UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

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FEB 12 1991

Mr. Randall W. Battaglia
Chemical Engineer
Environmental Coordinator
Seneca Army Depot
Romulus, New York 14541-5001

Dear Randy:

Enclosed are comments to the:

P.1 A. OB/OD Grounds RI/FS scoping document,

P.11 B. OB/OD Grounds Closure plan for the Nine Burning Pads, and the

P.13 C. OB/OD Grounds procurement scope of work (Part C-1 & C-2)

Issues discussed in the above mentioned reports, will be addressed by EPA at the meeting scheduled on 2/27 and 2/28.

No final response to these comments is expected by SEAD before the meeting. However, our issues and concerns should be addressed and incorporated into the OB/OD Ground RI/FS Workplan.

In accordance with Section 17.7(b) of the Interagency Agreement, this transmittal constitutes closure of EPA's comments for the OB/OD Grounds RI/FS Scoping Document.

On Thursday February 14, 1991 I would like to schedule time to develop the agenda for the meetings. If you have any questions please contact me at (212) 264-1841.

Sincerely,

Miriam Martinez

Miriam Martinez, Project Manager
Federal Facilities Section

Enclosure

cc: K. Gupta, w/attach

PART A. PAGE-SPECIFIC COMMENTS FOR THE OB/OD GROUNDS RI/FS SCOPING DOCUMENT

p. 1-1 Section 1.0 states "The area to be investigated is restricted to the nine (9) open burning pads and adjacent areas within the Open Burning/Open Detonation (OB/OD) grounds (90 acres)." This directly contradicts the first paragraph on p. 1-3 which states "The 30 acres associated with the burning pads is the subject of this investigation". The scope of this investigation needs to be clarified.

p. 2-13 Paragraph 2 states ground water analyses conducted between 1981 and 1897 included TOC and TOX. Ranges detected appear in Table 3. Some interpretation of this data (comparison with values expected in uncontaminated areas) should be provided to determine whether or not the concentrations detected are indicative of contamination.

p. 2-14 Table 3 presents only a single value for each explosive compound, whereas a range of concentrations are provided for other contaminants. Does this suggest explosives were only detected on one occasion, reported values did not vary, or only a single sampling event is being referenced?

p. 2-14 Table 3 - Some of the concentrations cited as MCLs in this table represent National Interim Primary Drinking Water Regulations (NIPDWR). These should be referenced as such. In some cases these values are more stringent than the MCLs (e.g., barium, chromium, and selenium). In other cases, the MCL is more stringent and should be cited (MCL for cadmium is 5 ug/L, and the MCL for lead [at source] is 5 ug/L).

p. 2-14 No value is provided for Ag (silver) in Table 3 or 12. An NIPDWR standard has been set for silver at 50 ug/L.

Federal Ambient Water Quality Criteria (AWQC) are available for inorganics and could be cited in Table 3. It would be useful to compare concentrations reported at the site to these criteria.

p. 2-14 Table 3 - MCLs are unavailable for the explosives cited in Table 3. Health advisories (HAs) are available and could be cited in this table to provide a frame of reference for concentrations detected. HAs are available for 1-day, 10-day, long-term, and lifetime exposures. HA

values range from: 5,000 ug/L to 400 ug/L for HMX; from 100 ug/L to 2 ug/L for RDX; and from 20 ug/L to 2 ug/L for TNT.

The above analysis suggests that the concentration reported for RDX (30 ug/L) may pose health risks from lifetime exposures.

p. 3-4 Section 3.1.2 cites explosives, including: HMX, RDX, and Tetryl. These compounds should be identified by their complete chemical name to enable retrieval of chemical-specific data from the literature, including information relating to physical, chemical, and toxicological properties of these compounds.

Note - the chemical name for RDX is cyclotrimethylene-trinitramine.

p. 3-5 Table 6 presents physical/chemical data for the explosives. This table does not present the density (or specific gravity) of the compounds in question. Density is an essential property in predicting the fate of chemicals in water. Note that a density greater than 1 gm/cm3 indicates that a compound, if present at concentrations of 10-percent of its limit of solubility or more, has the potential to sink in water and form non-aqueous phase liquids (NAPLs).

For 2,4,6-TNT, the density is 1.654. For 2,6-TNT, the density is 1.28. For 2,4-TNT, the density is 1.32. The fact that TNT compounds have the potential to form NAPLs should be acknowledged in the discussion provided in Section 3.1.2.1. This characteristic should be evaluated in relation to other physical/chemical properties of these compounds (solubility, mobility, etc.).

p. 3-6 Paragraph 1 states "Compounds such as RDX and HMX have extremely low vapor pressures and would not volatilize through the soils. Consequently, RDX and HMX are not expected to represent a significant environmental pathway." This sentence should read "volatilization is not expected to represent a significant environmental pathway."

p. 3-9 Section 3.1.3.1 - The Ground water Summary and Conclusions discussion should acknowledge the limitations of the prior studies. These include the following:

1. Current ground water data is based on wells screened exclusively in the shallow glacial till layer. The tendency for

explosives to sink in water combined with their relatively low solubilities suggests the possibility that these compounds may have migrated over time through the till and into the weathered shale layer. These compounds may exist undetected as an immiscible layer atop the competent bedrock.

It is recommended that the weathered shale portion of the aquifer be evaluated during subsequent field programs to evaluate the potential vertical migration of contaminants.

2. Prior studies were limited to analysis for explosives, EP toxicity metals, TOC, TOX, pH, pesticides, nitrates, and specific conductance. The explosives are stated to be semi-volatile organic compounds, thus there may be degradation products associated with these compounds which have not been analyzed for.

   It is recommended that the chemical degradation pathway of the explosives of concern be studied, and that future programs include analyses for these degradation compounds. The Target Compound List (TCL) for semi-volatile organics should be considered for use.

p. 3-10 Section 3.1.3.2, paragraph 5 states "In summary, a substantial sampling and analysis effort has been undertaken by the U.S. Army over the last several years. Although environmentally present, both the concentration and number of samples which detected explosives and heavy metals, have failed to indicate that a substantial environmental problem exists at the site."

This statement appears inappropriate for the following reasons. The potential for contamination with explosives and/or metals has been demonstrated at Pads F, B, and H. No data is available for soils beneath Pads A, C, D, E, G or J (refer to previous paragraph). No analysis for explosive degradation products has been conducted.

Also, sampling for metals was limited primarily to the EP Toxicity test which is now superseded by the Toxicity Characteristics Leachability Procedures (TCLP). Whereas EP Toxicity levels were previously used to assess RCRA applicability, treatment standards have now been formulated to assess applicability of Land Disposal Restrictions (LDRs) which in many cases are more stringent than the

EP Toxicity criteria. Soils previously determined not to be subject to RCRA regulations may in fact be subject to RCRA LDRs.

In summary, it appears that additional sampling of surface/subsurface soils and of the berms associated with the pads with analysis for a broader range of parameters including: Target Analyte List (TAL) (metals), and TCL semi-volatiles, and the TCLP is required before conclusions regarding the existence of contamination at these pads can be made.

p. 3-12 Section 3.3 Scoping of Potential Remedial Action Alternatives - Six remedial options are presented. Because the types and levels of contamination are expected to vary from pad-to-pad in the OB grounds, a single alternative may not be able to be applied uniformly across the site. This should be acknowledged in the scoping document.

p. 3-12 CERCLA RI/FS Guidance states in Section 2.2.3 (Develop Remedial Action Alternatives) that, once the conceptual understanding of the site is obtained, remedial action objectives and a preliminary range of remedial action alternatives and associated technologies should be identified. The CERCLA guidance states:

> "The identification of potential technologies at this stage will help ensure the data needed to evaluate them...Technologies that may be appropriate for treating or disposing of wastes should be identified along with the sources of literature on the technologies' effectiveness, applications, and cost."

Although Section 3.3 presents a range of alternatives, Section 3.3 does not present preliminary remedial action objectives or a list of associated technologies for which data needs can be formulated.

p. 3-12 Section 3.3 states "Based on the conceptual model, ground water impacts appear minimal...Consequently, potential ground water remedial alternatives are not being scoped at this time". This approach is questionable. The decision not to scope remedial actions for ground water infers "no action" will be required, and suggests that the RI may not be aggressive in evaluating hydrologic conditions/ground water quality in the OB grounds.

p. 3-13 Section 3.3.3 Excavation and Landfilling is provided as a potential remedial alternative. This discussion is correct in suggesting that excavation is well-suited to the remediation of contamination "hot

spots". However, this discussion goes on to state "Landfilling...is becoming increasingly difficult and more expensive due to steadily growing regulatory control of this technology." Some comments appear below.

1. In light of the limitations of landfilling as a technology, and in consideration of the fact that CERCLA guidance states that the decision-maker should identify "a range of alternatives in which treatment that significantly reduces the toxicity, mobility, or volume of the waste is a principal element" (p.2-9), it may be preferable to replace landfilling with some type of on-site treatment, or create an additional option which includes excavation and treatment.

2. Contaminants at the OB Grounds fall into three general categories: non-halogenated semivolatiles (2,4-TNT, etc.), volatile metals (arsenic, lead etc.), and non-volatile metals (cadmium chromium etc.). A single treatment option applicable to soils contaminated with semi-volatiles and metals is soil washing. The soil washing process extracts contaminants from soil using a liquid medium as the washing solution. Washing fluids are selected based on the type of contaminants to be removed. This technology is commercially available.

3. Where metals are not a concern, demonstrated or potential technologies for treating excavated soils contaminated exclusively with non-halogenated semi-volatiles include: incineration (rotary kiln, fluidized bed, infrared thermal, pyrolysis), chemical extraction, and thermal stripping.

4. Excavation/treatment is best suited to remediate "hot spots", thus this remedy could be expanded to include in-situ treatment (bioremediation etc.) for the less-contaminated areas.

p. 3-14 Section 3.3.4 states "Since the disturbance and excavation of unstable explosive materials in and around the burn pads will be extremely hazardous, in-situ technologies have inherent advantages". Three in-situ technologies are cited: vitrification, radio-frequency heating, and solidification. The first two of these do have the advantage over excavation in that they do not involve overly invasive techniques. However, in-situ solidification involves invasive techniques. Chemical reagents must be injected into the ground,

with the subsequent in-situ mixing of reagents with soils using heavy equipment (backhoe, pull shovel, front-end loader). Extensive mixing will be required to achieve the appropriate soil-to-reagent ratio to ensure that the physical/chemical characteristics of the solidified mass will meet the desired leachability/compressive strength criteria.

It is noted that in-situ solidification may be just as hazardous to workers as excavation.

p. 3-14 A potentially applicable in-situ technique not listed in Section 3.3.4 is soil flushing. In-situ soil flushing is a process applied to unexcavated soils using a ground water extraction/reinjection system. The process consists of injecting a solvent or surfactant to enhance contaminant solubility, which results in increased recovery of contaminants in leachate or ground water.

Although in-situ soils flushing has had limited success to-date in field applications, the use of a modified soil flushing approach combined with in-situ homogenization of soils to minimize short-circuiting, may pose a viable alternative and satisfy the preference of SARA to utilize innovative technologies at CERCLA sites, where possible. It is noted that this technique will pose risks to worker safety (similar to excavation and solidification) in the event that unexploded ordinance are present in the soils.

p. 3-16 Section 3.3.5 cites Resource Reclamation as a potential remedial alternative. Although favorable in concept, this option does not stand-alone as a remedial alternative as it is likely to apply at only a few of the pads, and would need to be used in conjunction with one of the other alternatives.

Further discussion of this technology should also be provided to assess the validity of this technique to the site. The current discussion is too brief.

p. 3-18 Section 3.4.2 presents the Preliminary Identification of ARARs and TBCs. This section includes a broad list of potential chemical-specific ARARs (Table 8), location-specific ARARs (Table 9), action-specific ARARs (Table 10), and other criteria "to-be-considered" (Table 11). The RI/FS CERCLA Guidance requires ARARs/TBCs be identified during project planning, and based on EPA's interpretation of the guidance, merely listing potential ARARs is not sufficient. See examples below.

1. CERCLA guidance states "a preliminary evaluation of action-specific ARARs may be made to assess the feasibility of remedial technologies being considered at this time" (p. 2-9). According to this statement, CERCLA guidance is requiring not only that potential action-specific ARARs/TBCs be listed, but also that the contractor conduct a preliminary analysis of the applicability of such ARARs/TBCs to the RI/FS program. No such analysis is provided in this document.

2. Chemical-specific ARARs should be identified and considered as preliminary remediation goals during project planning. This enables technologies which have been identified, but have no ability to achieve the types of clean-up goals expected at the site, to be eliminated from consideration early in the planning process.

   Note- The project planner should develop preliminary Remedial Action Objectives which specify the medium of interest, exposure pathways, and preliminary remediation goals. This permits a range of treatment and containment alternatives to be developed.

p. 3-20 Table 9 - Three additional federal location-specific ARARs should be evaluated as to their applicability:

- Wild and Scenic Rivers Act (16 USC 1271) - regulates activities which may have an adverse effect on designated scenic waterways;

- Endangered Species Act (16 USC 1531) - restricts activities in areas where endangered species are present; and

- Wilderness Act (16 USC 1131) - restricts activities in designated wilderness areas.

p. 3-21 Table 10 - Additional action-specific ARARs should be cited:

- SARA (42 USC 9601) - prefers alternatives utilize treatment technologies which permanently reduce the volume, mobility, and/or toxicity of wastes, and requires that remedial actions attain ARARs unless a waiver is invoked;

- OSHA (29 CFR 1910.120) - regulates the safety of workers at all hazardous waste sites through medical monitoring, training, etc.;

- Clean Air Act (40 CFR 50,61) - establishes emission limitations for particulates, fugitive dust, heavy metals, toxic organics (potentially applicable to excavation/treatment/incineration type-remedial actions).

p. 3-22 Table 11 - Additional criteria should be cited:

- Ambient Water Quality Criteria (AWQC) (45 Federal Register 79318-79379) - criteria for aquatic organisms/drinking water, and adjusted for drinking water only;

- RCRA Clean-up Criteria for Soils/Groundwater (RFI Guidance (EPA 530/SW-89-031) - Cleanup criteria for carcinogens/systemic toxicants at RCRA facilities.

p. 3-27 Section 3.5.2, paragraph 1 states "in order to meet the requirements of NY state, samples for metals and VOAs in soils/sediments and surface water/ground water will be collected and analyzed according to NYSDEC CLP protocols and the data reported as Level IV".

This approach appears correct providing the Contract Required Quantitation Limits (CRQLs) associated with the NYSDEC protocol are set at levels below critical environmental/toxicity criteria (e.g. protocol allows detection of contaminants below level deemed to pose health risks).

p. 3-30 The third bullet, Constituents to be Screened cites contaminants of interest to be heavy metals, explosives and volatiles. Semi-volatiles (explosive-degradation products) should also be listed.

p. 3-38 MAIN proposes a grid-spacing of 200-ft for the entire site, and 1 25-ft grid system for the burn areas. MAIN should elaborate on the application of these grid-networks to the RI. For instance, it is unclear if MAIN is actually proposing to sample soils at each 25 or 200-ft grid-point, and also what depth intervals are to be sampled.

p. 3-38 Section 3.6 Data Gaps and Data Needs - Comments on this section appear below:

Ground water

1. There is the need to assess hydrologic properties and quality of the ground water within the weathered shale layer to fully assess contaminant migration. Also, TNT-related compounds have a density greater than 1 gm/cm3 and thus have the potential to form NAPLs if present at concentrations of 10-percent of their limit of solubility, or more. Thus, there exists the potential for vertical migration of these compounds into the weathered bedrock layer.

2. There is the need to evaluate the physical condition of the existing monitoring wells prior to use. Well construction information should be sought for wells MW-1 through MW-7.

3. The analytical protocol must be broad enough to include analysis for all degradation-products of the explosives in question. It is recommended that a subset of all ground water samples be analyzed for the complete TCL/TAL.

4. There is a need to identify potential remedial technologies and the data needed to evaluate them. General response actions for ground water may include: extraction (collection), containment (subsurface barriers), in-situ treatment (bioremediation), and physical/chemical treatment. Data needs for collection/containment technologies include: hydrologic properties of the aquifer (transmissivity, storativity, hydraulic conductivity) and physical characteristics of the substratum (soil type, geology, grain size distribution). In-situ bioremediation technologies require an analysis of nutrient content (NH3, NO3, PO4 etc.), microbial populations, gross organic components (BOD, TOC), dissolved oxygen, pH, and temperature.

   Additional data needs to evaluate physical/chemical treatment processes include: specific conductance, total hardness, TDS, ammonia, cyanide, and iron.

Surface Water

1. The analytical protocol for surface water should be stated. Preferably, the complete TCL/TAL should be utilized, in addition to explosives (and degradation-products).

2. The need for surface water control technologies and the data needed to evaluate them should be identified. Technologies to establish control of runoff/drainage may include: berms/dikes, ditches/diversions, and chutes/downpipes. Data needs of these technologies may include: soil characteristics (permeability, type, atterburg limits), topography, and climate.

Soils

1. The analytical protocol for surface water should be stated. Preferably, the complete TCL/TAL should be utilized, in addition to explosives (and degradation-products).

2. The need to collect surface and subsurface soils to support risk assessment development should be stated.

3. Data needs of capping, excavation, in-situ treatment should be established. These may include: soil properties (gradation, atterburg limits, moisture content, compaction, permeability, strength), nutrient content (NH3, NO3, PO4 etc.), microbial populations, gross organic components (BOD, TOC), pH, temperature, soil porosity, and BTU content.

   The need for treatability studies to support alternative development for soils should be stated in the scoping document. Such studies may be required for alternatives involving: bioremediation, stabilization/ solidification, thermal treatment, vitrification, and/or soil washing/flushing techniques.

Biological

1. A complete analysis/inventory of flora/fauna and endangered species in the vicinity of the site is required.

O11E

Part B. Comments on the Closure of the Nine Burning Pads: Evaluation of Field Investigation

HYDROGEOLOGICAL INVESTIGATION

1. Based on the contours presented on Figure 3.3, and the water elevation data, it appears that ground water flow in the till layer has a strong easterly component with some localized flow to the north/northeast. Considering the variability observed in ground water flow patterns, the following observations are made. As indicated in Figure 3.1, Burning Pads A, B, and D each have a downgradient monitoring point within 100-ft of the pad (e.g., MW-16, MW-15, and MW-14, respectively); these wells are situated directly north/northeast of the pads and should be adequate to monitor releases from these pads. Burning Pads F, H, J, and G each have a downgradient monitoring well (e.g., MW-13, MW-9, MW-8, MW-11, respectively); however, these wells appear to be situated approximately 200-ft or more from the pads. Although MW-13 and MW-9 should be able to monitor the ground water quality in the vicinity of Pads F and H, respectively; given the greater than 200-ft distance of MW-8 and MW-11 from pads J and G, respectively, it is doubtful whether these wells will give any indication as to the current contaminant release rates from these pads. Burning Pads E and C have no designated monitoring point, or downgradient well situated within close proximity of the pad. Based on this analysis, it appears that pads A, B, D, F, and H are being adequately monitored by the current well network; however, it appears that burning pads C, E, G, and J are not being adequately monitored for releases.

2. An additional consideration regarding the existing well network relates to the fact that monitoring wells MW-8 through MW-17 are all screened within the glacial till which has a demonstrated low permeability and hydraulic conductivity (0.02 to 1.47 ft/day). This adds to the possibility that, given the distances of some of the downgradient monitoring points from the burning pads, it is possible that contaminants currently being released to the groundwater beneath each pad may not be detected in these wells. Again, this is especially the case for pads C, E, G, and J where the closest downgradient well (if present at all) is situated 200-ft or more from the pad.

3. It is recommended that, on the basis of sampling of soils within the pads during the RI, if high levels of contaminants are detected in

soils at a particular pad, the Army should consider installing an additional well beneath the pad, or immediately adjacent to and downgradient of that pad to monitor for releases. (Note- the risk assessment is supposed to evaluate risk associated with "worst-case" exposures; therefore, direct monitoring of ground water at each pad is required to determine the maximum contaminant levels associated with chemical leaching at each source.)

