional advective transport model considering adsorption and dispersion in porous media was used to approximate the potential leaching of contaminants from and through the unsaturated zone. Flow properties of unsaturated porous media are a function of the soil water content of site soils. The one-dimensional model is conservative because it assumes that the greatest potential for contaminant migration through the unsaturated zone occurs when unsaturated zone soil moisture contents are at maximum capacity. It does not consider situations where soils in the unsaturated zone are less than saturated, nor does the model consider the potential evapotranspiration of the study area. Therefore, leaching, as predicted by the model, is likely to be greater than actual site leaching.

The Summers Model estimates the potential contaminant concentration in leachate (eminating from the source area) at the top of the shallow aquifer. In order to determine corresponding soil concentrations, an estimate of retardation must be applied to modify the leachate concentration. Retardation is estimated using USEPA octanol-water partitioning coefficients and estimates of soil organic carbon content. An organic carbon content of 1 percent (0.01) was used to approximate subsurface soil fraction of organic carbon content (f_{oc}). Analytical data suggest that subsurface soil f_{oc} values may be somewhat higher. These values may be attributable to the presence of site associated contaminants, therefore, a lesser value was selected. Using an f_{oc} of 1 percent instead of some higher value increases the likelyhood of overestimating source area leaching potential.

Attachment II
Summer's Model Spreadsheet Calculations

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = 1,1-DCE

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	65
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.05
k1 =	Soil decay (d-1)	0.0111
k2 =	Water decay (d-1)	0.0111
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	0.167	
Kd =	Koc*foc (L/Kg)	0.650	
Rd =	Retardation ()	5.33	
D =	Dipersion Coeff. (m2/d)	0.033	
k =	Overall decay (d-1)	0.0111	
Co =	Initial Conc. (mg/L)	0.068	
R =		202.778	
S =		0.067	
A1 =		11.627	
A2 =		12.255	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.048601853	

** PRG For Leaching **		
Chemical =	1,1-DCE	
CGW =	Groundwater PRG (mg/L)	0.007
Csoil =	Soil PRG (mg/Kg)	0.052

ELEMENT NUMBER 2. MIXING IN THE SATURATED ZONE BENEATH THE SOURCE AREA. (used only with Element III option)

Assume average moisture case and 5 day anticedent precipitation is 0.

Days	1	5	6	7	8
Rainfall (cm)	0.00	0.00	8.95	10.98	6.55

From SCS curves.

CN2 =	Curve Number 2	79
CN1 =	Curve Number 1	62
CN3 =	Curve Number 3	91
S =	Water Retention (cm)	16
IA =	Initial Abstraction (cm)	3.2
Q1 =	Day 1 runoff (cm)	1.560
S2 =	Water Retention (cm)	6.8
IA2 =	Day 2 Abstraction (cm)	1.4
Q2 =	Day 2 runoff (cm)	0.000
S3 =	Water Retention (cm)	2.6
IA3 =	Day 3 Abstraction (cm)	0.5
Q3 =	Day 3 runoff (cm)	4.237

Runoff (cm)	5.797
Rainfall (cm)	26.48
% Infiltrate	78%

Assume that all yearly rain events follow the moisture curve profile.

Total Yearly Precip. (cm)	111
Evapotranspiration (cm)	0
Infiltration (m/d)	0.002375366

MASS BALANCE EQUATION

		Inputs
Ksat =	Aquifer hyd. cond. (m/d)	5
I =	Hydraulic Grad. (ft/ft)	0.01
n =	Aquifer Por.	0.3
l =	Length of source area (m)	43
w =	Width of source area (m)	18
h =	Depth of the aquifer (m)	10
Ca =	Upgradient Conc. (mg/L)	0

		Values
vd =	Darcy Velocity (m/d)	0.166666667
Qp =	Flow from unsat. zone (L/d)	1.8E+03
C =	Concentration (mg/L)	0.05
Qa =	Flow in the sat.zone (L/d)	30.0