4. a. Another concern regarding the well placements relates directly to the site hydrogeology. The water table exists 3 to 6-ft below ground level. Ground water exists within a surficial (till) aquifer which is expected to yield only a small supply of water due to the low-permeability of the till (p.11). A bedrock aquifer unit lies directly beneath the till consisting of 2 to 4-ft of weather bedrock, overlying a competent shale (refer to Figure 3.2). The weathered bedrock layer appears to exist as a continuous layer throughout the OB grounds.

b. Monitoring wells MW-8 through MW-17 all have screens set within the till layer at the interface of the till and the weathered bedrock. Currently, no information has been provided regarding the hydraulic conductivity of this weathered bedrock layer. It is possible that there exists an equal or greater ground water flow within this weathered bedrock layer than the overlying low-permeability till. If this is the case, contaminants may migrate through the weathered bedrock layer and would not be detected by the current well network. Although, unlikely, it is also possible that the weathered bedrock layer may exhibit different flow characteristics than the overlying till. This could lead to the occurrence of alternate flow paths including flow to the south which could enable contaminants to migrate off of the SEAD property.

c. It is recommended that the Remedial Investigation of the OB grounds determine the hydrogeologic characteristics of the weathered bedrock layer. It is recommended that 2 to 3 wells be installed during the RI field program which are screened within the 2-4 ft weathered bedrock layer; if this is not feasible based on the minimal thickness of this layer, well screens should be placed such that they extend across the base of the till layer and the weathered bedrock layer and extend to the surface of the competent bedrock. Preferably, the shallow bedrock wells should be paired with existing wells at the site, and be installed along the eastern (downgradient) and western (upgradient) portion of the study area, and along the southern border of the facility (to monitor potential offsite

migration). Slug tests and/or pumping tests could be performed on these well installations to determine: properties of hydraulic conductivity, storativity, transmissivity and flow patterns of this layer, the existence of a vertical hydraulic gradient in the study area, and the presence of dense non-aqueous phase liquids (DNAPLs).

d. If, based on the results of the slug tests, water level measurements, and the results of chemical sampling; the weathered bedrock layer is demonstrated to have a lower hydraulic conductivity than the till, a downward vertical gradient is not present, and site-related contaminants are not detected, additional well placements within this layer may not be required.

5. Well construction information and drilling methods have not been provided for well MW-1 through MW-7 in the Closure Plan, or other available documents. This information should be researched and reviewed for these wells prior to their use in the RI, to assess compliance with Region II QA/QC requirements for well construction and drilling.

SOURCE CHARACTERIZATION

6. The Closure Plan states (p.5) that PEP and PEP-containing wastes have been disposed of at the OB/OD Grounds. These materials include: manufacturing wastes and residues, items in storage or manufacture which have failed QA tests, obsolete or out-of-date explosives, propellants and munitions, unsafe munitions and related wastes which have been contaminated with PEP during production, storage, and handling. Munitions destruction activities occurred in the OD grounds. The pads in the OB grounds were used to destroy ammunition, fuses, projectiles containing TNT, composition B explosives, and amatol. It is noted that the EM and magnetometry surveys revealed the presence of subsurface anomalies in the vicinity of pads A, B, C, D, E, G, and J.

a. Surface soil sampling was conducted by the Army during the Phase 2, Hazardous Waste Management Study No. 39-26-0147-83 (May 1982). Samples were analyzed for explosives and EP toxicity metals. The analysis revealed the presence of explosives in the berm soil and the top one-foot of pad soils, the detection of EP toxicity metals at deeper depths, and the presence of metals and explosives outside the bermed areas.

b. The above discussion suggests the following: (1) "manufacturing wastes" are not defined -therefore, there exists the possibility that waste material other than explosives may have been destroyed or deposited in these areas and contaminants other than explosive-degradation products, hydrocarbons and metals may be of concern: and (2) source areas may not be limited to the burning pads, but appear to extend beyond the limits of the pads and berms.

c. No sampling of surface or subsurface soils has been conducted during the most recent investigation; therefore, it appears that the characteristics of the sources have not been fully determined, nor have the limits of potential sources area been defined. It is recommended that the RI include extensive sampling of surface and subsurface soils in, and surrounding the pads to determine the presence of and lateral/vertical extent of the sources and/or "hot spots".

Other Sources

d. The Closure Plan states that the location of the 10 wells installed by M&E were chosen to monitor ground water at each of the 9 burning pads and other "known contaminant sources isolated in previous investigations" (p.16). These other "known" sources are not defined in the Closure Plan. These other sources should be researched during the review of background data during project scoping. Other sources, if present within the study area, will need to be characterized during the RI.

ANALYTICAL PROTOCOL

7. As stated previously, ground water samples were analyzed for: total recoverable metals, explosives (HMX, RMX, 2,4-DNT, 2,6-DNT, 2,4,6-TNT, PETN), petroleum hydrocarbons, pH, specific conductance, and temperature. Although certain metals were found to be slightly elevated above background (lead and chromium) and some explosive by-products were detected (PETN, 2,4,6-TNT), significant levels of contamination have not yet been detected in the ground water at the OB grounds. (Note- prior ground water data presented in the 1988 RFA were limited to sampling of MW-1 through MW-7; of these wells, only MW-5, MW-6, and MW-7 are located within the OB grounds. No trends regarding the presence of a plume were discernable from this data.)

8. Because there has been no sampling and analysis of source materials for the full Target Compound List (TCL) constituents (e.g. organics, pesticides/PCBs, cyanide), there is no way to assess whether the limited analytical protocol used above is adequate. A broader range of parameters (full TCL/TAL) should be included in subsequent investigations for at least a subset of surface soil, subsurface soils, and ground water samples (preferably those samples suspected of having the greatest level of contamination), to verify that the constituents of concern are limited to explosive-degradation products, metals, and petroleum hydrocarbons.

9. Prior studies in this area (RFA, August 1988) have also included analysis of ground water samples for gross alpha, gross beta, and radium-226. Although the levels detected did not exceed the National Priority Drinking Water Standards (NPDWS) for gross alpha activity or radium (note- beta particle activity requires analysis of mrem/yr, therefore exceedences have not been assessed), it is recommended that subsequent field programs conduct occasional monitoring for radionuclides (e.g., intermittent monitoring during invasive subsurface explorations).

GEOPHYSICAL INVESTIGATIONS

10. -The Geophysical Surveys provide valuable information which should be considered during project scoping. The shallow depth to bedrock in this area should make interpretation of survey data relatively easy, and subsequent "ground truthing" (test pitting, sampling and analysis) easy to accomplish.

-Two survey methods were utilized: electromagnetic (EM) conductivity and magnetometry. EM is useful for defining locations of plumes, locating buried metals, identifying bedrock fracture systems, mapping burial trenches, and defining lithology. Magnetometry is useful for identifying areas of anomalous magnetic strength that are rarely confused with natural sources (buried drums, cables, tanks, pipelines). -The surveys were designed to provide clearance for installing wells MW-8 through MW-17, therefore the survey areas were primarily limited to a 50 x 50-ft area in the vicinity of each proposed well location. As a result, the current survey data does not provide any useful information relating to plume locations or lithology, but rather gives a gross indication of the presence of buried metals within the surveyed locations. Also, the contour plot presented in Appendix A of the Closure Plan do not

encompass the burning pads themselves, and the survey areas are discontinuous throughout the site. The resulting plots are difficult to interpret because they are not superimposed onto site maps which illustrate key features (pads).

-**Data needs:** It is recommended that follow-up geophysics (electromagnetics, and magnetometry) utilize a single and continuous grid-network for the entire OB grounds study area. All results should then be presented on a single site-map for interpretation. This would enable the lateral limits of buried anomalies to be defined, and subsequent sampling programs to target these areas. EPA also recommends that the Army consider the use of ground-penetrating radar (GPR) techniques to further distinguish large buried metal objects identified by EM survey data.

RISK ASSESSMENT DATA NEEDS

11. Based on a review of the information provided in the Closure Plan, the following additional data is required to complete a risk assessment according to the "Risk Assessment Guidance for Superfund (RAGs), Volume I- Human Health Evaluation (Part A), Interim Final Version" (EPA 1989):

- sampling and analysis of all media within the study, including soils (surface and subsurface), ground water, surface water and sediments. Analysis should be conducted for TCL organics, inorganics, pesticides/PCBs for at least a subset of the samples for each media (requires Level III, IV or V data quality; CLP preferable).
- fate and transport must be defined for ground water flow within the surficial till aquifer and the lower weathered bedrock layer, and surface runoff must be defined.
- human/wildlife/sensitive environmental receptors must be defined, including location of private wells offsite to the south, wetland areas etc., all transport routes/ migration pathways should be established.

ENGINEERING/FS DATA NEEDS

12. To complete the FS according to the RI/FS Guidance under CERCLA (EPA 1988), the following types of information must be determined during the RI:

- the location and horizontal/vertical limits of all source area contamination (e.g., Volumes and Areas of Waste requiring treatment);
- the location, limits and composition of all ground water plumes.

The following types of engineering data may also be required to evaluate the types of technologies which may apply to soils and ground water at the OB grounds, in accordance the "Data Requirements for Remedial Action Technology Selection" (EPA/WR-5053, September 1986):

-Containment (Capping) - Soil Characteristics (gradation, atterburg limits, &-moisture, compaction, permeability, strength);
-Subsurface Containment - topography, seismic history, soil conditions/chemistry, ground water depth, direction and rate of flow, grain size distribution, compaction,permeability, % moisture, pH, sulfides, calcium;
-Excavation - extent of contamination, % soil moisture, waste characteristics;
-Ground water pumping - aquifer transmissivity, storativity, hydraulic conductivity contaminant solubility, soil type, grain size distribution;
-Biological Treatment - gross organic constituents (BOD, TOC), pH, temperature, nutrient balance (NH3, NO3, PO4), presence of toxins to microbes (phenols, cyanide), waste volume, heavy metals, soil type and permeability, microbial cell enumerations, dissolved oxygen.

PART C. TECHNICAL REVIEW - PROCUREMENT SCOPE OF WORK FOR THE RI/FS OF THE OPEN BURNING GROUNDS

SECTION C-1

The "Scope of Services for the Remedial Investigation /Feasibility Study at the Open Burning Grounds", Seneca Army Depot, Romulus, New York, has been reviewed for conformance with Appendix B (Elements of RI/FS Project Plans) and Appendix C (Model Statement of Work for Remedial Investigations and Feasibility Studies) of the RI/FS Guidance for CERCLA (May 1988).

General Comments

EPA Guidance identifies the following items which should be included in a Scope of Work (SOW) for an RI/FS program (EPA 1988, Appendix B & C). These include:

1) Purpose
2) Scope
   - Task 1 - Project Planning
   - Task 2 - Community Relations
   - Task 3 - Field Investigations
   - Task 4 - Sample Analysis/Validation
   - Task 5 - Data Evaluation
   - Task 6 - Risk Assessment
   - Task 7 - Treatability Studies
   - Task 8 - RI Report
   - Task 9 - Remedial Alternatives Development/Screening
   - Task 10- Detailed Analysis of Alternatives
   - Task 11- FS Reports

The following paragraphs briefly summarize the extent to which the SOW provides the information required for each item above.

1) **Purpose**

   Section 1.0 (General Statement of Services) of the SOW provides a brief introduction to the SOW. Section 2.0 (Objective) establishes the purpose of the SOW, as required by EPA Guidance. These introductory sections, however provide no description of or information (regulatory or otherwise) relating specifically to the Open Burning (OB) grounds. Rather, the information provided relates to the entire Seneca Army Deport (SEAD) Facility.

2) Scope

Section 3.0 (Detailed Description of Services) introduces the specific tasks associated with this RI/FS Program. This section fulfills Item #2 above "Scope", as required by the RI/FS Guidance. Comments on the individual tasks outlined in this section appear below.

Task 1 - Project Planning

Section 3.2 of the SOW directs the AE to conduct tasks related to project scoping, and to develop an RI/FS Project Scoping Document, and RI/FS Work Plan. Most project scoping tasks (i.e., development of a conceptual site model, preliminary determination of remedial alternatives and ARARs, formulation of data needs and data quality objectives) are included in the SOW. Minor deficiencies are noted below.

Task 1 requires that the review of background data include: (1) a local regional summary, (2) nature and extent of the problem, (3) history of regulatory and response actions, (4) and the preliminary site boundary (EPA 1988, Appendix C, p.C-3). The SOW does not specifically address items (3) and (4) above. Task 1 also requires that the contractor meet with EPA to discuss whether there is a need to conduct limited sampling to adequately scope the project, and/or the need for treatability studies. These items are not mentioned in the SOW.

Section 3.2 of the SOW specifies that RI/FS Work Plan shall include: a Health & Safety Plan (HSP), Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), Geophysical Investigation Plan, Soil Boring and Well Installation Plan, and a Community Relations Plan. In general, the specifications for these work plans appear to be appropriate; minor deficiencies are noted below regarding the HSP, QAPP, and the FSP:

Health & Safety Plan

In addition to OSHA 20 CFR 1910.120, EPA specifies that the Site Safety Plan address other references/requirements not cited in the SOW (EPA 1988, Appendix C, p.C-3). These include:

- U.S. EPA Order 1440.2 - Health & Safety Requirements for Employees Engaged in Field Activities
- U.S. EPA Order 1440.3 - Respiratory Protection
- U.S. EPA Occupational Health & Safety Manual
- U.S. EPA Interim Standard Operating Procedures*

* Note- EPA Standard Operating Procedures are available for: Site Entry (OSWER Dir. 9285.2-01), Decontamination (O. Dir. 9285.2-02), Air Surveillance (O. Dir. 9285.2-04), Work Zones (O. Dir. 9285.2-05), Site Safety Plans (O. Dir. 9285.3-01).

Quality Assurance Project Plan

Section 3.2.3.2 of the SOW does not direct the AE to develop the QAPP to conform with the "Region II CERCLA QA Manual", Final Copy, Rev.1 (October 1989), and/or the "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (QAMS-005/80, EPA 1980). The SOW should reference these Region II QA Manuals. Also, the QAPP format should be a stand-alone document which follows precisely the 16-point format cited in QAMS-005/80. Certain points have been omitted as indicated in the page-specific comments provided in Section 3.2 of this report.

Field Sampling Plan

Section 3.2.3.3 of the SOW does not specify that the AE must include within the FSP, an evaluation which explains what data are required to characterize the site, conduct a baseline risk assessment, and the support the evaluation of alternatives. Such an evaluation is required by (EPA 1988, Appendix C, p.C-3).

Task 2 - Community Relations

Section 3.2.4 of the SOW states that the Community Relations Plan (CRP) is presently being developed according to Appendix B, Task 2 of the RI/FS Guidance (EPA 1988). It is noted, however, that no details regarding: (1) the development of an information repository; or (2) preparation and dissemination of new releases, fact sheets, slide shows etc. are provided. It is assumed that such information will be incorporated into the CRP based on the above reference to EPA Guidance.

Task 3 - Field Investigations

Section 3.3.1 includes the following tasks under the general heading of Remedial Investigations:

Task A - Geophysical Survey
Task B - Drill Soil Borings
Task C - Surface Water Sampling

Task D - Surveying
Task E - Analysis of Soil Sampling
Task F - Collection and Analysis of ground water samples
Task G - Baseline Risk Assessment
Task H - Treatability Study Requirements Assessment

The following comments on this section are noted:

Section 3.3.1 of the SOW should only include specific field investigation tasks (e.g., Tasks A, B, C, D, and F). Also, the titles of the individual tasks do not adequately reflect what should be the objectives of the RI. For instance, regarding Task F, the RI must not only collect and analyze ground water samples but also determine: ground water flow characteristics, aquifer transmissivity and storativity, and hydraulic conductivity. A heading such as "Hydrogeological Investigation" would better reflect the nature of that component of the program than to state "Collection and Analysis of Ground Water Samples".

To further expand on the "Hydrogeological Investigation" for the OB grounds, it is noted that the ten monitoring wells installed during the most recent program all have screens set within the till layer at the interface of the till and the weathered bedrock. It is possible that ground water flow also exists within the weathered bedrock layer.

It is recommended that additional wells be installed and screened within the 2-4 ft weathered bedrock layer; if this is not feasible based on the minimal thickness of this layer, well screens should be placed such that they extend across the base of the till layer and the weathered bedrock layer, and extend to the surface of the competent bedrock. Slug and/or pump testing of these wells could be used to determine properties of hydraulic conductivity, storativity, transmissivity and flow patterns of the fractured bedrock, and to establish the presence or absence of a vertical hydraulic gradient in the area, and/or the presence of DNAPLs. It is noted that the SOW proposes no new well installations during the RI. (Note- well construction information and drilling methods should be reviewed for the existing wells prior to their use in the RI to assess compliance with Region II QA/QC requirements for well construction and drilling).

An additional consideration regarding the use of the existing wells during the RI is that it appears that burning pads C, E, G, and J are not being adequately monitored by the current well network. At some point in the RI, additional wells may need to be installed to monitor these pads, especially if soil sampling reveals high levels of contaminants in or surrounding these pads.

Section 3.3.1 of the SOW does not include certain tasks identified in the EPA guidance, and common to most RIs, including: procurement of subcontractors, mobilization, field screening activities, RI waste disposal, and task management (EPA 1988, Appendix B, p.B-2)

Task D Surveying should be identified prior to geophysical surveys and media sampling, as site surveys are usually conducted immediately following mobilization.

Tasks E and F which relate to analytical requirements should probably be placed in a different section under the heading "Sample Analysis/ Validation". EPA refers to this heading as Task 4 in the RI/FS Guidance (EPA 1988, Appendices B [p.B-2], and C [C-5]).

Task G "Baseline Risk Assessment" should not be included under the general heading of Remedial Investigation. EPA considers the Risk Assessment (RA) a separate entity (referred to as Task 6 - Assessment of Risks [EPA 1988, Appendices B [p.B-2], and C [p.C-5]).

Task H regarding the evaluation of the need for treatability studies is not considered an RI activity and should be relocated. Treatability studies should initially be considered during Task 1 Project Planning. If they are required, they should be identified as a separate task from the RI (EPA refers to this item as Task 7 -Treatability Testing/Pilot Studies, EPA 1988, Appendices B [p.B-3], and C [p.C-6]).

Task 4 - Sample Analysis/Validation

Section 3.3.1.2 of the SOW corresponds to EPA Task 4 (EPA 1988, Appendices B [p.B-3], and C [p.C-4]). The information provided relates primarily to cost estimates and contract negotiations. The following information is not discussed: development of a data management system including field logs, sample management and tracking procedures, document control for both laboratory data and field measurements to ensure that the data collected are of adequate quality and quantity to support the RA and the FS, data validation at the appropriate field or laboratory QC level.

Task 5 - Data Evaluation

The SOW includes no section entitled "Data Evaluation" nor any other section which includes the EPA-specified activities such as: data evaluation, reduction, and tabulation, and fate & transport modelling (EPA 1988, Appendices B [p.B-2], and C [p.C-5]).

Task 6 - Risk Assessment

Section 3.3.1.3 of the SOW discusses the Risk Assessment (RA). Numerous deficiencies were cited in this section which are included in the page-specific comments which follow. The primary concern relates to the fact that this section does not reflect the most recent EPA guidance manuals, including:

- Risk Assessment Guidance for Superfund (RAGS). Volume I, Human Health Evaluation Manual (Part A). Interim Final, December 1989. EPA/540/1-89/002.

- Superfund Exposure Assessment Manual. OSWER Directive 9285.5-1. U.S. EPA, April 1988.

Task 7 - Treatability Studies

Section 3.3.1.4 discusses Treatability Studies, however it is stated that the actual implementation of a "Treatability Study Concept Plan" is not a part of this SOW. EPA specifies that this component be included as a part of the SOW (EPA 1988, Appendices B [p.B-3], and C [p.C-6]); however, the SOW does specify that the AE evaluate the need for such studies, which may be adequate at this time.

Task 8 - RI Report

Section 3.3.3 of the SOW directs the AE to prepare a complete RI/FS Report. This approach is not consistent with EPA guidance which specifies the development of a separate RI and an FS report. Further, this section of the SOW does not specify the preparation of a preliminary site characterization report (EPA 1988, Appendix B [p.B-3], and C [p.C-6]).

Task 9 - Remedial Alternatives Development/Screening

Section 3.3.2 discusses the development of alternatives in the FS. The discussion provided in this section, however, do not provide an adequate breakdown of FS tasks. Refer to the page-specific comments provided in Section 3.2 of this report for a detailed list of FS tasks which should appear in the SOW, as a minimum.

Task 10 - Detailed Analysis of Alternatives

Section 3.3.2.2 of the SOW describes the analysis of alternatives. This discussion is not appropriate. The SOW should state, at a minimum, that each alternative will be evaluated based on the 9 criteria cited in Appendix C (EPA 1988, Appendix C, p.C-7, Task 10). These criteria are listed in the page-specific comments which follow.

Task 11- FS Reports

Section 3.3.3 of the SOW directs the AE to prepare a complete RI/FS Report. As stated previously, this approach is not consistent with EPA guidance which calls for a separate FS report (Appendix C, p.C-8). It is also noted that inadequate details have been provided on all aspects of the FS, including; the alternative development process and FS report preparation.