Cgw =	Mixed sat. zone conc (mg/L)	0.04782
	Dil. by mass balance	1.01632

NO DILUTION AFFORDED BY SHALLOW ZONE

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = t-1,2-dichloroethene

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	59
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0111
k2 =	Water decay (d-1)	0.0111
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	0.590	
Rd =	Retardation ()	4.93	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0111	
Co =	Initial Conc. (mg/L)	0.073	
R =		2027.778	
S =		0.067	
A1 =		39.165	
A2 =		39.356	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.052542544	

** PRG For Leaching **		
Chemical =	t-1,2-dichloroethene	
CGW =	Groundwater PRG (mg/L)	0.07
Csoil =	Soil PRG (mg/Kg)	0.480

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = Tetrachloroethene (PCE)

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	364
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0111
k2 =	Water decay (d-1)	0.0111
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	3.640	
Rd =	Retardation ()	25.27	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0111	
Co =	Initial Conc. (mg/L)	0.014	
R =		2027.778	
S =		0.067	
A1 =		17.132	
A2 =		17.564	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.010258966	

** PRG For Leaching **

Chemical =	Tetrachloroethene (PCE)	
CGW =	Groundwater PRG (mg/L)	0.005
Csoil =	Soil PRG (mg/Kg)	0.175

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = **Toluene**

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	300
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0455
k2 =	Water decay (d-1)	0.00476
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	3.000	
Rd =	Retardation ()	21.00	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0436	
Co =	Initial Conc. (mg/L)	0.017	
R =		2027.778	
S =		0.067	
A1 =		18.832	
A2 =		19.226	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.012343328	

** PRG For Leaching **		
Chemical =	Toluene	
CGW =	Groundwater PRG (mg/L)	1
Csoil =	Soil PRG (mg/Kg)	29.17

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = 1,1,1-TCEA

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	152
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0111
k2 =	Water decay (d-1)	0.0111
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	1.520	
Rd =	Retardation ()	11.13	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0111	
Co =	Initial Conc. (mg/L)	0.032	
R =		2027.778	
S =		0.067	
A1 =		25.991	
A2 =		26.278	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.023282325	

** PRG For Leaching **

Chemical =	1,1,1-TCEA	
CGW =	Groundwater PRG (mg/L)	0.2
Csoil =	Soil PRG (mg/Kg)	3.092

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = Benzene

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	65
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0625
k2 =	Water decay (d-1)	0.00893
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values
vz =	Seepage Vel. (m/d)	1.667
Kd =	Koc*foc (L/Kg)	0.650
Rd =	Retardation ()	5.33
D =	Dipersion Coeff. (m2/d)	0.333
k =	Overall decay (d-1)	0.0525
Co =	Initial Conc. (mg/L)	0.068
R =		2027.778
S =		0.067
A1 =		37.660
A2 =		37.859
erf(A1) =		1.00000000 *
erf(A2) =		1.00000000 *
erfc(A2) =		0.00000000 *
C =	Conc. at"z" (mg/L)	0.048601853

** PRG For Leaching **		
Chemical =	Benzene	
CGW =	Groundwater PRG (mg/L)	0.005
Csoil =	Soil PRG (mg/Kg)	0.037

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZON

Chemical Name = Vinyl chloride

		Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	8.2
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.2
k2 =	Water decay (d-1)	0.2
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	0.082	
Rd =	Retardation ()	1.55	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.2000	
Co =	Initial Conc. (mg/L)	0.233	
R =		2027.778	
S =		0.067	
A1 =		70.064	
A2 =		70.171	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.167592597	

** PRG For Leaching **		
Chemical =	Vinyl chloride	
CGW =	Groundwater PRG (mg/L)	0.002
Csoil =	Soil PRG (mg/Kg)	0.004

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = 1,2-dichlorethane

			Inputs
z =	Unsat. depth (m)		3
a =	Dispersivity (m)		0.2
Cs =	Soil Conc. (mg/Kg)		0.36
Koc =	Oct/H2O coeff. (L/Kg)		14
foc =	Organic Carbon		0.01
sb =	soil bulk density (Kg/L)		2
por =	soil porosity		0.3
Ksat =	Vert. Hydraulic Cond. (m/d)		0.5
k1 =	Soil decay (d-1)		0.0111
k2 =	Water decay (d-1)		0.0111
t =	time (d)		3650
ks =	Source decay rate (d-1)		9E-05

		Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	0.140	
Rd =	Retardation ()	1.93	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0111	
Co =	Initial Conc. (mg/L)	0.186	
R =		2027.778	
S =		0.067	
A1 =		62.655	
A2 =		62.775	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.134074077	

** PRG For Leaching **		
Chemical =	1,2-dichlorethane	
CGW =	Groundwater PRG (mg/L)	0.005
Csoil =	Soil PRG (mg/Kg)	0.013

ELEMENT NUMBER 1. ONE-DIMENSIONAL MASS TRANSPORT THROUGH THE UNSATURATED ZONE.

Chemical Name = Ethylbenzene

Symbol	Parameter	Inputs
z =	Unsat. depth (m)	3
a =	Dispersivity (m)	0.2
Cs =	Soil Conc. (mg/Kg)	0.36
Koc =	Oct/H2O coeff. (L/Kg)	1100
foc =	Organic Carbon	0.01
sb =	soil bulk density (Kg/L)	2
por =	soil porosity	0.3
Ksat =	Vert. Hydraulic Cond. (m/d)	0.5
k1 =	Soil decay (d-1)	0.0357
k2 =	Water decay (d-1)	0.0179
t =	time (d)	3650
ks =	Source decay rate (d-1)	9E-05

Symbol	Parameter	Values	
vz =	Seepage Vel. (m/d)	1.667	
Kd =	Koc*foc (L/Kg)	11.000	
Rd =	Retardation ()	74.33	
D =	Dipersion Coeff. (m2/d)	0.333	
k =	Overall decay (d-1)	0.0355	
Co =	Initial Conc. (mg/L)	0.005	
R =		2027.778	
S =		0.067	
A1 =		9.743	
A2 =		10.485	
erf(A1) =		1.00000000	*
erf(A2) =		1.00000000	*
erfc(A2) =		0.00000000	*
C =	Conc. at"z" (mg/L)	0.003487128	

** PRG For Leaching **		
Chemical =	Ethylbenzene	
CGW =	Groundwater PRG (mg/L)	0.7
Csoil =	Soil PRG (mg/Kg)	72.27

ATTACHMENT III

VADEQ COMMENT RESPONSES
CAMP ALLEN LANDFILL
RI/FS

Draft Final RI Report

VADEQ Comment 1. The Camp Allen Salvage Yard (CASY) is currently operational. Surface water runoff from CASY is directed via storm sewers to the drainage ditches north of Area A and south of Area B. Given very little relief and physical barriers, storm water runoff directly to Area A and Area B soils is minimal.

VADEQ Comment 2. Based on Naval Base operations and historical information related to Camp Allen Landfill operations at Area A and Area B, ordnance disposal is not indicated.

VADEQ Comment 3. Prior to predesign efforts (Fall of 1993), a total of 69 "monitoring wells" were installed at the Camp Allen Landfill Site (43 shallow and 26 deep). However, based on previous investigation results, not all monitoring wells were sampled during the 1992/1993 RI effort. In general, seven shallow wells and one deep well were not sampled during the 1992/1993 RI effort, as they are older wells determined to be unsuitable for monitoring purposes.

VADEQ Comment 4. General surface water flow is indicated on most figures contained in the Executive Summary. A topographic map indicating likely surface water runoff in the area will be added to Section 4.0 of the RI Report.