SECTION C-2
Page-Specific Comments for the Procurement Scope of Work

p. AG-1 **Site Background (1.1)** - this section provides general background for the entire SEAD facility, but no information on the specific units of concern. Sect 1.5 states the RI/FS applies to the open burning grounds; again no background on these units is given.

p. AG-1 **Regulatory Status (1.3)** - Section indicates all work for the entire SEAD facility is for compliance with CERCLA. No discussion is provided of status of OB grounds (i.e., do RCRA regulations also apply?).

P. AG-3 **Task 1 - Site Visit and Review Existing Data (3.2.1)** -Appendix C of the RI/FS Guidance requires that the review of background information include a "History of Regulatory and Response Actions" and a "Preliminary Site Boundary". These items should be included in this section.

p. AG-4 **Develop and Evaluate Preliminary Remedial Action Objectives and Alternatives** (3.2.2.3) - This section should state that Remedial Action Objectives (RAOs) will include: (1) the contaminants of concern, (2) exposure route(s) and receptor(s), and (3) a preliminary remediation goal.

p. AG-4 Section 3.2.2.3 - states "the choice of alternatives shall be based on proven effectiveness of the technology and the anticipated cost of implementation". The RI/FS Guidance states that the preliminary identification of remedial alternatives be "based upon the initially identified potential routes of exposure and associated receptors" (EPA 1988, p.2-7, 2.2.3).

Effectiveness and costs of technology should be evaluated during the FS; they are not to be considered at this stage.

p. AG-4 **Develop Data Needs and Data Quality Objectives** (3.2.2.5) - It is recommended that this section cite compliance with "Data Quality Objectives for Remedial Response Activities", Volumes I & II (OSWER Directive 9355.0-7B, EPA 1987).

p. AG-5 **Quality Assurance Project Plan** (3.2.3.2) - This section should cite conformance with the "Region II CERCLA QA Manual", Final Copy, Rev.1 (October 1989). Also, the QAPP format should be a stand-alone document which follows precisely the 16-point format cited in "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (QAMS-005/80, EPA 1980).

The SOW includes most of the elements in QAMS-005/80, however, a few items are missing and the numbering system is different. The 16-points identified in QAMS-005/80 are as follows:

1) Title Page
2) Table of Contents
3) Project Description
4) Project Organization and Responsibility
5) QA Objectives for Measurement Data in Terms of Precision, Accuracy, Completeness, Representativeness and Comparability
6) Sampling Procedures
7) Sample Custody
8) Calibration Procedures and Frequency
9) Analytical Procedures
10) Data Reduction, Validation, and Reporting
11) Internal Quality Control Checks
12) Performance and System Audits
13) Preventative Maintenance
14) Specific Routine Procedures Used to Assess Data precision, Accuracy, and Completeness
15) Corrective Action
16) Quality Assurance Reports to Management

p. AG-5 **Field Sampling Plan** (3.2.3.3) - This section should state that the sampling/drilling techniques discussed will be consistent with: (1) the "Region II QA Manual" (EPA 1980), and (2) "A Compendium of Superfund Field Operations Methods" (OSWER Directive 9355.0-14, EPA 1987).

EPA requires that the FSP contain an evaluation which explains what data are required to characterize the site, conduct a baseline risk assessment, and the support the evaluation of alternatives (EPA 1988, Appendix C, p.C-3). This is not stated in the SOW.

p. AG-6 **Soil Boring and Monitoring Well Installation Plan** (3.2.3.3.2) - The section proposes to install no new monitoring wells during the RI.

It is noted that the ten monitoring wells installed during the most recent program all have screens set within the till layer at the interface of the till and the weathered bedrock. It is possible that there also exists ground water flow within the weathered bedrock layer. This layer is not being monitored by the current system.

It is recommended that additional wells be installed and screened within the 2-4 ft weathered bedrock layer to determine: (1) ground water quality in this layer, (2) determine properties of hydraulic conductivity, storativity, transmissivity and flow patterns of the fractured bedrock, and (3) establish the vertical hydraulic gradient in the area.

p. AG-7 Task A - Geophysical Surveys (3.3.1.1.1) - This section states the "AE shall utilize a method of geophysical investigation capable of detecting buried metal and debris...to a depth of 15-ft." Section 3.2.3.3.1 previously stated that the objectives of the survey are to obtain information on the physical, subsurface conditions at the site, and to locate UXO prior to drilling.

If subsurface conditions are to defined during the geophysical work (i.e., bedrock contours established, lithology defined, etc.), 15-ft may not be an adequate depth for geophysical profiling. Also, further definition of the term "UXO" should be provided.

p. AG-7 Task D - Surveying (3.3.1.1.4) - A topographic survey and set-up of a site survey-grid should be completed at the beginning of the RI, and perhaps should be included as Task A. Following set-up the survey-grid, the locations of all sampling/survey points associated with the follow-up investigations (i.e., geophysics, well installations, etc.) can then be established relative to this site-wide grid network.

p. AG-8 Chemical Sampling and Analysis (3.3.1.2) - This section is intended to correspond to EPA Tasks 4 & 5 of Appendix B of the RI/FS Guidance (EPA, 1988). Information is provided

relative to cost estimates and contract negotiations. This information is not consistent with the EPA requirements for Task 4.

Task 4 of the guidance states "the contractor will develop a data management system including field logs, sample management and tracking procedures, and document control for both laboratory data and field measurements to ensure that the data collected are of adequate quality and quantity to support the risk assessment and the FS. Collected data should be validated at the appropriate field or laboratory QC level to determine whether it is appropriate for its intended use."

Data Quality Objectives for the program should be stated in this section. The DQO Guidance specifies Levels III, IV, and V data are required to support a risk assessment (EPA 1987, p.4-11, Table 4-3). Level IV CLP routine analytical services (RAS) is preferable for a risk assessment as it includes rigorous QA/QC protocol and documentation not included in Level III.

p. AG-8 Task E - Analysis of Soil Samples (3.3.1.2.1) - section proposes EP toxicity tests at sites that show a high metal content. The EP Toxicity test has been superseded by the RCRA Toxicity Characteristics Leaching Procedures (TCLP) analysis (March 27, 1990, Federal Register). It is recommended that the TCLP protocol replace the EP Toxicity protocol.

p. AG-8 Task F - Collection and Analysis of Ground Water Samples - An RI must not only collect samples but also determine: ground water flow characteristics, aquifer transmissivity and storativity, hydraulic conductivity etc. It is recommended that the title of this section be changed to read "Hydrogeological Investigation", and incorporate these other items as objectives.

p. AG-9 Task G - Baseline Risk Assessment (3.3.1.3) - This sections states that "The Risk Assessment Report shall be prepared using the guidance presented in the RI/FS Guidance Manual and, as a minimum, contain a baseline risk assessment, an exposure assessment, and a standards analysis." This discussion is inadequate. The following points are noted:

1.) The Risk Assessment should be prepared in accordance with the following EPA manuals, at a minimum:

- Risk Assessment Guidance for Superfund (RAGS). Volume I, Human Health Evaluation Manual (Part A). Interim Final, December 1989. EPA/540/1-89/002.

- Superfund Exposure Assessment Manual. OSWER Directive 9285.5-1. U.S. EPA, April 1988.

2.) In accordance with Task 6 of the RI/FS Guidance, and RAGS (EPA 1989), the above sentence should state that the risk assessment will involve four components: contaminant identification, exposure assessment, toxicity assessment, and a risk characterization

3.) What is meant by a "standards analysis"? If this is referring to an ARARs analysis, that should be stated. Further, an ARARs analysis is not an intrinsic component of the risk assessment, but rather is an activity which should be conducted in a preliminary fashion in the RI/FS Work Plan, addressed further in the RI report, and then finalized during the FS.

It is noted that toxicological (dose-response) data should be gathered during the "toxicity assessment".

p. AG-9 **Identification of Contaminants of Concern** (3.3.1.3.1) - Selecting COCs is no longer a mandatory requirement of a risk assessment. Further, RAGs states that the number of chemicals to be evaluated in the risk assessment should only be reduced in cases where there is such a large number of chemicals detected at the site that the RA will be difficult to read and understand (RAGS, p.5-20, 5.9).

If contaminant reduction is to be attempted by the contractor, RAGS cites 8 activities which must first be conducted. These include:

1) consult with RPM;
2) consider procedure for documenting rationale;
3) examine historical information;
4) consider concentration and toxicity of chemicals;

5) examine chemical mobility, persistence, and bioaccumulation potential;
6) consider special exposure routes;
7) consider treatability of chemicals;
8) examine ARARs; and
9) examine the need for the procedures (e.g. is contaminant reduction necessary?).

P. AG-10 **Toxicity Assessment** (3.3.1.3.3) - The information provided in the section is incorrect as it directs the AE to compare exposure levels to acceptable contaminant levels (ARARs and TBCs).

According to Task 6 of the RI/FS Guidance, the toxicity assessment "will involve an assessment of the types of adverse health or environmental effects associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity (e.g. weight of evidence for carcinogenicity (EPA 1988, p.C-5, Task 6).

It is noted that a comparison of exposure levels to ARARs is not a toxicological assessment (also known as a "dose-response assessment"). An ARARs/TBCs analysis identifies state and federal chemical standards and guidelines (i.e., MCLs, etc.), as opposed to a toxicological assessment which identifies dose/response data (i.e., carcinogenic potency factors, chronic reference doses for noncarcinogenic effects, etc.). Refer to Chapter 7 of RAGs (EPA 1989) for a comprehensive description of a toxicity assessment.

p. AG-10 **Risk Characterization** (3.3.1.3.4) - The information provided throughout this description is inaccurate. The following points are noted:

1) The first sentence should state that the risk characterization will "integrate information developed during the exposure and toxicity assessments to characterize the current or potential [e.g. future] risk to human health and/or the environment posed by the site" (EPA 1988, p.C-5, Task 6).

2) The statement that the characterization will include a summary of exposure routes for COCs, and distribution of risk

across various sectors of the population requires further explanation.

Note that is acceptable policy to evaluate carcinogenic and noncarcinogenic risks to children, teenagers, and adults independently; and with regard to carcinogenicity to evaluate the lifetime risk of an individual (combining all three risk estimates). Is this the type of activity being referred to in the statement regarding risk evaluation "across various sectors of the population"?

3) All areas of "uncertainty" associated with the risk assessment must be fully explained in the final discussion of risk assessment results. It is recommended that a separate section be provided for this purpose.

p. AG-10 Propose ARARs and TBC Requirements (3.3.1.3.5) - ARARs/ TBCs are to be identified during project scoping, summarized in the RI Report, and utilized in the FS where appropriate. RAGs, however does not require an analysis of ARARs/TBCs in the risk assessment, nor is it a fundamental component of the RA process.

p. AG-11 Identify and Evaluate Alternative Remedial Actions (3.3.2.2) - The description provided in this section does not adequately discuss the alternative development process. In accordance with the RI/FS Guidance (p. C-6, Task 9; p.p.4-3, 4.1.2.1), the following key steps must be cited:

1) develop remedial action objectives (RAOs) specifying contaminants and media of interest, exposure pathways, and preliminary remediation goals;

2) identify general response actions (GRAs) for each medium of interest (i.e., containment, treatment, etc.), to satisfy RAOs;

3) identify volumes or areas or media to which GRAs apply;

4) identify and screen technologies and process options associated with each GRA on the basis of technical implementability;

5) identify and evaluate technology process options on the basis of effectiveness, implementability, and cost;

6) assemble representative process options into a range of treatment and containment alternatives, as appropriate;

7) provide the following types of information for each technology used in an alternative:

- size and configuration of onsite extraction and treatment systems or containment structures;
- time frame in which treatment, containment, or removal goals can be achieved;
- rates or flows of treatment;
- spatial requirements for constructing treatment or containment technologies or for staging excavation or construction material;
- distance for disposal technologies; and
- required permits for offsite actions and imposed limitations.

8) screen alternatives on the basis of effectiveness, implementability, and cost;

9) conduct detailed analysis of remaining alternatives on the basis of:

- overall protection of human health and the environment;
- compliance with ARARs;
- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume;
- short-term effectiveness;
- implementability;
- cost;
- state acceptance; and
- community acceptance.

10) conduct comparative analysis of alternatives based on the 9 criteria cited above.

p. AG-12 Section 5.0 **Safety Requirements** - This section of the SOW includes all the major elements cited in OSHA 29 CFR 1910.120. It is recommended, however that the SOW state in paragraph 1 that the AE must develop the Site-Specific Safety and Health Plan in accordance with:

- 29 CFR 1910.120, Federal register, Vol. 54, No. 42, March 6, 1989, Hazardous Waste Operations and Emergency Response (OSHA); and
- The Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH/OSHA/ USCG/EPA), October 1985.

p. AG-21 **Hazard Assessment and Risk Analysis** (5.4) - It is recommended that the following references be cited in this section with regard to the identification of chemical health hazards and the selection of action levels for respiratory protection:

- NIOSH Pocket Guide to Chemical Hazards, U.S. Dept. of Health and Human Services, February 1987; and
- Threshold Limit Values and Biological Exposure Indices for 1988-1989 (ACGIH, 1988).

This section should also identify the need to monitor for established action levels for radionuclides, and discuss the hazards associated with potentially-explosive material.

p. AG-22 **Training** (5.6) - This section should identify the minimum levels of training specified in OSHA 29 CFR 1910.120 (e)(2,3), including 40-hrs of initial instruction for all employees, and a minimum of 8 additional-hrs for supervisory personnel. In addition, section (e)(7) of the regulations specifies that employees must also be trained in how to respond to expected emergencies. Such emergencies at the OB grounds may involve contact with potentially explosive material and/or radionuclides.

p. AG-26 **Chemical Data and Laboratory Requirements** - This section should cite conformance with the "Region II CERCLA QA Manual", Final Copy, Rev.1 (October 1989). Further, the laboratory requirements, QA requirements, and data reporting requirements should be outlined in the QAPP, which should follow the 16-point format cited in "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans" (QAMS-005/80, EPA 1980).

Note - with regard to laboratory selection, performance samples may need to be submitted to Region II to verify the precision and accuracy of the laboratory protocol.

Jim for the file

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233 -7010

Thomas C. Jorling
Commissioner

FEB 2 1 1991

Mail 2-21
25 Feb 91

Mr. Randall Battaglia
Environmental Coordinator
Department of the Army
Seneca Army Depot
Romulus, NY 14541

Dear Mr. Battaglia:

Re: Seneca Army Depot Site NY ID No. 850006
RI/FS Scoping Document for Open Burning/
Open Detonation Grounds (OB/OD)

The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have reviewed the above document and provide the following comments:

1. The entire report has identified explosives with their acronyms or abbreviations. It would be easier for the readers if these compounds are included in the list of acronyms and abbreviations and their complete chemical names be given.

2. Table 3. For explosives, detection limits are not available (NA), however it is observed that 46 samples are listed as exceeding detection limits. This apparent anomaly should be explained.

3. Tables 3 thru 5. These tables use ND in their notation yet ND is undefined. Presumably it means not detected, however, it should be defined especially in light of the anomaly above. BDL is defined as below detection limit. Are BDL and ND the same?

4. Section 3.1.3.1 - The Groundwater Summary and Conclusions: This summary should acknowledge the limitations of the prior studies. These include the following:

   a) The previous groundwater investigation was based on wells screened exclusively in the shallow glacial till layer. It is possible that the contaminants may have migrated over time through the till and may exist in the weathered shale layer.

   b) The RI/FS needs to identify what chemicals are formed when explosives 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, tetryl, RDX, AMX are discharged. The products formed from the discharge of these explosives need to be included in the list of analytes proposed for the RI/FS study. The full Target Compound List (TCL) and Target Analyte List (TAL)(metals) should be considered for use.

5. Section 3.1.3.2, paragraph 5 states "In summary, a substantial sampling and analysis effort has been undertaken by the U.S. Army over the last several years. Although environmentally present, both the concentration and number of samples which detected exposives and heavy metals have failed to indicate that a substantial environmental problem exists at the site."

This statement appears inappropriate as the potential for contamination with explosives and/or metals has been demonstrated at Pads F, B, and H. No data is available for soils beneath Pads A, C, D, E, G or J (refer to previous paragraph). No analysis for explosive degradation products has been conducted.

It appears that additional analysis of surface/subsurface soils and of the berms associated with the pads for a broader range of parameters including: Target Analyte List (TAL)(metals), and full TCL, is required before conclusions regarding the existence of contamination at these pads can be made.

6. The RI/FS needs to expand upon Section 3.2.4 of the scope of work to demonstrate that ingestion of groundwater is not a route of human exposure of concern at this site. Groundwater samples collected from on-site monitoring wells contained levels of contaminants above NYSDOH Part 5-1 drinking water standards. The RI/FS needs to address the potential impact of the contaminated groundwater on residential wells in the vicinity of the OB areas.

7. This document has very little information on how natural ecosystems on or off site will be evaluated. A Habitat Based Assessment should be performed (a copy enclosed). Initially, only Steps I and III should be performed. After Steps I and III are performed and evaluated, a recommendation should be made whether it is appropriate to complete Steps II and IV. Though the document recommends (P3-4) fish tissue sampling to evaluate the possible exposure due to ingestion of contaminated fish, this seems premature since it is not known whether fish habitats have been contaminated. The decision to do fish tissue sampling should be reserved until Steps I and III have been completed.

8. To help assess the potential for fish and wildlife exposure due to the migration of contaminants off site through Reeder Creek, sediment samples from Reeder Creek and its collection streams will need to be collected. The sediment sampling is needed since many of the contaminants of concern at this site have low solubility and high bioaccumulation factors. This sampling is in addition to the proposed surface water samples.

9. Habitats that can be anticipated to have contaminated sediments will need to be evaluated for their potential or actual impacts on natural resources. The procedures in the document "Sediment Criteria - December 1989" should be utilized for this evaluation. A copy is enclosed.

10. To interpret the significance of chemical analyses of water and sediments on fish and wildlife resources, it will be necessary to have hardness and total organic data respectively.

11. The evaluations required to determine impacts on natural resources should be performed by an individual(s) experienced to do so.

12. The RI/FS must include a section for the protection of the community. This section is intended to ensure that there is no release of harmful levels of contaminants to the community as a result of on-site field activities. Whenever field activities occur at the site, there must be continuous real-time monitoring conducted for volatile organic compounds (VOCs) and particulates at the downwind site perimeter. If the level of VOCs at the downwind site perimeter exceeds 5 ppm above background levels measured upwind from the work area, then all activities must be stopped and corrective measures implemented to control the source of the release. If the level of airborne particulates at the downwind site perimeter exceeds the action level of 150 $\mu g/m^3$ that is established in the New York State Department of Environmental Conservation Technical and Administrative Guidance Memorandum entitled "Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites", then all work activities must be stopped and corrective measures implemented to control the release of the airborne particulates. Particulate monitoring is especially important since surficial soils have been shown to contain elevated levels of metals.

13. P3-18. Section 3.4.2.1 discusses potential ARARs. The following should also be added as potential ARARs.

- The standards and guidance values contained in NYSDEC DOW TOGS 1.1.1 (9/90) must be included as ARARs. Tables and references to water quality criteria should be corrected accordingly (many corrections are necessary).

- Article 1 ECL Declaration of Policy
- Article 3 ECL Department of Environmental Conservation; General Functions, Powers, Duties and Jurisdiction
- Article 15 Title 5 ECL Protection of Water
- 6 NYCRR Part 701 Classifications and Standards of Quality and Purity
- 6 NYCRR Part 608 Use and Protection of Waters

14. P3-18. Section 3.4.2.2 discusses potential items to be considered (TBCs). The following 2 items should be listed as TBCs.

- Habitat Based Assessment
- Sediment Criteria - December 1989

If you have any questions, please give me a call at (518) 457-3976.

Sincerely,

Kamal Gupta

Kamal Gupta
Federal Projects Section
Bureau of Eastern Remedial Action
Division of Hazardous Waste Remediation

cc: G. Kittal, SEAD
M. Martinez, USEPA, Region II
R. Tramontano, NYSDOH, Albany

DRAFT

TO: Regional Hazardous Waste Engineers, Bureau Directors, Section Heads and Regional Supervisors of Natural Resources

FROM: Michael J. O'Toole, Jr., Director, Division of Hazardous Wase Remediation and Kenneth Wich, Director, Division of Fish and Wildlife

SUBJECT: DIVISION TECHNICAL AND ADMINISTRATIVE GUIDANCE MEMORANDUM (TAGM): HABITAT BASED ASSESSMENT. GUIDANCE DOCUMENT FOR CONDUCTING ENVIRONMENTAL RISK ASSESSMENTS AT HAZARDOUS WASTE SITES

DATE: December 28, 1989

Background- State and Federal laws and regulations establish the basis for the evaluation of the threat to human health and environment from inactive hazardous waste sites. The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), was established to ensure that threats to public health, welfare, or the environment would be appropriately evaluated. In order that remediation of sites would meet the requirements of sections 121(b)(1) and (d) of CERCLA, the EPA developed several guidance documents: Guidance on Remedial Investigations Under CERCLA. Superfund Public Health Evaluation Manual. Guidance on Feasibility Studies Under CERCLA and most recently, Risk Assessment Guidance For Superfund--Environmental Evaluation Manual and the Human Health Evaluation Manual.