VADEQ Comment 5. Yes, geophysical coverage did extend beyond documented boundaries of Areas A and B of the Camp Allen Landfill. All known historical records have been incorporated into previous investigations and the RI Report by reference. Construction atop disposal areas has reportedly been limited to the Brig Facility, Incinerator/substation, and the Heliport, all of which are/were located in Area A of the Camp Allen Landfill.

VADEQ Comment 6. Detailed documentation of incineration activities is limited to previous investigation reports. As indicated in Section 1.0 of the RI Report, incineration activities ceased in the mid-1960s.

VADEQ Comment 7. The Navy disagrees with the state's position regarding postponement of groundwater and soil remedial design activities until completion of the Camp Allen Salvage Yard (CASY) PA/SI activities. Based on information to date, potential CASY conditions would not significantly effect soil or groundwater design efforts. RI/FS findings justify an accelerated cleanup approach as governed by Superfund and NCP regulation and guidance.

VADEQ Comment 8. This page can be added as a summary to the Table of Contents.

VADEQ Comment 9. The soils map does provide useful information in that it identifies soil types in the Camp Allen area. Development of a "color-sensitive map" would not be cost effective considering the "added usefulness."

VADEQ Comment 10. This statement was strictly a generalized interpretation. Groundwater information should be limited to documented sources and investigation activities.

VADEQ Comment 11. Yes. Predesign activities were performed during the Fall of 1993 (Draft Final Remedial Design Project Plans, 1994).

VADEQ Comment 12. This is based on USGS Background Information (Schacklette, H.T. and J.G. Boerngen, 1984). Please note that ultimate conclusions presented in the Baseline Risk Assessment are based on a COPC selection process retaining the primary toxic/heavy metals for a conservative evaluation.

VADEQ Comment 13. Storet Database data were incorporated for reference of general sediment quality in areas nearby and adjacent to the Camp Allen Landfill Site. This will be clarified in the RI Report.

VADEQ Comment 14. There is no removal Action scheduled for Area A. RAP/ROD activities will be conducted following the Removal Action at Area B (Also see State Comment 56).

VADEQ Comment 15. This statement "with the exception of arsenic and barium" was directed to the interim RI results (Malcom Pirnie, 1988), as indicated under RI results, barium was not a constituent of concern because it is detected at concentrations below the USEPA Region III RBC concentration of 2600 µg/L. Please note that ultimate conclusions presented in the Baseline Risk Assessment are based on a COPC selection process retaining the primary toxic/heavy metals for a conservative evaluation.

VADEQ Comment 16. This discussion refers to total inorganic constituent concentrations detected in the shallow groundwater south of the drainage ditch behind the Camp Allen Elementary School. This area is monitored by one shallow well. These detections appear to be the result of interference caused by suspended solids (indicated by high aluminum and iron concentrations compared to other shallow wells) in the well from which the groundwater sample was collected. The text will be revised to clarify this point.

VADEQ Comment 17. Section 4.3.3 clearly identifies potential off-site sources. These potential off-site sources are not related to Area A or Area B of the Camp Allen Landfill.

VADEQ Comment 18. Removal Action and Soil/Groundwater Design activities are not anticipated to effect nearby wetland locations adjacent Area A. Wetland areas do not overlap the remediation areas of concern. Soil/Groundwater design activities will address wetland related issues.

VADEQ Comment 19. Wetland delineations were prepared by USDI, Fish and Wildlife Service, LANTDIV Code 20, 1988. The Army Corps of Engineers is reportedly in the process of surveying the Naval Base.

VADEQ Comment 20. Comment noted.

VADEQ Comment 21. No, toxicity testing is not considered for future activities. The results of the benthic macroinvertebrate sampling indicated a benthic environment dominated by tubificid worms. However, the presence of other families of benthos indicate a diverse community of benthic invertebrates. The dominance of the tubificid worms is expected due to the extreme fluctuations that would occur in a drainageway habitat. Station 5 was a background reference station and the benthic community was dominated by tubificid worms. However, there were no exceedances of relevant water quality criteria or sediment screening values. The dominance by the tubificid worms at Station 5 is a result of the habitat because of the absence of contamination.

VADEQ Comment 22. In certain cases, the surface water quality standards for pesticides and PCBs are lower than the detection limits. In general, required detection limits for various constituents are unattainable using reasonable, generally accepted analytical methods.

VADEQ Comment 23. Comment noted. Please note that RI comparisons are for reference only. ARARs are one of the main considerations in development of remedial action objectives presented in the FS Report

VADEQ Comment 24. Comment acknowledged.

VADEQ Comment 25. Yes, the Virginia Water Quality Standards for groundwater were used. The term "State MCL" is merely used to label this information in Appendix Y.

VADEQ Comment 26. VA Waterworks Regulations (6/23/93) were not available during the RI Report compilation. The latest Virginia MCLs will be added to the tables in Appendix Y.

VADEQ Comment 27. Comment acknowledged. (See State Comment 31)

VADEQ Comment 28. Soil cleanup goals will be developed as appropriate (See State Comment 72).

VADEQ Comment 29. Please note that concentration ranges are presented in the Baseline Risk Assessment (Appendix A), where this information is actually utilized.

Draft Final Baseline Risk Assessment Report

VADEQ Comment 30. Although USEPA Directives present the use of multiple risk descriptors to characterize risk, USEPA Region III toxicologists suggest that remedial decisions be made on the RME unless an average case risk estimate can be supported by the use of multiple risk descriptors such as Monte Carlo simulations. Monte Carlo simulations require statistically defensible inputs for the exposure factors used to derive risk. Many of the exposure scenarios used in the Camp Allen Landfill risk assessment do not have statistically defensible exposure factors which would make risk estimates derived using multiple risk descriptors meaningless. Therefore, the RME should be used for FS decision making and should be retained in the baseline risk assessment.

VADEQ Comment 31. Risk based screening using risk based concentration (RBC) values was developed by USEPA Region III toxicologists to replace the existing toxicity screening approach in RAGS. RBCs cannot be used solely to determine chemicals of potential concern. Other screening criteria presented in RAGS and discussed in the text of the baseline risk assessment must also be considered in the determination of COPCs.

VADEQ Comment 32. Methylene chloride and 2-butanone were detected in blank samples. Text will be modified to reflect this fact, however, raw analytical data will not be presented in the baseline risk assessment but are presented in the Remedial Investigation Report. Five and ten times rules were applied to blank results in addition to mass/mass conversions for comparison to solid samples.

VADEQ Comment 33. Surface soils were collected and analyzed for inorganics at the request of USEPA. Organic analyses were not requested by the Agency.

VADEQ Comment 34. The chemical 1,2-dichloroethane was retained as a COPC, and page 2-14 will be modified to reflect this.

VADEQ Comment 35. RBCs cannot be used solely to determine COPCs (USEPA Region III, 1993). Other criteria such as chemical prevalence (defined as frequency of positive detection and chemical concentration in environmental media) must also be considered in the selection of COPCs.

VADEQ Comment 36. The rationale for analyzing well samples for volatile contaminants was based on the relative environmental mobility of these chemicals as opposed to the lesser mobility of semivolatiles, pesticides, PCBs and inorganics. It is reasonable to assume that if volatile organics are not detected in a manner consistent with known plumes at the site, their presence is probably not site related. Therefore, other less mobile contaminants (i.e. PCBs, pesticides, semivolatiles and inorganics) should not be present due to site activities. Additionally, it must be noted that a shallow groundwater hydrogeologic barrier (drainage ditch) exists between Area A of the Camp Allen Landfill and Glenwood Park. Analytical results from shallow groundwater monitoring wells in this area further support that detected constituents in noted residential well groundwater samples are not site related. Furthermore, the less environmentally mobile semivolatiles, pesticides, and PCBs were not detected in residential area monitoring wells located between the Area A landfill and Glenwood Park residences. This rationale will be clarified in Section 3.0.