The New York State Environmental Conservation Law Article 27 Section 1313 establishes Department responsibilities for the identification and remediation of inactive hazardous waste sites for the protection of human health and environment. The remediation process is an interdivisional review process established to insure that the potential threat of releases from hazardous waste sites are identified. The Division of Fish and Wildlife is responsible for the evaluation of threat to fish and wildlife populations within this process. In order to adequately predict and identify site specific risks, the Division in association with the Division of Hazardous Waste Remediation has established the following guidance document based upon the above noted EPA guidance.

Please review this proposed TAGM and provide comments no later than Janurary 26, 1989 to Jack Cooper c/o Bureau of Environmental Protection, Division of Fish and Wildlife, 50 Wolf Road, Albany, New York 12233, area code (518)457-1769.

Introduction- This Habitat Based Assessment(HBA) provides guidance for the characterization of the fish and wildlife values and threats at hazardous waste sites being

considered for remediation. This evaluation involves a stepwise approach: 1)description of the existing environment with respect to fish and wildlife species and habitats, 2)identification of existing hazards to fish and wildlife,
3)analysis of potential risk to fish and wildlife, 4)the evaluation of proposed remedial measures and 5)development of a monitoring plan.

Objectives of the Habitat Based Assessment-

1. Provide a proper characterization of the existing ecological values of the site and the identification of habitats which may be located within the pathways of contamination
2. Identify the types of fish and wildlife receptors that would utilize these habitats
3. Evaluate the potential acute, chronic or bioaccumulation affects expected from site contaminants
4. Identify areas where further sampling is needed; ie, bioassay or tissue sampling
5. Evaluate proposed remedial alternatives to determine the extent of protection afforded the environment

Step I

"A Description of the Existing Environment"

A. Site description-the Remedial Investigation/Feasibility Study (RI/FS) report should include a description of the existing ecology of the site and the adjacent off-site areas which could be affected by contaminants. The RI/FS should describe the natural resources associated with the site in terms of the vegetative covertypes and their associated fish and wildlife populations(within 0.5 mile radius). Include Significant habitats, wetlands, regulated streams, lakes, other resources of significance within a minimum 2 mile radius and downstream of the site a minimum of 9 miles.

1. Covertype Map(within 0.5 mile radius of site)
-format: use NYS Natural Heritage covertypes,
-methods: aerial photos, groundlevel photos, USGS topo maps, soils maps, followed by ground truthing,
-include: major vegetative communities, wetlands, aquatic habitats, significant habitats (important spawning areas, rookeries, areas of special concern, etc., -verification: conduct limited field checking to verify covertype accuracy and vegetative species

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2. Identification of Special Resources(within a 2 mile radius of site and within 9 miles downstream)
-regulated wetlands, streams, lakes, significant habitats, endangered species, wild and scenic rivers
-use file information from the Department of Environmental Conservation, USFWS, EPA, local bird clubs, colleges or other sources (SEE APPENDIX A)

3. Habitat description/value
-major vegetative communities, typical vegetative species, and general densities within terrestrial, wetland and aquatic habitats. Within aquatic habitats, the chemical and physical parameters should be discussed (water chemistry, temperature, DO, depth, substrate, flows, gradient, submergent vegetation, among others)

B. Resource Characterization-

1. Associate the fish and wildlife species that would utilize the habitats shown on the covertype map
-methods: contact with NYS Department of Environmental Conservation Central and Regional Offices, US Fish and Wildlife Service, local bird clubs, colleges, standard natural history references (SEE APPENDIX B)

2. Consider the general quality of the habitat in providing the needs of organisms
-methods: contact with NYS Department of Environmental Conservation Central and Regional Offices, US Fish and Wildlife Service, local bird clubs, colleges, standard natural history references
-collect chemical and physical water quality data such as pH, alkalinity, hardness, temperature, DO.
-when little background data is known about the site a reconnaissance survey will be necessary (can be conducted during the covertype verification).
(SEE APPENDIX A)

3. Consider existing stress caused by the hazardous waste site
-areas of stressed vegetation, leachate seeps, fish and wildlife mortality, known population impacts

C. Hazard Threshold Identification

1. Identify the fish and wildlife related Applicable or Relevant and Appropriate Requirements (ARARs) and To Be Considereds (TBCs)
-Freshwater wetlands Act and implementing regulations (Article 24 ECL, 6NYCRR Part 663 and Part 664): a) describe how the remedial action

alternative meets the permit issuance standards included in Part 663, b) show all regulated wetlands on the site and downgradient of the site(within 2 mile radius minimum), c) include classification, d) include location on the covertype map (boundaries should be delineated by Regional Fish and Wildlife Staff)
-Tidal Wetlands Act (Chapter 10 of 6NYCRR Part 661)
-Regulated streams (Article 15 ECL, 6NYCRR Part 608): a) describe how the remedial action plan meets the permit issuance standards in Part 608, b) show location and classification of all streams on site and downgradient of site(within 5 miles downstream minimum), c) include aquatic resources (fisheries), d) show location on covertype map
-Navigable waterbodies (Article 15 ECL, 6NYCRR Part 608): same as above
-Coastal Zone Significant fish and wildlife habitats: show locations on covertype map
-Significant habitats as shown by Natural Heritage Program (show locations on covertype map)
-Wild, Scenic and Recreational Rivers Act
-Rare, endangered or threatened plant and animal species
-NYS Water Quality Standards/Guidance values (6NYCRR Part 701 and TOGS 1.1.1);application of the sediment criteria formula based upon AWQS/GV above should be used to establish "clean-up levels" for contaminated sediments
-Toxicity information from literature reviews(use where no standards or guidance values exist)

2. Exceedance of established limits or mandated standards established in regulations, or guidances (above) should "trigger" the need for more evaluation as indicated in Step II.

STEP II

"Hazard Identification"

If any phase of the RI/FS study indicates potential contaminant migration into the habitats identified in the "Step I HBA", and indicates that "hazard thresholds" are exceeded, then more involved studies must be conducted to determine if the contaminants pose a significant threat to the fish and wildlife receptors which utilize the habitat.

A. Specific objectives for additional studies:

1. determine the concentration of site contaminants found in the tissues of aquatic or terrestrial organisms on the site

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2. determine the concentration of site contaminants found in vegetation which is consumed by fish and wildlife receptors
3. determine the toxicity (acute and chronic) of contaminants found on the site to fish and wildlife species utilizing the site (prey or predator species)
4. determine the effect of site contamination upon habitat suitability to species utilizing the site
5. determine the impact of site contamination upon the use or consumption of fish and wildlife by humans (recreational, commercial, aesthetic, etc.)

B. Investigative Approaches (SEE APPENDIX B)

1. Tissue sampling and analysis, bioaccumulation studies supported by chemical analysis of various media, hydrogeological modelling and environmental fate modelling, comparison with FDA advisories

2. In situ toxicity tests, laboratory toxicity tests using various on and off-site media, chemical analyses of various media compared with standards and criteria when available, documentation of past fish and wildlife mortality events, collection of specimens for histopathology studies

3. Collection of population density, diversity or species richness data and calculate biotic index for macroinvertebrates to determine impact of contaminants on long term fish and wildlife use of the site relative to control areas or expected occurrence

4. Characterization of expected or potential use that would be made of the fish and wildlife resources within the site and direct off-site areas; ie. trapping, hunting, fishing, birdwatching, commercial fishery, etc, determine how the site contamination has affected these uses

5. Literature search of existing contaminant specific toxicity data on the fish and wildlife species known or expected to inhabit the site

STEP III

"Impact Analysis"

A. Risk Assessment-this assessment should be conducted regardless of whether or not a Step II is completed.

Information outlined in Step I and/or Step II of the Habitat Based Assessment will be utilized to evaluate the potential risk that contaminants pose to the resident and migratory fish and wildlife receptors using the site. This assessment will allow the consultant/PRP and/or the reviewing agency to make quicker and more informed decisions on the potential threat to the environment.

The assessment of risk to fish and wildlife should include the following:
-Toxic affect; acute, chronic and subacute
- bioaccumulation of site contaminants
- population affects, reduction in diversity, numbers, long term population trends, vigor
- reduction in use of habitats
- reduction in recreational use of fish and wildlife
- threat to upper level consumers both human and other fish and wildlife

B. Mitigation-relates to the methods used to minimize, reduce or eliminate project related impacts or compensate for habitat destruction via the creation of new habitat of equal value.

1. Toxicity related
   - pump and treat, biotreatment, chemical or physical reactions
2. Habitat related
   - create new habitat of equal quality and quantity to compensate for lost or degraded habitat
   - improve existing habitat to increase carrying capacity
   - must be developed on a site specific basis
   - must comply with statutory mandates (ECL and regulations)

3. Construction related
   - involves siltation and erosion controls
   - temporary seeding
   - creating limited work zones
   - limiting construction to avoid critical times
   - applying site specific conditions on construction
   - other site specific protective conditions

C. Assess future risk to fish and wildlife
-with and without remediation include both direct and indirect impacts on fish and wildlife
-evaluate effectiveness of mitigation measures

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-determine reduction in toxic effects, threat to upper level consumers or changes in: population densities, habitat use and recreational use
-assess construction related impacts

STEP IV
"Monitoring"

A. Develop monitoring plan with specific objectives
- determine long term effectiveness of remediation
- determine if contaminants are remaining at levels protective of fish and wildlife
- determine long term response of fish and wildlife species to clean-up
- effectiveness of mitigation features
- other site specific issues

B. Parameters which may be evaluated during monitoring
-tissue sampling
- water and sediment sampling
- population monitoring (long term trends)
- toxicity tests or biomonitoring

C. Establish "Red Flags" to alert to potential problems and establish a chain of command for handling the situation

ATTACHMENT
cc: N. Sullivan
D. Markell
A. DeBarbieri
C. Goddard
E. McCandless
R. Tramontano, DOH
A. Fossa
J. Kelleher
J. Colquhoun
M. Keenan
D. Ritter
Regional Directors
Regional Engineers
Regional Solid and Hazardous Waste Engineers
Regional Citizen Participation Specialists

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APPENDIX A

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
ENVIRONMENTAL RESOURCE INFORMATION SOURCES

A. SIGNIFICANT HABITATS PROGRAM AND NATURAL HERITAGE PROGRAM FILE INFORMATION:

STATEWIDE REQUESTS

Requests for data from the New York Natural Heritage Program and the Significant Habitat Program are now being consolidated. When requesting information from our files, please include a brief description of the proposed project and a photocopy of the appropriate topographic quadrangle(s) with the site or sites identified. All requests should be addressed as follows:

ATTN: Information Services
Significant Habitat Unit
NYS Dept. of Environmental Conservation
Wildlife Resources Center
Delmar, New York 12054-9767

REGIONAL REQUESTS

REGION 1 (Nassau, Suffolk Counties)

NYS Department of Environmental Conservation
Region 1
SUNY Campus, Building 40
Stony Brook, New York 11794

CONTACT PERSON: Mike Schieble

REGION 2 (New York City)

NYS Department of Environmental Conservation
Region 2
Hunters Point Plaza
47-40 21st Street
Long Island City, New York 11101

CONTACT PERSON: Joe Pane

REGION 3 (Dutchess, Orange, Putnam, Rockland, Sullivan, Ulster, and Westchester Counties)

NYS Department of Environmental Conservation
Region 3
21 South Putt Corners road
New Paltz, New York 12561

CONTACT PERSON: Bill Rudge

REGION 4 (Albany, Columbia, Delaware, Greene, Montgomery, Otsego, Rensselaer, Schenectady, and Schoharie Counties)

NYS Department of Environmental Conservation
Region 4
2176 Guilderland, Avenue
Schenectady, New York 12306

NYS Department of Environmental Conservation
Region 4
Route 10 - Jefferson Road
Stamford, New York 12167

CONTACT PEOPLE: Bill Sharrick - Schenectady
Nate Tripp - Stamford

REGION 5 (Clinton, Essex, Franklin, Fulton, Hamilton, Saratoga, Warren and Washington Counties)

NYS Department of Environmental Conservation
Region 5
Route 86
Raybrook, New York 12977

NYS Department of Environmental Conservation
Region 5
Box 220
Hudson Street Extension
Warrensburg, New York 12885

CONTACT PEOPLE: Al Koechlein - Warrensburg
Ken Kogut - Ray Brook

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REGION 6 (Herkimer, Jefferson, Lewis, Oneida, and St. Lawrence Counties)

NYS Department of Environmental Conservation
Region 6
State Office Building
Watertown, New York 13601

NYS Department of Environmental Conservation
Region 6
State Office Building
207 Genesee Street
Utica, New York 13503

CONTACT PEOPLE: Lee Chamberlaine - Watertown
John Page - Utica

REGION 7 (Broome, Cayuga, Chenango, Cortland, Madison, Onondaga, Oswego, Tioga and Tompkins Counties)

NYS Department of Environmental Conservation
Region 7
615 Erie Boulevard West
Syracuse, New York 13204-2004

NYS Department of Environmental Conservation
Region 7
P.O. Box 5170
Fisher Avenue
Cortland, New York 13045

CONTACT PEOPLE: Ray Nolan - Cortland
Joanne March - Syracuse

REGION 8 (Chemung, Genesee, Livingston, Monroe, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne, and Yates Counties)

NYS Department of Environmental Conservation
Region 8
6274 East Avon-Lima Road
Avon, New York 14414

CONTACT PERSON: Dave Woodruff

REGION 9 (Allegany, Chattaraugus, Erie, Niagara, Wyoming, and Chautauqua)

NYS Department of Environmental Conservation
Region 9
600 Delaware Avenue
Buffalo, New York 14202

NYS Department of Environmental Conservation
Region 9
128 South Street
Olean, New York 14760

CONTACT PEOPLE: Tom Jurczak - Olean
Mark Kandel - Buffalo

B. GENERAL FISH AND WILDLIFE INFORMATION REQUESTS

STATEWIDE REQUESTS

Division of Fish and Wildlife
Central Office
50 Wolf Road
Albany, New York 12233-4756

Delmar Wildlife Resource Center
Game Farm Road
Delmar, New York 12054

New York State
Department of Environmental Conservation
Habitat Inventory Unit
700-Troy Schenectady Road
Latham, New York 12110

REGIONAL INFORMATION REQUESTS

(Mailing Addresses Listed Above)

REGION 1

Supervisor of Natural Resources - Frank Panek
Wildlife Manager - Harry Knoch
Fisheries Manager - Frank Panek
Supervisor of Regulatory Affairs
(Wetlands and Stream Permit
Information) - Robert Greene

REGION 2

Supervisor of Natural Resources -	Joe Pane (Acting)
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Barbara Rinaldi

REGION 3

Supervisor of Natural Resources -	Bruce MacMillan
Wildlife Manager -	Glenn Cole
Fisheries Manager -	Wanye Elliot
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Ralph Manna

REGION 4

Supervisor of Natural Resources -	John Renkavinsky
Wildlife Manager -	Quentin VanNortwick
Fisheries Manager -	Russ Fieldhouse
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	William Clarke

REGION 5

Supervisor of Natural Resources -	Terry Healey
Wildlife Manager -	Robert Inslerman
Fisheries Manager -	Larry Strait
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Richard Wild

REGION 6

Supervisor of Natural Resources -	Leigh Blake
Wildlife Manager -	Dennis Faulknham
Fisheries Manager -	Al Schiavone
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Randy Vaas

REGION 7

Supervisor of Natural Resources -	Bradley Griffin
Wildlife Manager -	John Proud
Fisheries Manager -	Cliff Creech
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Allan Coburn

REGION 8

Supervisor of Natural Resources -	Edward Holmes
Wildlife Manager -	Lawrence Myers
Fisheries Manager -	Carl Widmer
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Al Butkas

REGION 9

Supervisor of Natural Resources -	Lawrence Nelson
Wildlife Manager -	Terry Moore
Fisheries Manager -	Steve Mooradian
Supervisor of Regulatory Affairs (Wetlands and Stream Permit Information) -	Steven Doleski

C. REQUESTS FOR OBSERVED EFFECTS INFORMATION

Fish Kills, Associated Bioassays - NYSDEC Region 1 and 2:

Fish Manager - Region 1

Fish Kills, Associated Bioassays - NYSDEC Regions 3-6:

Environmental Disturbance Investigation Unit
New York State Department of Environmental Conservation
Hale Creek Field Station
7235 Steele Avenue Extension, R.D. #2
Gloversville, New York 12078

Fish Kills, Associated Bioassays - NYSDEC Regions 7, 8, and 9:

Environmental Disturbance Investigation Unit
New York State Department of Environmental Conservation
6274 East Avon-Lima Road
P.O. Box 57
Avon, New York 14414

Wildlife Mortality:

Wildlife Pathology Unit
New York State Department of Environmental Conservation
Wildlife Resource Center
Delmar, New York 12054

Contaminant Residues in Fish and Wildlife Tissues:

Toxic Substances Monitoring Program
New York State Department of Environmental Conservation
50 Wolf Road - Room 530
Albany, New York 12233-4756

Other Reliable Sources:

- o Notes in NYSDEC Phase I Reports.
- o New York State Department of Health Files.
- o New York State Department of Environmental Conservation Regional Offices (Fish and Wildlife Staff).
- o U.S. Fish and Wildlife Service, 100 Grange Place, Cortland, New York 13045
- o Universities.

From: Biothreat Site Ranking Model Users Manual-Oct 88.

Appendix 7.1

USEPA. 1989. Ecological Assessment of Hazardous Waste Sites: A Field and Laboratory Reference Document. EPA/600/3-89/013.

USEPA. 1989. Risk Assessment Guidance for Superfund: Environmental Evaluation Manual. EPA/540/1-89/001A.

Greene, J.C., C.L. Bartels, W.S. Warren-Hicks, B.R. Porkhurst, G.L. Linden, S.A. Peterson, and W.E. Miller, 1988. Protocols for short-term toxicity screening of hazardous waste sites. USEPA. Corvallis, OR.

Peltier, W.H. and C.I. Weber. 1985. Methods for measuring the acute toxicity of effluents to freshwater and marine organisms. Third edition. EPA/600/4-85/013.

Jones, P.A. 1985. Manual for Toxicity Testing of Industrial and Municipal Effluents. NYSDEC. Division of Water.

Reschke, L. 1987. Natural and cultural ecological communities of New York State. Draft No. 3. December 1, 1987. NYSDEC, Natural Heritage Program. Unpublished report.

Sediment Criteria - December 1989

Used as Guidance by the Bureau of Environmental Protection, Division of Fish and Wildlife, New York State Department of Environmental Conservation

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Note: This document is used as guidance by the Division of Fish and Wildlife. It is neither a standard nor a policy of the Department.

TABLE OF CONTENTS

I. Introduction and Overview of Sediment Criteria Methodology

On February 2 and 3, 1989, the USEPA presented to its Science Advisory Board (SAB) a methodology for deriving sediment criteria for non-polar (or non-ionic) organic chemicals. It is known as the equilibrium partitioning (EP) approach. A briefing document was given to the SAB which summarized the theoretical basis for the EP methodology and supporting lab and field data, and included the first list of interim criteria derived by the method (EPA 1989).

The methodology has been discussed in the scientific community for several years. It is based on the theory that toxics in sediments will exert their effect, either toxicity or bioaccumulation, to the extent that the chemical becomes freely bioavailable in the sediment interstitial (pore) water. It has been determined that the best sediment parameter with which to make predictions of bioavailability of non-polar organics in sediments is the fraction of organic carbon in the sediment. For sediments which exceed 0.5% total organic carbon the concentration of the chemical in the pore water can be predicted dividing the bulk sediment concentration by the product of the sediment/organic carbon partition coefficient (K_{oc}) and the fraction organic carbon. Few K_{oc} are accurately known, however it has been determined that K_{ow} (octanol/water partition coefficient) is very nearly equal to K_{oc} and may be substituted for K_{oc} in this calculation. By setting the pore water concentration equal to the water quality standard or criterion for the chemical a sediment criterion can be calculated by solving for the bulk sediment concentration. The sediment criterion algorithm normalized for organic carbon (OC) follows:

Sediment Criterion, ug/gOC = (AWQS/GV, ug/l) X (K_{OW}, l/kg) X $\frac{1\ Kg}{1.000 gOC}$

where AWQS/GV is the ambient water quality standard or guidance value for a chemical

K_{OW} is the octanol/water partition coefficient for the chemical; units are those for K_{OC}.

and $\frac{1\ Kg}{1.000\ gOC}$ is a unit conversion factor.