VADEQ Comment 37. RBCs cannot be used solely for the selection of COPCs. However, COPC selection will be revisited and the list of COPCs will be revised, if necessary, in the next version of the Baseline Risk Assessment. As noted in the response to VADEQ Comment 36, the less environmentally mobile semivolatiles, pesticides, and PCBs were not detected in residential area monitoring wells located between the Area A landfill and Glenwood Park residences.

VADEQ Comment 38. Agreed. Selection of air COPCs will be revisited in the next version of the baseline risk assessment.

VADEQ Comment 39. Maximum concentrations exceeding RBCs does not necessarily indicate that adverse health effects will occur subsequent to exposure. Text will, however, be modified and COPC will be reevaluated in the next version of the baseline risk assessment. Additional COPCs may be selected and included, if necessary, in the Final Baseline Risk Assessment.

VADEQ Comment 40. Text will be modified to reflect scenarios where volatilization is likely in groundwater.

VADEQ Comment 41. Comment acknowledged. Text concerning the conceptual model will be modified to explain that although volatilization is important with respect to contaminant removal form surface waters it is doubtful that volatilization from surface waters is important from an exposure standpoint because of the infinite dilution potential of outdoor air.

VADEQ Comment 42. Brig employees perform maintenance duties primarily in Area B Pond. School employees perform maintenance around the school. The model will be reevaluated to stress the division of responsibilities.

VADEQ Comment 43. Agreed. This pathway will be considered in subsequent versions of the baseline risk assessment.

VADEQ Comment 44. Comment acknowledged. Specific values will be evaluated and, if agreeable to USEPA Region III toxicologists, will be used in the Final Baseline Risk Assessment.

VADEQ Comment 45. Prisoners will not be digging as an adult resident might. The contact is assumed to be more of an incidental nature, in line with commercial/industrial types of exposure.

VADEQ Comment 46. Older children were considered to be the receptor most likely to access Area A. Younger children could potentially access Area B, thus the use of a higher ingestion rate.

VADEQ Comment 47. The RfD for 1,2-dichloroethene was checked. The oral RfD for total 1,2dichloroethene is 0.009 mg/Kg/d and can be found in Health Effects Assessment Summary Tables (FY 1993).

VADEQ Comment 48. The discrepancy will be resolved.

VADEQ Comment 49. Because adults and younger children were used to evaluate this pathway, the range of potential risks are accounted for. Older children would fall in the middle of the adult-child risk range. Text will be expanded to address this comment.

VADEQ Comments 50, 51, 52, 53, 54. Tables and appendix spreadsheets will be corrected.

VADEQ Comment 55. Salvage yard workers do not work at the Camp Allen Landfill. If workers at the Camp Allen Landfill did work in Area A and Area B, the risk would not be additive, but averaged to account for potential exposure to both Areas.

Draft Final Feasibility Study Report

VADEQ Comment 56. The RI/FS is usually finalized after a removal action is completed. However, the objective of the removal action at Area B is the protection of groundwater, which will be demonstrated through the attainment of soil cleanup goals based on groundwater protection. No additional risk assessment calculations will be required following the removal action, and therefore, the RI and risk assessment can be finalized before the removal action is completed.

The FS can also be prepared and finalized before the removal action is completed based on the assumption that cleanup goals will be achieved. Based on available information concerning the nature and extent of subsurface contamination within the Area B Landfill, there is no reason to suspect that the removal action will not succeed in removing the source of groundwater contamination. Therefore, development of source control (i.e., soil) alternatives for Area B in the FS is not warranted at this time. The Navy is planning to delay finalization of the Remedial Action Plan and the public comment period until after the removal action is completed. Should confirmation sampling results indicate that the source of contamination was not adequately removed during the removal action, the FS and Remedial Action Plan may need to be revised to incorporate additional source control alternatives.

VADEQ Comment 57. Because limited information concerning the Industrial Wastewater Treatment Plant (IWTP) was available during development of the FS, only a preliminary evaluation of the feasibility of using the IWTP to treat contaminated groundwater from the site was included in the FS. A more thorough evaluation of the IWTP has been conducted as part of the pre-design activities, and it has been determined that this alternative is not cost-effective compared to on-site treatment. The FS will be revised to indicate this result.

VADEQ Comment 58. The cost of pilot-scale testing was included in the cost estimate for the in situ vapor extraction alternative (Alternative A-SO5) ($20,000). The cost of pilot-scale testing was not included in the thermal treatment alternative (Alternative A-SO6) because the scope of the test and associated costs are vendor-specific and are dependent on regulatory requirements (e.g., air monitoring requirements), which are usually determined on a site-specific basis and were not available for the FS. Pilot-scale testing was not included in the groundwater extraction and treatment alternatives. Several short-term pumping/pilot tests were conducted as part of the predesign activities to better determine aquifer hydraulic and chemical characteristics.

VADEQ Comment 59. Sediment cleanup goals based on the protection of surface water were not developed in the FS. Results of the ecological risk evaluation indicate that the sediments do not pose an unacceptable risk to ecological receptors. Volatile organic compounds (VOCs) in the surface waters were most prevalent in the ponded area at Area B and at Area A in the far northeastern portion of the drainage ditch where surface water from Area B is conveyed via an underground culvert. The VOCs detected in these areas are believed to be the result of the groundwater seep associated with the Area B Landfill, the source of which will be addressed by the Area B Removal Action.

VADEQ Comment 60. The beneficial use of the shallow aquifer is non-potable use. Non-potable use cleanup goals were developed for the shallow aquifer, which are based on a 1×10^{-6} cancer risk level and the exposure pathways of incidental ingestion and dermal absorption of contaminants during outdoor activities, such as car washing and lawn watering.

However, since contaminants have the potential to migrate vertically from the upper to lower aquifer, the groundwater cleanup goals developed for the Yorktown Aquifer will initially be used for the shallow (water table) aquifer to protect the Yorktown Aquifer to its beneficial use. Higher cleanup goals for the shallow aquifer will be adopted in the future if it can be demonstrated, through ongoing groundwater monitoring, that they are protective of the Yorktown Aquifer and adjacent surface waters. These higher cleanup levels will be equal to or less than the non-potable use cleanup goals to ensure that they are protective of the shallow aquifer's beneficial use.

VADEQ Comments 61-71, 73, 74, and 76. The requested ARAR revisions will be incorporated into the FS.

VADEQ Comment 72. Soil cleanup levels were not developed in the FS because little data were available on the nature and extent of contamination within the "hot spot" area assumed for Area A. Soil cleanup goals have now been developed based on the results of the subsurface soil pre-design investigation. The soil cleanup goals and supporting calculations are provided in Attachment II. Following regulatory review, these goals will be incorporated into the FS.

Soil cleanup goals were developed based on attainment of Maximum Contaminant Levels (MCLs) in shallow groundwater immediately below the source area in order to protect the lower Yorktown Aquifer to its potential future beneficial use (i.e., drinking water supply). Since the MCLs for the contaminants of concern are less than the federal Ambient Water Quality Criteria and Virginia Water Quality Standards, soil cleanup goals are also protective of surface water.

The developed soil cleanup goals will be used to estimate remediation areas of concern for the Feasibility Study and Remedial Design. It should be noted that since Area A is a landfill, the remedial action objective (RAO) for the soils is groundwater protection rather than soil cleanup. Therefore, achievement of this RAO will not necessarily be based on attainment of the developed soil cleanup goals since they represent theoretical values calculated through modeling. The cleanup goals were developed using conservative assumptions (see Attachment I) and may not be representative of actual site conditions. Therefore, achievement of groundwater protection will be determined through development of treatment system performance curves and through evaluation of actual environmental monitoring results (i.e., via ongoing monitoring of contaminant levels in groundwater and in the extracted vapors from the in situ vacuum extraction system, the preferred treatment alternative for the soils). Soil contaminant concentrations may eventually reach asymptotic levels below which contaminant levels cannot be reduced via in situ vacuum extraction. If treatment system performance curves indicate that the cleanup goals for some or all of the contaminants cannot be achieved, then the soil cleanup goals will be reevaluated.