To derive a sediment criterion for a specific sediment, the OC normalized value is multiplied by the OC concentration in the sediment. For example, table 1 contains a carbon normalized sediment criterion for PCB of 1.4 ug/gOC which is derived as follows:

$$\text{PCB Sediment Criterion} = 0.001 \text{ ug/l} \times 10^{6.14} \times \frac{1 Kg}{1.000 g\ OC} = 1.4 \text{ ug/gOC}$$

To obtain a site-specific criterion for a sediment with 3% total OC multiply the OC normalized criterion by the fraction of organic carbon:

Site-specific criterion = 1.4 ug/gOC X 30 gOC/Kg = 42 ug/kg

Sediment with contaminants in excess of the criteria would be predicted to contain interstitial water in excess of the AWQS/GV. The PCB AWQS that is the basis for the sediment criterion of 1.4 g/gOC is designed to protect wildlife which consume other biota. Therefore, exceedance of the sediment criterion would be predicted to cause accumulation of PCB in surface water biota to levels that would be harmful to wildlife consumers of the biota.

Table 1 contains sediment criteria for a number of non-polar organic chemicals. For many of the chemicals, there is more than one criterion, reflecting the varied environmental protection objectives of the AWQS/GV/C used to calculate the criteria. Exceedance of the aquatic toxicity based criterion for a chemical would be predicted to cause toxicity to benthic or epibenthic life. Exceedance of the human health residue based criterion would be predicted to cause accumulation of the chemicals in aquatic animals to levels that would exceed a human health tolerance, action level or cancer risk dose (depending on the basis of the AWQS/GV/C). Exceedance of the wildlife residue based criterion for a chemical would be predicted to cause accumulation of the chemical in aquatic animals to levels that would be harmful to wildlife consumers of the animals.

There are a number of sediment criteria in Table 1 whose AWQS/GV/C is followed by the footnote "+". The human health based water quality criteria followed by this footnote are 1×10^{-6} cancer risk AWQC derived by the method for calculating water quality standards and guidance values in 6NYCRR 701.12. The wildlife based water quality criteria followed by this footnote are derived by dividing fish flesh criteria from Newell et al. (1987) by bioaccumulation factors.

Table 2 provides sediment criteria for five substances in 1% OC and 3% OC sediments. There are differences between sediment criteria derived using current TOGS values and proposed Division of Fish and Wildlife (DFW) values because DFW has proposed use of low cancer risk based criteria in the case of human health and somewhat more protection for wildlife resulting from revised wildlife risk assessments. The EPA criteria for PCB are considerably higher because the water quality criteria upon which the sediment criteria are based were derived using bioaccumulation factors that are known to be too low and higher fish flesh criteria for wildlife than is prudent.

Although the methodology described above is intended for non-polar organics, there are phenolics in Table 1. Phenolics are generally considered polar or ionic chemicals. However, at pH around neutrality phenolics do not ionize, and they act like non-ionic chemicals. Sorption of phenolics to sediments is known to be an important environmental fate process. Phenolics are also a major environmental contaminant. Therefore, sediment criteria were calculated for the phenolics by the non-polar formula.

For non-polar chemicals with log K_{ow} less than about 2.0 the sediment criteria for typical sediments of 0.5-5% total OC is always less than the AWQS/GV/C that was used to derive the criterion. This can be interpreted to mean that virtually all of the chemical in the sediment is bioavailable. It would not appear to make sense to actually implement sediment criteria that are less than the AWQS/GV/C. Therefore, for non-polar organic chemicals with K_{ow} <2 the sediment criterion should be considered to be the same as the AWQS/GV/C.

Until the non-polar method receives SAB approval and subsequent public review, there will likely be controversy about its use. If its use at a particular site is questioned, then the criteria should be used in conjunction with sediment toxicity and bioaccumulation tests. A limited number of such tests should be conducted to site-specifically calibrate the criteria.

For polar organics (except for phenols) and metals there are no algorithms to calculate sediment criteria in order to account for variable sediment characteristics which may affect metals toxicity. However, following the logic above, in order to ensure compliance with water quality standards, interstitial (pore) water should not exceed AWQS/GV/C for polar organics in TOGS 1.1.1. This application of AWQS/GV/C is complicated by the fact that dissolved organic carbon (DOC) in pore water is generally quite a bit higher than in the water column. DOC tends to reduce toxicity and bioaccumulation of chemicals. Since water column DOC is usually low AWQS/GV/C are not modified by DOC known to occur in specific waters. If partitioning between DOC and a chemical is known, then the effect of DOC on toxicity or bioaccumulation may be accounted for, and AWQS/GV/C may be applied to pore water. K_{DOC} is known for many chemicals. Also, chemicals with low K_{oc} do not show uptake suppressed by DOC. Appended are some methods for collecting interstitial water, along with references.

For metals, the primary concern in sediments is toxicity to benthic (bottom) organisms. The Ontario Ministry of the Environment reviewed a number of methods to derive sediment criteria, each with a somewhat different level of benthos protection, and calculated metals criteria for each as data was available (MOE 1989). Persaud (1989) derived from MOE (1988) no-effect

levels and lowest effect levels for metals (Persaud 1989 is a personal communication which is expected as a formal document in late 1989). Table 4 presents the geometric mean of these two values. Calculation of the geometric mean of a no-effect and lowest effect level is one method used for deriving water quality criteria. It is also appropriate for calculating sediment criteria. The methods used to derive these criteria do not account for variability of bioavailability of metals in sediments with differing organic content, particle size distribution or iron and manganese oxide content. Implementation of these metals sediment criteria is discussed below.

Although there currently is no algorithm for metals to calculate sediment criteria, EPA is working on the problem. Recently, a finding was made that may lead to such an algorithm. A paper by D.M. Di Toro et al was presented at the November 1989 meeting of the Society of Environmental Toxicology and Chemistry in Toronto which indicates that bioavailability of cadmium (and probably other heavy metals) in sediments is largely determined by the amount of acid volatile sulfide (AVS) in sediments that is available to bind with cadmium. While confirming studies have not been completed, there is sufficient promise to this approach to warrant advising users of sediment criteria to include quantification of AVS among the measurements of each sediment sample taken where metals are of concern. It appears to be important to avoid contact of sediment samples with air to minimize oxidation of iron and manganese sulfide, and it would be useful to measure AVS at several depths of sediment cores. At this time, interpretation of this data will be site-specific but by 1991, it may be possible to use this data to calculate sediment criteria for the metals. Therefore, it is worthwhile to begin AVS measurement now.

For the measurement technique DiToro et al cited Morse (1987). Appendix 2 is a procedure used by DiToro et al which presumably is derived from Morse et al (1987).

There is concern that use of bioaccumulation based sediment criteria derived by the EP method may not be appropriate if the surface water impairment of concern is an elevated residue in pelagic fish. The SAB is addressing this question. It seems to be well accepted that residues in benthic animals are accurately modeled by the EP method, but for low K_{ow} chemicals (less than about 10^5), residues in pelagic fish may not be clearly related to pore water concentrations. However, for high K_{ow} chemicals (greater than about 10^5) biomagnification through the aquatic food chain is known to occur, and EP criteria may actually be underprotective. For these chemicals, there may be an alternative approach to derive sediment criteria. Recent studies with PCB and 2,3,7,8-TCDD indicate that residues in fish can be predicted by sediment to fish bioaccumulation factors. Accumulation in edible fillet with 3% lipid from sediment with 3% OC is about 0.1-1 times the sediment concentration for 2,3,7,8-TCDD and about 1-10 times the sediment concentration for PCB. Using these sediment to fish accumulation factors, sediment criteria can be back calculated from fish residue levels of concern. Table 3 presents some of these criteria. Complete documentation for this approach can be provided in the near future.

Sediment criteria derived by this sediment-to-fish approach are comparable to those derived by the EP method. For PCB the EP criterion in Table 2 of 0.24 ug/kg may be compared to the criterion in Table 3 of 0.6 - 0.06 ug/kg because they are both 1×10^{-5} cancer risk based; as can be seen the former falls within the range of the latter. Similarly the PCB wildlife based criterion

in Table 2 of 18 ug/kg falls within the range of the PCB wildlife based criteria in Table 3 of 100-10 ug/kg. For 2,3,7,8-TCDD the cancer risk based criterion from Table 2 of 6×10^{-5} ug/kg falls within the range of the cancer risk criteria range in Table 3 of 1.4×10^{-5} to 1.4×10^{-4} ug/kg. The 2,3,7,8-TCDD wildlife based criterion from Table 2 of 0.006 ug/kg falls within the wildlife criteria range in Table 3 of 0.03 - 0.003 ug/kg. The good agreement between these two methods supports the scientific validity of the resultant sediment criteria.

This sediment criteria report will be amended upon completion and review of the EPA Science Advisory Board Report on the EP method for deriving sediment criteria..

II. Use of Sediment Criteria in Risk Management Decisions

As is indicated above, exceedance of sediment criteria can be expected to result in some specific adverse effects. The volume and location of sediment exceeding the criterion, the magnitude of the effect expected, the length of time sediments will be contaminated, and the certainty that the effect will occur, will all play a role in making decisions about how much sediment to clean up in order to eliminate or minimize the adverse effects. The effect of these factors on risk management decisions is discussed below.

Where the volume of sediment exceeding criteria is small and the sediment is fairly accessible, the pragmatic solution may be to remediate all the sediment. Where volumes are large and/or difficult to remediate (either because of accessibility or sensitivity of the impaired habitat), it may be practical to sort out and proceed with remediation of those sediments whose

remediation is practicable and feasible. For the sediments which cannot feasibly be treated or removed, further risk management evaluations may be warranted.

The magnitude of the effect caused by a contaminated sediment will depend on the magnitude of the exceedance of the criterion. Where the criterion is based on direct toxicity to aquatic life or indirect toxicity to wildlife via consumption of contaminated fish, a slight exceedance of a criterion would be expected to cause only a slight adverse effect. Increases in the magnitude of exceedance will cause increases in the magnitude of the effects. It may be useful to attempt to quantify the magnitude of predicted adverse impacts where remediation of sediments is expected to be difficult or costly to accomplish. This may be accomplished by desk-top investigation into the basis for a criterion, or site-specific sediment criterion and/or bioaccumulation tests. Decisions about the volume of sediment to remediate may then be made considering predicted residual effects from any unremediated sediments. Where the sediment criterion is based on human exposure to a carcinogen in fish, shellfish or other edible biota, exceedance of the sediment criterion would be predicted to cause a greater than 10^{-6} incremental cancer risk for humans. The actual risk that society is willing to accept may be factored into cleanup decisions. Presumably, once it is predicted that an FDA or EPA tolerance or action level would be exceeded, then cleanup would have to be made to the associated sediment concentration. As with the fish and wildlife toxicity based sediment criteria, site-specific bioaccumulation tests could be conducted to verify that sediments cause the predicted level of biota residues.

Once the source of contaminants to sediments is cut off, the length of time a particular area of sediments will contain unacceptable levels of contaminants will depend on the persistence of the chemicals and the site-specific dynamics of the sediment which control sedimentation, resuspension, biological and chemical degradation and other fate processes. If a chemical is not persistent (e.g. sediment levels would be expected to fall to acceptable levels within six months) then sediment remediation may not be necessary. Even for a persistent chemical, it may not be necessary to remediate the sediments if the contaminated area is a deposition zone, if burying of the contaminated sediments would be expected to occur within a short time, and if resuspension was unlikely.

The confidence in the EP sediment criteria for non-polar organics depends on a number of factors: that exceedance of a water quality standard or criterion in sediment interstitial water will cause an adverse effect, that no other factors other than OC affect bioavailability and that the K_{ow} or K_{oc} used is accurate. It is difficult to place uncertainty bounds on water quality standards and criteria. Methods to derive them have been developed and fine-tuned for a number of years. It is assumed that they have no uncertainty. Currently, EPA also makes this assumption about its sediment criteria approach. Regarding other factors, at this time EPA (1989) has concluded that all other factors contribute a minor amount to bioavailability of contaminants.

For the uncertainty of K_{ow}, EPA has used the correlation between K_{oc} and K_{ow} to place 95% uncertainty bounds about their proposed interim sediment criteria of about (in general) one order of magnitude in either direction. This may be interpreted to mean that there is a high degree of confidence

that exceedance of a criterion by about ten times will be associated with onset of impacts. For sediment criteria based on bioaccumulation this would mean that there is a high degree of confidence that at ten times the criteria aquatic animals exposed to the sediments would accumulate contaminants to levels that would exceed human health or wildlife related tolerances, action levels, fish flesh criteria etc. For sediment criteria based on toxicity to aquatic life this would mean that there is a high degree of confidence that sediments with contaminants at ten times the criteria would exhibit chronic toxicity to benthic animals. Onset of chronic toxicity may be difficult to detect in natural systems. Since water quality criteria to prevent acute toxicity are generally about ten times the chronic criteria, it may be generalized that for sediments with contaminants at 100 times (factors of 10 for uncertainty and acute:chronic ratios, respectively) toxicity based criteria there is a high degree of confidence that there will be onset of acute toxicity to benthic animals. Such effects would likely be evident as an impacted or depauperate benthic community.

It must also be noted that due to uncertainty about actual partitioning of a chemical between water and sediments there is the possibility that the sediment criteria are somewhat underprotective rather than overprotective.

Uncertainty of the metals criteria can not be characterized so simply. The criteria are based on empirical evidence from both lab and field studies without an attempt to normalize for any toxicity controlling factors in the sediment. Variability of toxicity of metals in any given sediment is evident from Table 4 which provides criteria, all of which are lower than the upper 95% confidence limit of pre-industrial metal concentrations in Great Lake

sediments. This is interpreted to mean that in some sediments relatively low levels of metals, even below "high" background, are toxic, whereas in other sediments fairly high levels, i.e. up to and possibly even above "high" background, may not be toxic. However, for all metals, except iron, the "Limit of Tolerance" exceeds "high" bachground by a considerable amount, and at these levels significant and noticeable toxicity would be expected in all sediments. Site-specific tests could be conducted to determine the magnitude of effects caused by contaminants in sediments. Such tests could be used to determine whether onset of effects occurs at sediment concentrations somewhat above or below the sediment criterion.

Where contaminated sediments are not remediated, sediment criteria will be useful in quantifying residual damages for preparation of a natural resource damage claim.

Interpretation and application of sediment criteria should be conducted in coordination with the Division of Fish and Wildlife.

Much of the above implementation guidance can be outlined in a strategy for use of the sediment criteria and actions to take when criteria are exceeded.

1. Compare sediment concentrations with sediment criteria.

   a. quantify the area or volume of sediment in excess of the criteria.

   b. describe the significance of exceedances in terms of the basis of the criteria: e.g. would only bioaccumulation be expected or both

bioaccumulation and toxicity, and based on quantity of exceedance would impacts be expected to be isolated or widespread through the ecosystem of concern.

2. Compare sediment concentrations with unimpacted, local background concentrations: consider significance of criteria exceedances in light of background concentrations, in particular, for naturally occurring substances such as metals.

3. If sediment concentrations are less than criteria, remediation is not necessary to ensure compliance with standards.

4. If sediments exceed criteria, and especially if exceedance is widespread in the ecosystem of concern, a number of steps can be taken to verify the need for remediation.

   a. For non-polar organic chemicals with K_{ow} <3.0, further remedial investigation or sediment remediation is not necessary if it can be demonstrated that the source of sediment contamination will be eliminated and the sediment will cleanse itself within one year. For these chemicals the greatest value of sediment criteria may be for documentation of a significant release.

   b. For sediments exceeding aquatic toxicity based criteria, including metals:

      i. conduct assessments of ecological communities to estimate

degree of impairment: correlate sample specific ecological results with sediment concentrations.

ii. collect sediment samples and conduct acute and chronic toxicity tests with fish and benthic invertebrates; correlate with toxicity test results with sediment contaminant concentrations.

iii. For organics, exceedance of aquatic toxicity based criteria in Table 1 by 100 times in significant portions of the ecosystem indicates the likelihood that biota are impaired and remediation should be considered necessary.

iv. For metals, Table 4 contains "limits of tolerance". If these values are exceeded in significant portions of the ecosystem of concern, it is highly likely that biota are impaired and remediation should be considered necessary.

c. For sediments exceeding human health bioaccumulation based criteria:

i. collect data on residues in edible biota and compare with tolerances/action levels/guidance and/or 1×10^{-6} cancer risk levels, or

ii. collect sediment samples, test with representative edible biota, measure residue.

d. For sediments exceeding wildlife risk bioaccumulation based criteria:

i. identify biota which consume aquatic life and study them to determine whether they have been impaired by contaminants in their food supply.

ii. collect sediment samples, test with wildlife food supply and measure residues; compare with residue levels known to be toxic to wildlife.

5. When sediment concentrations and criteria are less than detection, ecological assessments are necessary to directly measure toxicity of sediments or residues in biota if it is suspected that sediments were contaminated by releases.

a. generally, it is expected that low level impacts would be associated with presence of contaminants in sediments below detection.

b. however, if impacts are found to be of unacceptable magnitude, then iterative ecological assessments may be necessary to quantify the volume of sediments to remediate.

III. Division of Fish and Wildlife sediment criteria contact is Arthur J. Newell, Room 530, 50 Wolf Road, Albany, New York 12233-4756, 518/457-1769.

IV. Detailed Criteria for Contaminants, see tables and appendix.

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TABLE 1

Sediment Criteria, Derived for a Variety of Environmental Protection Objectives. (Sediment criteria are normalized to organic carbon (OC) content as ug/gOC; to obtain criteria for bulk sediments in ug/Kg multiply criteria by fraction OC; i.e. for 1% multiply by 10, for 2% OC by 20, etc.)

			Aquatic Toxicity Basis		Human Health Residue Basis		Wildlife Residue Basis	
Substance	Log K_{ow}	Freshwater or Marine F or M	AWQS/GV/C* ug/l	Sediment Criterion ug/gOC	AWQS/GV/C ug/l	Sediment Criterion ug/gOC	AWQS/GV/C ug/l	Sediment Criterion ug/gOC
Acenapthene	4.33	F		730**				
Anilene		F		0.0662**				
		M		0.248**				
Aldrin and Dieldrin	5.0	F&M			0.001++	0.1		
		F&M	0.084+	8.4	0.00001+	0.001	0.0077+	0.77
Azinphosmethyl	2.4	F	0.005++	0.001				
		M	0.01++	0.003				
Azobenzene	3.82	F&M			0.07+	0.5		
Benzene	2.0	F&M			6++	0.6		
Benzo(a)pyrene and some other PAHs♦	6.04	F			0.0012++	1.3		
		M			0.0006++	0.7		
Benzidene	1.4	F	0.1++	0.003				
Bis(2-chloro-ethyl) ether	1.73	F&M			0.2+	0.01		
Bis(2-ethylhexyl) phthalate	5.3	F	0.6++	119.7				
Carboturan	2.26	F	1++	0.2				

Table 1 (continued)

Substance	Log K_{ow}	Freshwater or Marine F or M	Aquatic Toxicity Basis AWQS/GV/C* ug/l	Aquatic Toxicity Basis Sediment Criterion ug/gOC	Human Health Residue Basis AWQS/GV/C ug/l	Human Health Residue Basis Sediment Criterion ug/gOC	Wildlife Residue Basis AWQS/GV/C ug/l	Wildlife Residue Basis Sediment Criterion ug/gOC
Carbon tetrachloride	2.64	F&M			1.3+	0.6		
Chlordane	2.78	F&M			0.002++	0.001		
		F&M	0.01+	0.006	0.00008+	$8X10^{-8}$	0.01+	0.006
Chlorobenzene	2.84	F&M	5++	3.5				
Chloro-o-toluidine	about 2.0	F&M			6.5+	0.65		
Chlorpyritos	5.11	F		3.22**				
		M		0.44**				
DDT, DDD & DDE	6.0	F&M					0.001++	1
		F&M						0.828**
		F&M	≤0.05+	≤50	0.00001+	0.01		
Dieldrin	5.0	F		19.5**		0.13**		
		M		5.77**		0.13**		
Diazinon	1.92	F	0.08++	0.007				
Dichlorobenzenes	3.38	F&M	5++	12				
1,2-Dichloroethane	1.48	F&M			24+	0.7		
1,1-Dichloroethylene	1.48	F&M			0.8+	0.02		
2,6-Dinitrotoluene	2.05	F&M			1+	0.1		
Diphenylhydrazine	3.03	F&M			0.1+	0.1		

Table 1 (continued)

Substance	Log K_{ow}	Freshwater or Marine F or M	Aquatic Toxicity Basis AWQS/GV/C* ug/l	Aquatic Toxicity Basis Sediment Criterion ug/gOC	Human Health Residue Basis AWQS/GV/C ug/l	Human Health Residue Basis Sediment Criterion ug/gOC	Wildlife Residue Basis AWQS/GV/C ug/l	Wildlife Residue Basis Sediment Criterion ug/gOC
Endosulfan	3.55	F	0.009++	0.03				
		M	0.001++	0.004				
Endrin	5.6	F&M	0.002++	0.8			0.0019+	0.8
		F		1.04**		0.0532**		
		M		0.215**		0.0532**		
Ethyl Parathion	2.1	F		0.081**				
Heptachlor & Heptachlor epoxide	4.4	F&M	0.001++	0.03	0.00003+	0.0008	0.0038+	0.1
		F				0.11**		
		M				0.104**		
Hexachlorobenzene	6.18	F&M	<5+	<7568	0.0001+	0.15	0.008+	12
Hexachloro-butadiene	3.74	F&M			0.06+	0.3	0.07+	0.4
		F	1++	5.4				
		M	0.3++	1.6				
Hexachloro-cyclohexanes	3.8	F		0.157**				
		F	0.01++	0.06				
		M	0.004++	0.03				
		F&M			0.009+	0.05	0.23+	1.5
Hexachlorocyclo-pentadiene	3.99	F	0.45++	4.4				
		M	0.07++	0.7				
Isodecyldiphenyl phosphate	5.4	F	1.73++	434				

Table 1 (continued)

Substance	Log K_{ow}	Freshwater or Marine F or M	Aquatic Toxicity Basis AWQS/GV/C* ug/l	Aquatic Toxicity Basis Sediment Criterion ug/gOC	Human Health Residue Basis AWQS/GV/C ug/l	Human Health Residue Basis Sediment Criterion ug/gOC	Wildlife Residue Basis AWQS/GV/C ug/l	Wildlife Residue Basis Sediment Criterion ug/gOC
Linear alkyl-benzene sulfonates	3.97 (Sodium dodecyl-benzene sulfonate)	F	40++	373				
Malathion	2.2	F&M	0.1++	0.02				
Methoxychlor	4.3	F&M	0.03++	0.6				
Mirex	5.83	F&M F&M			0.001++ 0.0001+	0.7 0.07	0.0055+	3.7
Octachloro-styrene	About 6.0						0.0005+	0.5
Parathion & methyl parathion	2.5	F	0.008++	0.003				
Pentachlorophenol	5.0	F	0.4++	40				
Phenanthrene	4.45	F M		139** 102**				
Phenols, total	2.75	F	1++	0.6				
Phenols, total unchlorinated	2.0	F	5++	0.5				
PCB	6.14	F&M F&M F M	<0.2+	<276	0.000006+	0.008	0.001++ 0.0004+	1.4 0.6 19.5** 41.8**

Table 1 (continued)

Substance	Log K_{OW}	Freshwater or Marine F or M	Aquatic Toxicity Basis AWQS/GV/C* ug/l	Aquatic Toxicity Basis Sediment Criterion ug/gOC	Human Health Residue Basis AWQS/GV/C ug/l	Human Health Residue Basis Sediment Criterion ug/gOC	Wildlife Residue Basis AWQS/GV/C ug/l	Wildlife Residue Basis Sediment Criterion ug/gOC
2,3,7,8-Tetrachlorodibenzo-dioxin	7.0	F&M F&M	<0.001+	<10	$1X10^{-6}$ ++ $2X10^{-10}$ +	0.01 $2X10^{-6}$	$2X10^{-8}$ +	0.0002
1,1,22-Tetrachloro-ethane	2.56	F&M			0.7+	0.3		
Tetrachloro-ethylene	2.88	F&M			1++	0.8		
O-Toluidine	1.4	F&M			18+	0.45		
Toxaphene	3.3	F&M	0.005	0.01	0.009+	0.02		
Trichlorobenzenes	4.26	F&M	5++	91				
1,1,2-Trichloro-ethane	2.17	F&M			4+	0.59		
Trichloroethylene	2.29	F&M			11++	2		
Triphenyl phosphate	4.59	F	4++	156				
Vinyl chloride	0.6	F&M			18+	0.07		

* AWQS/GV/C = Ambient water quality standard or guidance value in TOGS 1.1.1 or other water quality criterion.
+ AWQGV proposed by Division of Fish and Wildlife.
++ Current NYS AWQS or GV in TOGS 1.1.1.
** EPA proposed interim sediment criteria; taken from an EPA briefing document for the EPA Science Advisory Board.
♦ The sediment criterion for benzo(a)pyrene also applies to benz(a)anthracene, benzo(b)fluoranthene, benzo-(k)fluoranthene, chrysene, indeno(1,2,3-cd)pyrene, and, methylbenz(a)anthracenes. These PAH have the same TOGS 1.1.1. guidance value as benzo(a)pyrene.

TABLE 3

Sediment Criteria Derived by the Sediment-to-fish Bioaccumulation Method

	PCB		2,3,7,8-TCDD	
	Fish Residue ug/kg	Sediment Criterion*, ug/kg	Fish Residue ug/kg	Sediment Criterion,* ug/kg
Tolerance or Advisory	2000	2000-200	0.01	0.1-0.01
10^{-6} Cancer Risk @ ½ lb/week fish consumption	0.6	0.6-0.06	$1.4X10^{-5}$	$1.4X10^{-4}$-$1.4X10^{-5}$
Wildlife Fish Flesh Criterion	100	100-10	0.003	0.03-0.003

* For PCB and 2,3,7,8-TCDD, the ranges result from dividing the Fish Residue by a fish to sediment accumulation factor of 1-10 and 0.1-1, respectively.

Table 4. Sediment criteria for metals, ug/g (ppm) except iron which is in percent.

	Background*	Criteria**	Limit of Tolerance***
Arsenic	12	5 (4.0- 5.5)	33
Cadmium	2.5	0.8(0.6- 1.0)	10
Chromium	75	26 (22 - 31)	111
Copper	65	19 (15 - 25)	114
Iron (%)	5.9	2.4 (2 - 3)	4
Lead	55	27 (23 - 31)	250
Manganese	1200	428 (400 -457)	1100
Mercury	0.6	0.11(0.1- 0.12)	2
Nickel	75	22 (15 - 31)	90
Zinc	145	85 (65 -110)	800

* From MOE (1988); upper 95% confidence limit of pre-industrial concentrations in Great Lakes sediments.

** Values in parentheses are "no-effect" and "lowest-effect" levels, respectively, from Persaud (1989).

*** Concentration which would be detrimental to the majority of species, potentially eliminating most. (Persaud 1989)

APPENDIX 1

Collection of Interstitial Water

At this time, there is not a specific recommendation for a site-specific method to collect interstitial water. It is recommended that regulated parties investigate the subject and propose to DEC a method which will provide a sample to best characterize the bioavailable metals in site-specific interstitial water. As a start, it is suggested at least four methods should be considered along with some references.

1. Centrifugation (Edmunds and Bath 1976; Giesy et al. 1988; Landrum et al. 1987; Engler 1977);

2. Squeezing (Reeburgh 1967; Bender et al. 1987; Kalil and Goldhaker 1973);

3. Suction (Knezovich and Harrison 1987); and

4. Equilibrium by using dialysis membrane or fritted glass sampler (Hesslin 1976; Mayer 1976; Bottomley and Bayly 1984; Pittinger et al. 1988).

Additional literature which should be considered are Carignan et al. 1985, Bray et al. 1973, Lyons et al. 1979, Word et al. 1987, and Jenne and Zachara 1987.

These suggestions and references were obtained from a draft ASTM guidance document on sediment collection, storage, characterization, and manipulation. However, this document is not yet available for circulation or reproduction.

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APPENDIX 2

ACID VOLATILE SULFIDE
Procedure Used at Manhattan College

The apparatus consists of the following vessels:

A 500-mL Erlynmeyer flask fitted with a three-hole stopper, where the sample to be analyzed is placed.

Three 250-mL Erlynmeyer flasks. Into the first is placed 175-200 mL of pH 4 buffer (0.05M potassium hydrogen phthlate). The second and third contain 175-200 mL of a 0.1M silver nitrate solution. Each of these is fitted with a two-hole stopper.

The four flasks are connected in sequence with appropriately shaped glass and Tygon tubing. All fittings must be air tight.

A nitrogen gas line is introduced into the first vessel through one hole of the stopper. A thistle tube with a stopcock is placed in the second hole. The exit line from the first to the second vessel is placed in the third hole. The second, third and fourth stoppers contain the entry and exit lines, the entry line being below the liquid surface and the exit line, above.

Between the nitrogen tank and the first vessel, an oxygen-scrubbing system must be placed. This system consists of a vanadous chloride solution in the first scrubbing tower and the matrix of the analyte (usually seawater or freshwater) in the second tower. The solution used in the first tower is prepared in the following manner. Four grams of ammonium metavanadate is boiled with 50 mL of concentrated hydrochloric acid and diluted to 500 mL. This solution is then transferred to the tover. Amalgamated zinc, prepared by taking about 15 grams of zinc, covering it with deionized water and adding 3 drops of concentrated hydrochloric acid before adding a small amount of mercury to complete the amalgamation, is then added to the vanadous chloride solution in the first tower. The solution should now be blue or green. When nitrogen is bubbled through it for a time it will turn purple. When the solution is exhausted, it will turn back to blue or green. It may be replenished by adding more amalgamated zinc or a few drops of concentrated hydrochloric acid.

The sample or standard to be analyzed is placed in the first vessel after the entire system has been purged with nitrogen for about an hour. The usual sample size is 10-15 grams of wet sediment. Any water used in the transfer of the sample to the vessel must be completely deaerated. The system is again purged for 5-10 minutes. Deaerated 6M hydrochloric acid is now added from the thistle tube gs to achieve a final concentration in the vessel of 0.5M.

The system is now run for an hour with the nitrogen at a bubble rate of about four/sec. The sample vessel should be swirled every five or ten minutes. When the reaction is complete and all hydrogen sulfide produced has been converted to silver sulfide in the third vessel, the solution in that vessel should be relatively clear and the precipitate should have settled to the bottom. There should be no precipitate in the fourth vessel.

The suspension in the third vessel is passed through a 1.2 micron GF glass fiber filter, which is dried at 102°C. and weighed.

A standard can be prepared from appropriate quantities of iron(II) sulfate and sodium sulfide, the latter being best added from a solution standardized against lead perchlorate.

Typical silver sulfide precipitates are in the range 10-30 mg. When a blank is run (sample without acid), about 0.9 mg silver sulfide is obtained. When the acid is run without a sample, about 0.6 mg silver chloride is obtained.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
JACOB K. JAVITS FEDERAL BUILDING
NEW YORK, NEW YORK 10278

JUN 22 1992

Mr. Randall Battaglia
Environmental Coordinator
Seneca Army Depot
Romulus, New York 14541

Re: Open Burning Grounds Preliminary Site Characterization Report (PSCR)

Dear Mr. Battaglia:

This letter is in response to the Open Burning (OB) Grounds PSCR dated April 1992 prepared by C.T. Main, Inc. for the Seneca Army Depot. EPA received the document and plans on April 28, 1992. The following comments and recommendations should be incorporated into the Remedial Investigation (RI) Report for the OB Grounds:

PAGE-SPECIFIC COMMENTS

Section 1.0 - Introduction

p.1-1,¶2 The first sentence in this paragraph references Figure 1-1, which is not presented until the end of Chapter 1. It is recommended that all figures be incorporated within the text so that the figure appears on the page immediately following the first reference to the figure. This will simplify referencing between the text and the figures. This comment should be incorporated throughout the report, but is noted only here.

Regional Geologic Setting

p.1-2,¶3 The text states that the "till thickness varies from 1-50 meters." Other portions of the text utilize U.S. Customary Units and not Metric Units. It is suggested that, for consistency and ease of reading, that U.S. Customary Units be used throughout text.

Regional Hydrogeologic Setting

p.1-3,¶3 The PSCROBG indicates that ground water in the county is very hard, and therefore, the quality is minimally acceptable for use as potable water. Clarification of the source of potable water for the area and the primary source of water for area agricultural enterprises should be provided to support risk assessment development.

p.1-3,¶3 The text should state whether the wells shown on Figure 1-8 comprise all of the known wells utilized for drinking water, industrial, or agricultural purposes.

p.1-5,¶1 It is stated that "within the deeper sections of shale, limestone cavities are encountered which provide substantial quantities of water" and that "very few wells in the region adjacent to SEAD utilize the limestone as a source of water." The text does not state, however, whether the locations of these "few wells" have been determined. It is suggested that MAIN provide a more detailed discussion of the "limestone cavities" that are mentioned. It does not appear reasonable that limestone cavities exist within the shale. Additional information (e.g., locations, average yields) should also be provided for the "limestone wells" that are also mentioned.

Site History

p.1-6,¶3 The discussion that is provided for the history of the site is vague. It is suggested that a more detailed description of the activities that have been conducted at the site be included the final RI Report.

Previous Investigations

p.1-9,¶4 Tables summarizing the analytical results from each of the previous studies conducted at the site should be presented in the final RI Report. This would provide a better conceptualization of the site and provide a basis to compare historical analytical results with recently acquired results.

Conceptual Site Model

p.1-10,¶1 It is stated that an "active ordnance disposal site is within the demolition area, but is not part of this study." A more-detailed description of this active ordnance disposal area should be included, along with an analysis of the activities conducted at this site with respect to the environmental impact that they may have had or are having on the OB/OD area.

p.1-15 Section 1.1.4, Conceptual Site Model, requires significant modification as it currently does not evaluate migration pathways for source area contaminants or discuss potential receptors. It may not be possible to evaluate all of these features at this time; however, refinement of the model should occur before the Phase II RI activities are formulated by MAIN. A migration pathway analysis is critical to defining where follow-up

soil boring and well installations should be located (i.e., wells should be situated to intercept zones of potential contaminant movement based on an extensive hydrogeologic analysis of Phase I data).

For specific Phase II recommendations, the reader is referred to Section 5.0.

p.1-15,¶4 All private, public drinking water, industrial, and agricultural water supplies within a one mile radius of the site should be identified in the final RI report.

Tables and Figures

Tbl.1-3 The units of the values presented in this table should be included. The qualifiers a,b,c, etc. should also be defined.

Tbl.1-4 The units of each of the values presented in this table should be included.

Tbl.1-5 The units of measurement presented in this table should be defined.

Tbl.1-6 A definition for K(oc) should be provided on this table.

Fig.1-2 The features other than the OB/OD Grounds that are presented on this figure should be identified so that a relationship may be established between the site and the surrounding area. This figure, as presented, does little in terms of helping the reader identify outstanding features located in proximity of the site. In addition, a scale should be provided for this figure.

Fig.1-5 The quality of this figure is poor. The scale that is presented is unreadable. A better quality figure should be provided.

Section 2.0 - Study Area Investigation

Site Survey Program

p.2-1,¶4 The statement regarding the well elevations which were surveyed should be specific in denoting whether the top of the steel protective casing or the top of the PVC casing (riser) was measured. It is recommended that both measurements be taken.

Geophysical Investigations

p.2-3,¶3 The section should identify what significant and potentially hazardous items were discovered during site

clearance activities and where these cataloged items can be located for review. A summary account of these items is warranted in the discussion.

p.2-4,¶3 The statement that "the results of the subsurface sampling of these suspected pits are presented in the following section" should also identify the type of results which are presented and the section number which should be reviewed for these results.

p.2-5,¶1 The section states that "the soil sampling program for these excavations is presented in Table 2-1." Table 2-1 indicates that it is a summary of the sampling program. It is suggested that a discussion be presented which provides details regarding the sampling procedures utilized during test pitting. In addition, Table 2-1 should be identified as the cross-sectional sampling table for the geophysical anomalies, as indicated by the title of the section. The analytical parameters should also be included in this table.

Surface Water and Sediments

p.2-5,¶4 This section states that "the sampling program for surface water and sediments is summarized in Tables 2-2 and 2-3, respectively." Tables 2-2 and 2-3 do not appear to fulfill their intended purpose for the following reasons:

- The analytical parameters have not been included in these tables.
- A key to the different sample identification numbers is not provided. For example, the designation W0711-50..52 in the current numbering system must have had some logic behind its use. It would be helpful if the meaning of this designation was provided. The sample number should reflect the sample location. This is especially critical in those situations where several samples were collected from a particular location.
- The tables should define which surface water and sediment samples were not paired due to a lack of standing water at a particular location as indicated in the text.
- The tables should present the reason why several samples in the first column of the table appear to have been collected from the same location. Clarification is warranted through use of a key which should be produced for each table.

p.2-6,¶2 The stations at which the sediment was too coarse to allow samples to be collected should be identified. The station location number which is considered a reference location should be also be stated in this discussion.

p.2-6,¶3 The discussion pertaining to the preservation of samples does not provide any details as to the preservation agents which were used. If water samples for volatile organic analysis (VOA) were collected, the procedure by which these samples were preserved should be presented. The collection of VOA samples requires that no headspace be present within the sample containers. The discussion presented indicates that preservatives were added after each surface water sample had been collected. It is not appropriate to collect surface water samples for volatile organic analysis using this method and the analytical results from any surface water VOA samples collected in this manner would be questionable. A detailed discussion should be included which specifies the sample collection and preservation techniques which were utilized by MAIN.

p.2-6,¶4 Sediment samples that were to undergo volatile organic analysis should have been taken directly from the scoop which was used to fill the stainless steel bowl. This procedure would have minimized the volatilization of VOCs from the sediments while additional volume was being collected.

The depth at which samples were collected with the scoop should be provided.

The necessary volume of soil which was required for all of the appropriate analyses should have been secured prior to homogenization of the samples in the bowl. The collection procedures as described for the samples in which large volumes were needed may not have provided representative samples. In addition, the filling of the appropriate glassware for laboratory analysis should have been conducted using small aliquots of the sample for each jar until all necessary jars were filled.

p.2-8,¶3 The text should indicate the section/appendix in which the results of the flow characterization calculations for Reeder Creek are presented.

Soils Investigation

p.2-9,¶1 The first sentence in this paragraph is confusing. The objectives of the soil program should be restated.

p.2-9,¶3 USAEHA should be defined upon first usage.

p.2-9,¶5 Undistributed should be revised to state undisturbed.

p.2-9,¶5 The discussion that is presented should include details regarding the procedure utilized in the collection of soil samples from the split spoon. At a minimum, the order of sample collection should be presented.

p.2-10,¶2 The text should define "the hill" that is referred to in this paragraph. A reference to the location of this hill in relation to the berm should be provided.

p.2-10,¶3 The text should provide a description of the soil screening procedure and the instrument which was used. This discussion should include the rate at which blanks were analyzed, the frequency of duplicates, and the standards which were utilized. Documentation that cross-contamination between samples did not occur must also be included. In addition, a discussion should be provided which presents the rationale for selecting lead, trinitrotoluene (TNT), benzene, and trichloroethene (TCE) as indicator compounds.

Explain the apparent discrepancies between the statement, "Of these samples, the surficial soil sample and one other from the remaining four underwent Level IV and V analyses" and the highlighted samples shown on Tables 2-7, 2-8, and 2-9 (i.e., MW-30, MW-32).

Ground Water Investigations

p.2-11,¶4 This section should provide a discussion describing the use of remote drilling techniques in the installation of monitoring wells. A description of the use of sandpack, seal, and grout in the installation of the monitoring wells should also be included. In addition, the text should also state whether or not the cement surface pads were sloped to direct surface runoff away from the annulus of the boring.

p.2-12,¶1 A discussion should be provided describing the procedures utilized in the installation of monitoring well screens in the weathered bedrock. Because short lengths of well screens were installed, drilling techniques which would have allowed separation of the overburden from the bedrock utilizing a seal should have been employed. Details of the installation techniques/procedures that were utilized should be discussed so that they may be evaluated.

p.2-13,¶2 The description of the slug testing procedure lacks sufficient detail to determine if the tests were

conducted accurately. Additional details that should be included are:

- the depth of the transducer;
- the type of slug used;
- the type of equipment; and
- a description of both the rising and falling head tests.

p.2-13,¶5 The text lacks any discussion of the ground water sampling techniques that were employed. The procedures that were utilized should be presented.

p.2-13,¶5 The section indicates that the summary of chemical testing for ground water samples is included in Table 2-12. However, Table 2-12 does not define the chemical testing completed on the samples. It does present the results of conductivity, pH, and temperature measurements. It is suggested that this table be re-titled. In addition, a summary table presenting the chemical testing for the ground water samples should be generated and presented which defines the analytical parameters for which each sample was submitted to the laboratory for analyses.

Ecological Investigation Program

p.2-14,¶2 An aquatic biota assessment within the unnamed stream present on the site was not proposed. Although this area would not be expected to provide fisheries habitat, a macroinvertebrate community would be present within the stream. The rationale for not assessing the biota of this aquatic habitat should be provided as it would appear that useful information could be obtained from surveying this area.