VADEQ Comment 75. For each area of contamination (Areas A1, A2, and B), the potable-use and non-potable-use groundwater cleanup alternatives included in the FS (Alternatives 3 and 4) will be combined into one alternative entitled "Protection of Water Table and Yorktown Aquifers to Their Beneficial Uses through Extraction and Treatment." Under this alternative, the remedial action objective will be to protect the water table aquifer to its potential future beneficial use (non-potable use) and the Yorktown Aquifer to its potential future beneficial use (potable use). As discussed in the response to Comment 60, the same cleanup goals will initially be used for both aquifers; however, higher cleanup goals for the shallow aquifer will be adopted in the future if ongoing monitoring indicates that they are protective of the Yorktown Aquifer and adjacent surface water.

VADEQ Comment 77. The requested ARAR references will be incorporated into the FS. Discharge of treated groundwater will comply with the substantive requirements of all pertinent federal and State ARARs. However, since the site is being addressed under DoD's Installation Restoration Program (IRP) and in accordance with CERCLA requirements, on-site discharge of treated groundwater will not require a permit.

VADEQ Comment 78. Federal and State ARARs are identified and discussed in Section 2.2 of the FS. Reiteration of all of the ARARs under the detailed analysis of alternatives (Sections 5.0 and 6.0) is not warranted. The "Compliance With ARARs" section for each alternative will be augmented to include the major federal and State contaminant- and action-specific ARARs pertinent to that alternative. The ARARs will be presented again in the Remedial Action Plan and in the Record of Decision, as well as identified during the Remedial Design.

ATTACHMENT IV

USFWS COMMENT RESPONSES
CAMP ALLEN LANDFILL
RI/FS

USFWS Comment 1. Particle size could not be analyzed by the laboratory because of the nature of the sediment samples. Field observations on the type(s) of sediment(s) observed at the benthic sampling locations will be presented in the final baseline risk assessment.

USFWS Comment 2. Status of the NOAA sediment screening values will be changed in text to indicate that these values are "indicators of sediment concentrations of chemicals that were associated with adverse biological effects (either sediment toxicity or depauperate communities)." NOAA values will not be referred to as ARARs or standards in the final baseline risk assessment.

USFWS Comment 3. Station 5 was a background reference station and the benthic community was dominated by tubificid worms. However, there were no exceedances of relevant water quality criteria or sediment screening values. The dominance by the tubificid worms at Station 5 probably is a result of the habitat because of the absence of contamination. Opportunistic species such as tubificid worms typically dominate in a habitat that undergoes extremes of variation in natural environmental parameters including fluctuations in tidal influence and water temperature. The aquatic habitats that are present at the site are estuarine and will have wide variations in natural environmental parameters that can result in large natural variability in the resident benthic macroinvertebrate population. The opportunistic species are best adapted to inhabit estuarine environs.

USFWS Comment 4. Comment acknowledged. Selection of COPCs will be revisited in the final baseline risk assessment.

USFWS Comment 5. Sediment toxicity testing is not being considered for future activities. The results of the benthic macroinvertebrate sampling indicated a benthic environment dominated by tubificid worms. However, the presence of other families of benthos indicate a diverse community of benthic invertebrates. The dominance of the tubificid worms is expected due to the extreme fluctuations that would occur in a drainageway habitat or estuarine habitat. Station 5 was a background reference station and the benthic community was dominated by tubificid worms. However, there were no exceedances of relevant water quality criteria or sediment screening values. The dominance by the tubificid worms at Station 5 probably is a result of the habitat because of the absence of contamination.