Tables and Figures

Tbl.2-1 The table should include the analytical parameters and a key to the sample designations.

Tbl.2-2 The table should include the analytical parameters and a key to the sample designations.

Tbl.2-3 The table should include the analytical parameters and a key to the sample designations. The table should also provide the sediment sampling depth.

Tbl.2-4 The table should include the analytical parameters, levels of analysis, and a key to the sample designations. Sampling intervals qualified with the symbol "+" should be defined in the key.

Tbl.2-5 The table should include the analytical parameters, levels of analysis, and a key to the sample designations. Sampling intervals qualified with the "+" symbol should be defined in the key.

Tbl.2-6 The table should include the analytical parameters, levels of analysis, and a key to the sample designations.

Tbls.2-7, 2-8, and 2-9

- These tables should include the analytical parameters, levels of analysis, and a key to the sample designations.
- These tables do not include the criteria which was used to select samples for additional analysis. It appears that several samples were submitted which did not indicate contamination. A discussion of the selection criteria should be added to the appropriate section of the report and referenced within each table.

Tbl.2-10 "Point of Well" should be defined. It is assumed to be the depth to which well screens were installed. However, the row for MW-19 contradicts this assumption. Clarification and correction of the table is warranted.

Tbl.2-11 This table presents data which are not discussed in the text. The text indicates that measurements of turbidity were used evaluate the development of the monitoring wells. However, Table 2-11 suggests that conductivity, pH and temperature were also used to evaluate the development of the wells. If this is the case, the text should be revised to indicate that these parameters were also considered. In addition, a key to the various units used in this table should be provided.

Tbl.2-12 This table does not include a sampling summary as indicated in Section 2.6.5 of the text. The analytical parameters for which samples were analyzed should be included. It would also be helpful if the table presented the quantities of ground water which were removed from each monitoring well prior to collection of samples.

Tbl.2-13 This table should provide the types of biota that were sampled. In addition, the species should be included.

Fig.2-1 No key is included on this figure. The key should provide the graphic designations for houses, property lines, streams, contour lines, site features, etc. Roads

and/or streets should also be labeled. The 620 contour line, which is truncated, should be extended. In addition, contour lines appear only on the western half of this figure. This figure should be revised to address these comments.

Section 3.0 - Detailed Site Description

Introduction

p.3-1,¶1 The detailed site description should state if there are any physical features, such as fencing, which effectively restrict unauthorized access to the site.

p.3-1,¶3 The text states that "on the western side of the OB grounds is located Reeder Creek." However, based on a review of figures of the site, it is evident that Reeder Creek is located to the east of the site. This inconsistency should be corrected.

The text indicates that all surface water runoff flows to the east into Reeder Creek. However, based on a review of the Surface Water Runoff Directions presented on Plate 3-1, it is evident that some of the surface water runoff in the southwestern portion of the site may flow to the west. It is suggested that surface water runoff patterns/directions be reviewed because, as the text states, "drainage patterns are poorly defined." In addition, the surface water flow patterns shown on Figure 3-1 appear oversimplified considering that the surface water runoff directions are "poorly defined." Surface water runoff patterns need to be precisely defined to evaluate the routes by which contaminants may migrate from the site and to determine locations at which to conduct additional sampling.

Site Geology

p.3-7,¶4 The term "glacially derived till" needs to be changed to "glacial till." All till, by definition, is derived by glacial processes, according to the Dictionary of Geological Terms (AGI, 1976).

p.3-8,¶1 The term "silty, claying till" should be changed to "silty, clayey till."

p.3-8,¶4 The discussion of the predominant joint directions needs to be properly referenced. The source of this information is unclear.

This paragraph discusses rock cores collected by Metcalf & Eddy. The text should provide a proper reference for this discussion or state that these cores were examined and described by MAIN. The discussion should also include the locations of these cores in relation to the site.

p.3-9,¶1 The text and the map plates should be consistent regarding maximum bedrock elevations. The text states that the bedrock high was 631 feet above mean sea level (MSL) in boring GB-10 but the bedrock elevation plate (plate 3-5) indicates a high of 633 feet above MSL in boring PB-J-1.

p.3-10,¶5 The discussion presented describing the berm excavations is vague. It is suggested that a more detailed discussion be presented describing what was or was not found during excavation of the berms.

Site Hydrogeology

p.3-12,¶4 The discussion of monitoring well elevations should provide an explanation for the exclusion of ground water elevations in wells MW-4, MW-5, MW-6, MW-7 and MW-16 from Plates 3-6 and 3-7. The elevations of ground water levels in all monitoring wells should be included in the respective overburden/weathered shale ground water elevation maps and also in the analysis of the ground water flow at the site.

We are concerned that ground water flow at the OB/OD Grounds may not be as relatively simple as has been depicted on Plates 3-6 and 3-7. The flow patterns shown for the site indicate that ground water flow is generally from west to east across the site. Although this may be the case, the possibility also exists that, considering the topography of the area, the drainage basin boundary located along the western portion of the site, and the location of Reeder Creek relative to the site, ground water flow may be more radial including flow towards the northeast and southwest.

Ground water flow patterns need to be defined so that monitoring wells may be installed downgradient of suspected source areas to determine whether an impact to ground water quality is occurring. It is suggested that the ground water elevations for all monitoring wells be considered in the evaluation of ground water flow at the site (MW-4, MW-5, MW-6, MW-7 and MW-16) or that an explanation be provided justifying their exclusion. Additional monitoring wells should be installed to the

north, south, and southwest of the site so that ground water flow patterns at the site may be refined. These additional monitoring wells would also assist in refining data on the quality of ground water at the site. In addition, MAIN should present the methodology that was used to determine the ground water elevation contours.

p.3-14,¶2 The report should provide better justification for the porosity values used in the seepage velocity calculations. The effective porosity of 0.25 used for glacial till is inappropriate for the slightly plastic gray silty till described for this site. The value of 0.25 for glacial till used in Driscoll (1986) is at the upper range of values for that material and would be more appropriate for a sandy till with far less fines than what has been indicated as being contained in the till on this site.

p.3-14,¶3 This paragraph needs to provide the rationale for using porosity values of 10 and 25 percent for the weathered shale interval. No basis is provided for the assumption that porosity values for the weathered shale will be the same as those of the glacial till.

p.3-14,¶4 The text needs to discuss vertical gradients in relation to actual vertical gradients between wells, not in terms of head differences between well pairs. The correct method of calculating vertical gradient is to divide the head elevation difference between two wells by the difference in the center point elevation of the respective well screens. Both the text and Table 3-7 should be revised.

p.3-15,¶3 The correct reference for the Hvorslev method is Hvorslev (1951).

p.3-15,¶5 The discussion of average hydraulic conductivity (K) values is confusing and should be revised. The text should explain why the average values for overburden wells included only those wells completed by MAIN. The text states that, based upon their calculations, "there is little significant variation between the hydraulic conductivities of the glacial till and those for the weathered shale." However, the average values for till and weathered bedrock presented in Table 3-8 indicate a consistent order of magnitude difference between the two materials when looking at the results of each method, independently.

In addition, the text needs to discuss the results of these tests in comparison to published K values for similar materials. This discussion should also indicate

whether these results are reasonable, for both the overburden and the weathered bedrock.

p.3-16,¶2 This paragraph should provide an explanation as to why certain wells were not slug-tested. In addition, MW-28 is discussed as both an overburden well and a weathered bedrock well. This inconsistency should be corrected.

Land Use

p.3-16,¶4 Further information on local zoning and possible future land use of the site including residential development and/or use for agriculture is needed to support the risk assessment. The types of human activity currently occurring at the site such as trespassing by area youths (e.g., dirt bike riding, target practice) and/or hunters should also be obtained.

p.3-17,¶4 Additional sources, such as the County Board of Health and Water Departments, should be contacted to identify all area private/public water supply wells for drinking water, industrial, and/or agricultural use. The classification for ground water in this area also needs to be stated.

Ecology

p.3-24,¶1 More details should be provided regarding the access restrictions to Reeder Creek that are mentioned here. This discussion should describe the access restrictions and how effective these restrictions are.

p.3-24,¶4 It should be stated if any produce farms are present in the area adjacent to the site and whether or not the produce is distributed locally (farm stands, etc.).

p.3-25,¶1 The Final RI report should provide information on the quantity of game species harvested each year. This information is necessary to evaluate potential impacts to human consumers.

p.3-25,¶2 The report states that no impacts to waterfowl, squirrel, gray fox, and ruffed grouse are expected due to the low populations of these species. This is not a reasonable rationale for determining that no impact would occur. A species having a low population within a contaminated area may experience a greater impact (local extirpation) than a more abundant species. The report should be clarified to state that species with low populations are not likely to have as many individuals affected by site contaminants as are species containing high population densities.

p.3-28,¶3 It is reported that state regulated wetlands are the only significant vegetative resource in the vicinity of the OB/OD Grounds area. However, the wetlands identified and delineated on the site should also be considered significant and sensitive resource areas.

p.3-28,¶4 The conclusion that the wildlife species composition and density for the habitats present on the OB/OD Grounds site are normal based on the late fall observations is not adequately supported by the limited information provided in the Site Characterization Report. Although the OB/OD Grounds site habitats may appear "normal", the site investigation did not determine densities of species inhabiting the area nor was a detailed comparison performed with an appropriate reference area(s). The report should be clarified to reflect this difference.

Tables and Figures

Tbl.3-5 This table should provide groundwater elevations for each set of groundwater level measurements listed.

Tbl.3-8 The average values for till and weathered bedrock listed for each method do not appear to be correct, based upon spot checks of the calculations. These values need to be rechecked and revised if necessary. The test results that were included in each calculation of average need to be listed as well as the type of average (arithmetic or geometric) that was performed.

Section 4.0 - Nature and Extent of Contamination

p.4-1,¶5 It is unclear how screening was performed for total volatile organics. The statement that "Level II screening was performed for total volatile organics as benzene and TCE" should be clarified.

p.4-1,¶6 The last sentence should be completed. " Level IV and V analyses (take?) up to 35 days to be completed."

p.4-2,¶2 MAIN should present the data, or state where the data may be found, that support the selection of 2,4,6-TNT as the indicator compound for explosives screening.

p.4-2,¶3 It is unclear which screening methodology "followed identical sample preparation steps as Level IV analysis." The paragraph does not refer to metals screening until the end. The first sentence should state that it is the metals screening methodology which follows identical sample preparation steps as Level IV analysis.

p.4-2,¶4 The methodology used to quantify total volatile organics measured with a PID relative to TCE and measured with a FID relative to benzene should be presented.

p.4-2,¶5 The discussion that is presented regarding which soil samples underwent which analyses is confusing. This discussion should be clarified so that it is clear which samples were subjected to which level of analysis.

p.4-3,¶1 For consistency in the report, refer to TNT as the indicator compound, not the indication compound.

The paragraph states that of the 19 samples that were collected, 16 underwent Level V analysis, and then states "of the 16 samples analyzed using Level IV methods,. . .". Clarification as to whether samples underwent Level IV analysis, Level V analysis, or both is needed.

p.4-4,¶3 The rationale used to summarize only samples with lead concentrations greater than 1000 mg/kg should be presented.

p.4-4,¶4 This paragraph presents a discussion comparing levels of compounds detected to site background levels. The samples that have been selected to represent background levels should be stated.

It is unclear what point is trying to be made in this paragraph. The paragraph states that for barium only 4 of the 13 highest concentration samples are associated with the 13 highest lead samples. This does not suggest that any correlation exists between levels of lead and levels of barium in soil. The text should discuss whether any correlations were found between lead concentration and metals concentration in soils and whether lead is an appropriate indicator for levels of metals in soils at the site. MAIN may wish to select another compound as the indicator compound for future investigations at the site if the data indicate that a greater correlation exists between the levels of one of the other metals (e.g. barium, chromium, copper, etc.) and metals concentrations in soils at the site.

p.4-7,¶5 The paragraph discusses the variogram model range and how the best fit of the data limits the range to no more than 550 feet. It also states that these results suggest a sample interval of approximately 150 feet. MAIN should present the rationale used to determine that a 150 foot interval is suggested by this data. In addition, MAIN should also provide the rationale that led to the statement that the 200 foot spacing actually used in the

investigation is in "good agreement" with the 150 foot interval when there is a 25% difference between the values.

p.4-8,¶2 MAIN should explain the correlation between the three values discussed in this paragraph: the model range of 160 ft., the closest grid spacing on the pad of 67 feet, and the burn pad sample interval.

p.4-8,¶4 It is stated that the complete list of volatile analytes is presented in Table 2-7. However, a review of Table 2-7 indicates that it presents a summary of the Level II screening results for grid borings. The table which presents the list of volatile analytes should be properly referenced in the text.

p.4-9,¶2 The last sentence in this paragraph which refers to what is presented in Appendix G is confusing and should be clarified and restated.

p.4-10,¶2 It is stated that "55 pad borings samples were submitted for semi-volatile organic analysis." It is also stated that a "total of 30 of the 50 pad boring soil samples had semi-volatile compounds detected." The inconsistency that appears between the two numbers of pad boring samples submitted for semi-volatile organic analysis should be corrected.

p.4-11,¶1 It is stated that a total of 23 berm excavation soil samples were submitted for semi-volatile organic analysis. However, Appendix G presents the results for only 17 samples. This inconsistency should be corrected.

p.4-11,¶3 It is stated that a total of 49 grid boring samples were analyzed for semi-volatile organics. However, the two sets of data tables included in Appendix G presenting the results of the analyses of the grid boring samples do not agree with this number. The first set of tables contain the results of a total of 52 samples while the second set contains the results of 54 samples. The inconsistencies between the text and Appendix G and between the two sets of tables displaying the results of the semi-volatile organic analyses of grid boring samples should be corrected.

p.4-12,¶2 It is suggested that a table be included in the Section 4 of the text which summarizes the results of the geophysical anomaly excavations.

p.4-13,¶4 It is stated that no pesticides or PCBs were detected in any of the berm excavation samples. However, a review of Appendix G indicates that sample BE-B-2-91 contained

4,4'-DDT at a concentration of 2800 C ug/kg, and sample BE-F-2A-9 contained Aroclor-1260 at a concentration of 180 Y ug/kg. The definitions of the qualifiers C and Y, as provided in Appendix G, do not indicate that values with these qualifiers are suspect or absent from the sample. Therefore, these results should be considered in the characterization of the site and discussed in the text.

p.4-22,¶4 It is stated that a total of 28 ground water samples were collected from monitoring wells for volatile organic analysis. However, a review of the data contained in Appendix G indicates that a total of 32 samples were collected for volatile organic analysis, 4 of which were duplicate samples. It is suggested that the text be revised to indicate that this was the case.

p.4-23,¶1 Please see Comment for page 4-22, paragraph 4. The data contained in Appendix G also indicates that 32 ground water samples were collected for volatile organic analysis. The text should be revised to state that this was the case.

p.4-23,¶4 It would be helpful if a summary table was presented of the metals analytical results for ground water samples. The data tables presented in Appendix G do not indicate which samples were and were not filtered (the text indicates that some samples were filtered and some were not). Distinguishing unfiltered samples from those that were filtered is necessary to properly evaluate the data. In addition, the text should include a discussion of the unfiltered metals results.

p.4-24,¶2 Table 2.6.5-1 is referenced in this paragraph. However, this table could not be located within the PSCROBG. It is suggested that the reference to this table be corrected.

p.4-25,¶2 The statement that "by comparison the groundwater sample from MW-18 did not identify the presence of explosive compounds above the detection limits" is confusing. It is suggested that this sentence be clarified and restated.

Given that no monitoring wells are located near the areas of highest explosive concentrations, and only one well (MW-18) is located downgradient of one of the locations at which high concentrations of explosives were detected in soils, it can not be assumed that there is no direct correlation between distribution of explosives in the groundwater and areas of high explosive concentrations.

p.4-26,¶1 The text should discuss which samples were used as background samples, and the compounds that were detected (if any) in those areas that were not thought to be influenced by surface water runoff from the OB/OD Grounds. In addition, the volatile organic compounds detected in sediment samples should be discussed with regards to possible sources.

p.4-26,¶4 Again, the text should discuss which samples were used as background samples, and any compounds that may have been detected in these background samples.

p.4-27,¶4 It is stated that aluminum is generally a component of shale rocks and MAIN therefore assumes that the concentrations detected in surface water samples are typical of the background surface water chemistry. The data that support this conclusion should be presented for review.

p.4-28 Section 4.5.4.2 presents the results of surface water sediment sampling, but does not discuss what the results indicate with regards to nature and extent of contamination. The discussion of the analytical results should include an analysis of whether or not these results indicate that contaminants have or are migrating from the site.

Tables and Figures

General Comments

- It would be helpful if the detection limits were presented in the tables for those analytes that were not detected in each sample.

- Section 4 should include summary tables for each class of contaminants that were analyzed for and also for each media and or area sampled. This would assist in the reduction of the data and ease the evaluation of the analytical results.

- It is also suggested that the semi-volatile organic results be combined into a single table (i.e., the semi-volatile organic results for one sample should not appear in two separate tables). The presentation of semi-volatile organic results in two tables for each media is confusing and makes for a difficult comparison of the data.

- Based on a comparison of the data included in Appendix G and the summary tables presented in Section 4, it appears that there are a number of samples in which compounds were detected, but the analytical results of which have been omitted from the data summary tables in Section 4. The following comments note the analytical results which were omitted from the data summary tables, based on the data presented in Appendix G. This may not be a complete and definite list because, due to the time constraints of this review, the analytical data contained in Appendix G was not compared on a sample to sample basis with the results presented in the summary tables in Section 4. Therefore, it is suggested that additional review be conducted to confirm that the results presented in the tables of Section 4 accurately represent the analytical results presented in Appendix G. The analytical results should then be reevaluated to determine whether the conclusions that were drawn regarding additional sampling needs and characterization of the nature and extent of contamination at the site should be revised.

- Figures should be generated which present the nature and extent of contamination (both the areal and vertical extent) at the site for all contaminant classes and all media sampled. MAIN has included figures demonstrating the extent of contamination for explosives in all media and lead in soils but, has not included figures presenting the extent of contamination for VOCs, SVOCs, pesticides/PCBs, or metals other than lead in any of the media sampled.

Tbl.4-5 Analytical results for samples PBD-1-3 (benzene, 3 J ug/kg, and toluene, 2 J ug/kg) and PB-J-3-1 (chloroform, 6 J ug/kg) have been omitted.

Tbl.4-6 Analytical results for samples BE-F-2-91 (benzene, 1 J ug/kg, and toluene, 5 J ug/kg) and BE-J-6-91 (toluene, 1 J ug/kg) have been omitted.

Tbl.4-7 Analytical results for sample GB-12-1A (trichloroethene, 3 J ug/kg) have been omitted.

Tbl.4-8 According to the data in Appendix G, the qualifier J should be added to the concentration of chrysene (100 J ug/kg) detected in sample PBG-6-1.

The qualifier for the concentration of the compound bis(2-ethylhexyl)phthalate detected in sample PBJ-4-2 710 is incorrect. It should be "U", not "J".

Tbl.4-9 The qualifier J given to the compound 4-methylphenol (1100 ug/kg) detected in sample PBC-1-4 is incorrect according to the data in Appendix G which indicates that this value has no qualifier.

The qualifiers for the compounds 2-methylphenol (760 ug/kg) and 4-methylphenol (1300 ug/kg) detected in sample PBC-1-4A are incorrect. According to Appendix G these values do not have qualifiers.

Tbl.4-10 The qualifier for the concentration of the compound 2,6-dinitrotoluene (760 ug/kg) detected in sample BE-H-3-91 is incorrect. According to Appendix G this value does not have a qualifier.

Tbl.4-11 According to the data in Appendix G, the qualifier J should be added to the concentration of n-nitrosodiphenylamine (1) (580 J ug/kg) detected in sample BE-F-2A-91. The data in Appendix G also indicates that the value for Di-n-butylphthalate in this sample does not have a qualifier (3100 ug/kg).

Tbl.4-12 According to the data in Appendix G, the qualifier "BJ" should be added to the concentration of bis(2-ethylhexyl)phthalate (100 BJ ug/kg) in sample GB-11-1RE.

The qualifier for the concentration of the compound bis(2-ethylhexyl)phthalate (970 ug/kg) detected in sample GB-15-2 is incorrect. According to Appendix G this value does not have a qualifier.

The qualifier for the concentration of the compound bis(2-ethylhexyl)phthalate (860 ug/kg) detected in sample GB-16-2 is incorrect. According to Appendix G, this value does not have a qualifier.

Tbl.4-15 The concentration of 4,4'DDE in sample MW-30 is incorrect. According to Appendix G, the concentration of the compound 4,4'DDE is 20 Y.

Tbl.4-19 Analytical results for the pad boring sample PB-A-1A (2,4-dinitrotoluene 1500 ug/kg) have been omitted.

According to Appendix G, the sample designated PB-D-1-3 is incorrect. The results for RDX (190 Y ug/kg) are from sample PB-D-1-3A.

The qualifiers for the concentration of the compounds 1,3,5-trinitrobenzene (80 ug/kg) and 2,4-Dinitrotoluene (79 ug/kg) detected in sample PB-G-7-1 are incorrect. According to Appendix G these values do not have qualifiers.

Tbl.4-21 Analytical results from samples BE-F-2-91DL (1,3,5-trinitrobenzene 6800 D ug/kg, 2,4,6-trinitrotoluene 25000 D ug/kg, 4-amino-2,6-dinitrotoluene 1900 D ug/kg, 2-amino-4,6-dinitrotoluene 2500 D ug/kg, 2,4-dinitrotoluene 1500 D ug/kg), BE-F-2A-91DL (1,3,5-trinitrobenzene 6800 D ug/kg, 2,4,6-trinitrotoluene 80000 D ug/kg, 2-amino-4,6-dinitrotoluene 2000 YD ug/kg, 2,4-dinitrotoluene 1800 YD ug/kg), and BE-G-1-91RE (1,3,5-trinitrobenzene 86 Y ug/kg, 2,4,6-trinitrotoluene 150 ug/kg, 4-amino-2,6-dinitrotoluene 370 ug/kg, 2-amino-4,6-dinitrotoluene 480, and 2,4-dinitrotoluene 78 Y ug/kg) have been omitted.

Tbl.4-22 Analytical results from sample GB-3-2-RE (1,3,5-trinitrobenzene 150 ug/kg, 4-amino-2,6-dinitrotoluene 280 ug/kg, 2-amino-4,6-dinitrotoluene 200 ug/kg, and 2,4-dinitrotoluene 630 ug/kg) have been omitted.

Tbl.4-24 Analytical results for the ground water sample collected from monitoring well MW-13 (acetone, 4 J ug/kg) have been omitted.

Tbl.4-27 According to Appendix G the qualifier for sample SW-170 (sodium 4850 U ug/kg) is incorrect. It should be "U", not "B".

The qualifier for potassium (3800 B ug/kg) in sample SW-120 is incorrect. According to Appendix G the qualifier "B" is missing.

Tbl.4-29 According to Appendix G, the qualifier "U" should be added to the compounds detected in the following samples: SW-120 (RDX 0.67 U), SW-193 (RDX 1.3 U), and SW-194 (RDX 4.6 U).

Analytical results for sample SW-160DL (RDX 9.4 D) have been omitted.

Appendix C: Soil Boring Logs

The following deficiencies are noted with the soil boring logs:

- boring logs are not provided for all of the monitoring wells;
- sample descriptions are not provided for all sampled intervals;
- sample recoveries are not provided;
- PID and/or FID readings are not provided;

- refusal depths are not noted for all borings; and
- sample descriptions should capitalize only the major (i.e., first) constituent, not all constituents.

Appendix F: Monitoring Well Installation Diagrams

Well installation diagrams have not been provided for all monitoring wells at the site. This information is needed for evaluation of the depth of contamination being detected as well as the potential to detect contamination present in each well.

Appendix I: Hydraulic Conductivity Results

The following deficiencies were noted with the hydraulic conductivity results:

- the formulas used for the calculations are not provided;
- no reference to commercially available software used to analyze the data are provided;
- no listing of formula input variables is provided;
- water levels on the day of the tests are not provided;
- the well depth below the water table is not provided;
- the screened interval below the water table is not provided;
- the aquifer saturated thickness is not provided;
- the variation of the Hvorslev (1951) method used to derive hydraulic conductivity is not provided; and
- no explanation of why most of the wells did not recover to 90 percent of the original static water level is provided.

Because no details of well geometry are provided, it is not possible to determine whether slug displacements caused the water level to drop below the level of the top of the screen. Such a drop makes a significant difference in how the hydraulic conductivities would be calculated by the Bouwer and Rice method.

Based upon the brief description of test procedures provided in Section 2 of the report, it appears that a falling head test was performed. However, all test results are for rising head tests. From the description provided, it appears that water level in each tested well was not allowed to re-equilibrate to static water level

prior to the start of the test. If so, then these test results are invalid.

Appendix J: Analytical Results

The analytical data presented in Appendix G as well as in the tables of Section 4 do not indicate that the results have been validated. The data qualifiers presented in Appendix G are those assigned by the laboratory according to CLP protocol. The data qualifiers presented in the tables of Section 4 are not those that would be assigned to the sample results according to Region II data validation guidelines. The text of the report does not address data validation. MAIN should validate the Level IV and V data in accordance with USEPA Region II data validation guidelines before using it in the characterization of the nature and extent of contamination at the OB/OD Grounds.

The following comments are from EPA's Water Management Division:

1. Please note the Maximum Contaminant Levels (MCLs) and Secondary Maximum Contaminant Levels (SMCLs) for some of the listed contaminants on table 1-2:

Contaminant	MCL(ug/l)	SMCL(ug/l)
Barium	2000	-
Cadmium	5	-
Chromium(total)	100	-
Lead(at tap)	TT*	-
Selenium	50	-
Silver	-	100
Fluorine	-	2000

TT = Treatment Technique
* Action level - 15 ug/l

2. For chemicals listed on table 1-2 that do not have federal or state MCLs, other potential ARARs and criteria that are not ARARs but are to-be-considered (TBC), should be identified.

3. Please note that the Federal EP Tox Limit has been replaced by the Toxicity Characteristic Leaching Procedure (TCLP) limits and the regulatory level for Hg is 0.2 mg/l on table 1-3.

4. A list of Federal Drinking Water maximum contaminant levels should be included within documentation for comparative purposes.

5. Though VOC contamination does not seem to be an issue at this operable unit, it should be noted that the Federal MCL for vinyl chloride in drinking water is 2 ppb whereas the detection limit of Appendix G of the report was 10 ppb.

6. On-site wetlands have been delineated, and they predominantly consist of small man-made emergent areas in which cattail is the most abundant species. Off-site wetlands were identified through examination of NYSDEC wetland maps and aerial photos, followed by field reconnaissance. The sizes of the various on- and off-site wetlands range from less than 1000 square feet to about 3 acres. WMD suggests that field data sheets from the on-site delineation be added to the appendix of the document.

7. Please note that the Section 404 ARAR and Executive Order 11990 require that wetland impacts resulting from future remedial activities be avoided or minimized.

The following comments are from EPA's Air Programs Branch:

APB's primary concern is with contaminated soils which are directly exposed to air and can be a source of airborne fugitive particulate matter. Since the soils are contaminated with metals and explosives, the emission rates of PM_{10} could be estimated and modeled to determine ambient air concentrations at receptors of interest. The results could then be incorporated into the baseline risk assessment. Attached are procedures for estimating PM_{10} emissions and ambient air concentrations.

RECOMMENDATIONS FOR THE PHASE II RI

The PSCROBG currently does not provide a detailed contaminant distribution and migration pathway analysis. Therefore, it is difficult to formulate specific recommendations for Phase II of the investigation. For instance, if a contaminant source area is found in the unsaturated soils, it is critical that there be an understanding of the potential migration pathways available to site contaminants (i.e., ground water flow patterns, vertical/horizontal hydraulic gradients, existence of preferential lithologic zones of contaminant transport, surface water runoff patterns, etc.) so that likely routes of migration may be identified. This allows identification of potentially impacted areas at which sampling may be proposed for Phase II of the RI.

Activities need to be proposed which will accurately define potential migration pathways at the site. Additional monitoring wells should be installed north, south, and southwest of the OB/OD Grounds so that ground water flow patterns may be refined. Subsequent to defining ground water flow patterns at the site, additional monitoring wells may need to be installed to evaluate ground water quality downgradient of potential source areas. Also, surface water runoff patterns should be verified so that additional sampling locations may be proposed which will evaluate these potential migration pathways. Surface soil samples should be collected from areas downwind of the site that may be impacted as

a result of aeolian erosion from potential source areas. Additional sediment and surface water samples should also be collected from Reeder Creek to refine data on the background quality of these media and also to refine the data on the quality of the stream in those sections that are subject to the influence of surface water runoff and/or deposition of soils eroded by wind from the OB/OD Grounds.

Because MAIN has yet to perform a pathways analysis, the following recommendations are based upon our current understanding of potential contaminant migration pathways at the OB/OD Grounds. These recommendations should be considered by MAIN; however, MAIN needs to independently evaluate the data and perform a pathway analysis prior to formulating Phase II RI activities.

Specific recommendations for additional activities at the OB/OD Grounds appear below.

1. We are concerned that ground water flow at the OB/OD Grounds may not be as relatively simple as has been depicted on Plates 3-6 and 3-7. The flow patterns shown for the site indicate that ground water flow is generally from west to east across the site. Although this may be the case, the possibility also exists that, considering the topography of the area and of the competent bedrock, the drainage basin boundary which is located along the western portion of the site, and the location of Reeder Creek relative to the site, that ground water flow may be somewhat radial and include flow to the northeast and southwest.

   Ground water flow patterns need to be adequately defined so that monitoring wells may be installed downgradient of suspected source areas to determine whether an impact to ground water quality is occurring. It is suggested that the ground water elevations for all monitoring wells be considered in the evaluation of ground water flow at the site (an explanation should be provided for any wells excluded from the analysis) and that additional monitoring wells be installed to the north, south, and southwest of the site so that ground water flow patterns at the site may be refined. These additional monitoring wells would also assist in refining data on the quality of ground water at the site. In addition, MAIN should present the methodology that was used to determine the ground water elevation contours so that it may be independently evaluated; in particular, were contours drawn subjectively by computer interpretation or triangulation of data points.

   If, through further evaluation and refinement of ground water flow patterns at the OB/OD Grounds, it is determined that existing monitoring wells do not provide data on the ground water quality downgradient of each of the potential source

areas (burn pads), We suggest that additional monitoring wells be installed to address these data gaps. Because of the potential for migration of contaminants through ground water, data is needed to determine whether potential source areas are impacting ground water quality at and downgradient of the site.

2. Based on a review of the surface water runoff directions presented on Plate 3-1 and the boundaries of the Reeder Creek Drainage Basin shown on Figure 1-9, it appears that along the western boundaries of the site there may be some surface water runoff which flows to the west. In addition, the topography of the area indicates that radial surface water flow patterns may be present at the site. It is suggested that surface water runoff patterns at the site be verified, particularly along the western portion of the site, for it appears that, considering that drainage channels at the site are poorly defined, the patterns that have been shown on Plate 3-1 may be oversimplified.

   If it is found that surface water runoff from potential source areas at the OB/OD Grounds flows to the west, or in other directions previously not evaluated, additional sampling of media is warranted to evaluate potential migration of contaminants along these potential migration pathways. If it is determined that the patterns that are shown on Plate 3-1 are correct, at a minimum, additional samples should be collected from the intermittent stream that originates in the southwestern portion of the site and from the wetland areas that have been identified along the western boundary of the site.

3. An investigation should be conducted of those areas downwind of the OB/OD Grounds that may be subjected to deposition of surface soils eroded from potential source areas. Contaminants detected in surface soils at the OB/OD Grounds may be transported with soil particles to which they have become adsorbed that are eroded from the site by wind. These soils may subsequently be deposited on areas downwind of the site. Samples of surface soils from those areas that are determined to be downwind of potential source areas should be collected and analyzed to evaluate this potential migration pathway.

4. Burn Pad C should be further investigated to determine the nature and extent of contamination at this potential source area. Table 2-8 indicates that relatively high concentrations of benzene (44,500 parts per billion (ppb) and 25,200 ppb) and trichloroethene (19,700 ppb and 13,000 ppb) were detected by MAIN using Level II screening methods in two soil samples collected from Burn Pad C. These soil samples, however, were not subjected to Level IV analyses. In addition, Table 4-4

and Figures 4-6 through 4-9 indicate that the soil sample in which the highest concentration of lead was detected was collected from Burn Pad C. This data suggests that the levels of contaminants present at Burn Pad C may be significantly higher than those concentrations found at the other burn pads. Therefore, further investigation of the nature and extent of contamination at Burn Pad C is warranted and we suggest that additional sampling be conducted at this area during Phase II of the RI. It is also suggested that surface water and sediment samples be collected from the wetland areas to the west and to the east of Burn Pad C that are shown on Plate 2-5 to determine whether these wetlands have been impacted by the past activities at Burn Pad C.

5. The text of the PSCROBG describes two tills at the OB/OD Grounds, a "clay-rich" till and a "sandy/gravely" till. However, these two tills have not been shown in any figures. It is suggested that, since a "clay-rich" till may be a deterent to vertical migration pathways, MAIN delineate these two tills and present a figure showing the extent of each at the site. If these two tills have not been fully delineated with the data that was obtained during Phase I of the investigation, MAIN may wish to install additional borings which would allow a more complete delineation of these two tills.

6. Analytical data from surface water sampling location SW-120 indicates that contaminant migration from the source area is occurring. This may be evidence of radial flow and discharging ground water, wind blown deposits and/or more varied surficial runoff patterns than indicated. Additional sampling along the stream is warranted to ascertain the origin and potential pathways of contaminant migration.

7. A review of Appendix J and the tables presented in the report has shown that analytical data has not yet been adequately validated. All data must be validated in accordance with USEPA Region II guidelines prior to using this data to characterize the site and support a risk assessment and a feasibility study.

8. An aquatic biota assessment within the unnamed stream present on the site was not proposed. Although this area would not be expected to provide fisheries habitat, a macroinvertebrate community would be present within the stream. Therefore, it is recommended that aquatic biota assessments be performed within the intermittent stream/ditch.

Hydrogeology

1. As previously stated, we are of the opinion that the ground water flow patterns that have been determined for the site,

and which are presented on Plates 3-6 and 3-7, may be oversimplified. We suggest that the data used to calculate the ground water elevation contours be reevaluated and that the ground water elevations in all monitoring wells be included in the analysis or an explanation be provided which justifies their exclusion. We also suggest that additional monitoring wells be installed north, south, and southwest of the site to further refine ground water flow patterns. Ground water flow directions need to be verified to assure that ground water quality downgradient of potential source areas is being monitored.

2. The discussion presented in Section 3 (page 3-15, paragraph 5) of the PSCROBG of average hydraulic conductivity (K) values is confusing and should be revised. The text should explain why the average values for overburden wells included only those wells completed by MAIN. The text states that, based upon their calculations, "there is little significant variation between the hydraulic conductivities of the glacial till and those for the weathered shale." However, the average values for till and weathered bedrock presented in Table 3-8 indicate a consistent order of magnitude difference between the two materials when looking at the results of each method, independently. Hydraulic conductivity data needs to be re-evaluated and, if necessary, the wells retested to more accurately determine aquifer hydraulic conductivities.

3. The hydrogeologic analysis should discuss vertical gradients in relation to actual vertical gradients between wells, not in terms of head differences between well pairs. The correct method of calculating vertical gradient is to divide the head elevation difference between two wells by the difference in the center point elevation of the respective well screens. Both the text and Table 3-7 should be revised.

I did not receive comments from EPA's Hazardous Waste Facilities Branch and Environmental Impacts Branch in time to be included in this letter. For that reason, we will be sending additional comments in the near future. If you have any questions, do not hesitate to contact me at (212) 264-4595.

Sincerely yours,

C. Struble

Carla M. Struble
Federal Facilities Section

Attachment

cc: G. Kittel, SEAD
K. Healy, USACE
K. Gupta, NYSDEC
M. Duchesneau, Main

DEPARTMENT OF THE ARMY
SENECA ARMY DEPOT
ROMULUS, NEW YORK 14541-5001

REPLY TO
ATTENTION OF

June 29, 1992

Office of Engineering/Environmental
Management Division

Carla Struble, Project Manager
Federal Facilities Section
Room 2930
Region II
United States Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

Dear Ms. Struble:

The purpose of this correspondence is three fold. First, this is to furnish the USEPA and NYSDEC with a copy of the public notice of availability of the Administrative Record file for the Open Burning (OB) Grounds Operable Unit. Secondly, I am furnishing both the USEPA and NYSDEC with a news release announcing the establishment of OB Grounds Administrative Record file.

In accordance with Section 31.3 of the IAG, any party issuing a formal press release to the media regarding any of the work required by the IAG shall advise the other parties atleast two (2) business days before issuance of such release.

lastly, I am providing copies of a fact sheet that describes the files which have been established for public inspection at the Romulus Town Hall. This fact sheet, along with the enclosed legal notice and press release, will be mailed to all individuals on the revised CRP mailing list in the near future.

If you have any questions or comments regarding this, or any other efforts by Seneca Army Depot to implement the Community Relations Plan, please contact Mr. James Miller at (607) 869-1532.

Sincerely,

Stephen M. Absolom
Chief, Engineering/Environmental
Management Division

Copy Furnished:

Kamal Gupta, Project Manager, Federal Projects Section, Bureau of Eastern Remedial Action, Division of Hazardous Waste Remediation, New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233-7010

Public Affairs Office

Seneca Army Depot
Romulus, N.Y.
14541-5001
(607) 869-1235

NEWS RELEASE

For immediate release: July 10, 1992 **Release no.: 92-13**

Open Burning Ground site documents available

ROMULUS, NY --- Seneca Army Depot, in cooperation with Romulus Town officials, has established an Administrative Record File at the Romulus Town Hall for the Depot's contaminated Open Burning (OB) Grounds site.

The OB Grounds Administrative Record File is in addition to two other files that were established in March of 1992. The other files include an Administrative Record File for the depot's contaminated ash landfill site and an Information Repository.

The Information Repository and Administrative Record Files are separate files designed to provide the public with information concerning known-contaminated sites recognized by the Environmental Protection Agency. The files are traditionally established when an installation enters the Remedial Investigation/ Feasibility Study (RI/FS) process for two reasons; to inform the public and to solicit public participation in choosing an appropriate remedial action.

The Administrative Record Files, that have been established for the OB grounds and Ash Landfill site, are legal files that contain a compilation of documents. These documents record the Army's decision-making process regarding the selection of a response action to be taken at a site. The legal files will serve as the basis of judicial review and document the Army's consideration of all significant public comments.

The Information Repository, which has been established for all areas of potential contamination including the Ash landfill and Open Burning Grounds sites, is a place where items pertaining to a response action at a site are stored and made available for public inspection and copying.

Comments concerning any of the documents contained in either the Information Repository or Ash Landfill and OB Grounds Administrative Record Files should be sent in writing to the Public Affairs office, Seneca Army Depot, Romulus, New York, 14541-5001.

The Information Repository and Administrative Record Files are available for review during normal business hours at:

The Romulus Town Hall
1435 Prospect Street
Willard, New York
(607) 869-9326

NOTICE OF PUBLIC AVAILABILITY

SENECA ARMY DEPOT ANNOUNCES THE AVAILABILITY OF THE ADMINISTRATIVE RECORD FOR THE OPEN BURNING (OB) GROUNDS SITE SENECA ARMY DEPOT, ROMULUS, NEW YORK

Seneca Army Depot announces the availability for public review of files comprising the Administrative Record for the selection of remedial action at the OB Grounds site, Seneca Army Depot, Romulus, New York. Seneca Army Depot seeks to inform the public of the availability of the record files at a repository located in the Romulus Town Hall, Willard, New York. Seneca Army Depot encourages the public to comment on documents as they are placed in the record file.

The Administrative Record File includes documents which form the basis for the selection of a remedial action at this site. Documents now in the record file include a Remedial Investigation/Feasibility Study (RI/FS) Workplan. Other documents will be added to the record files as site work progresses. These additional documents may include, but are not limited to a Community Relations Plan, RI/FS Reports, other technical reports, and new data submitted by interested persons.

The Administrative Record File is available for review during normal business hours (8:00 A.M. - 4:30 P.M.) at:

The Romulus Town Hall
1435 Prospect Street
Willard, New York
(607) 869-9236

Written comments on the Administrative Record should be sent to:

Jerry Whitaker
Public Affairs Officer
Seneca Army Depot
ATTN: SDSSE-PAO
Romulus, New York 14541-5001

Public Affairs Office

Seneca Army Depot
Romulus, N.Y.
14541-5001
(607) 869-1235

FACT SHEET

For immediate release: July 10, 1992 **Release no.: 92-04**

Second Administrative Record Established

Seneca Army Depot recently established the second of two Administrative Record Files in the Romulus Town Hall, Willard, N.Y. The second Administrative Record File has been developed for the depot's Open Burning (OB) Ground site.

The Administrative Record File is the collection of documents which form the basis for the selection of a response action at a Superfund site. Under Subpart 1 of the National Contingency Plan (NCP), Title 40 Code of Federal Regulations (CFR), Section 300.800, the Army is required to make a copy of the Administrative Record File for Superfund response actions and to make the copy of the Administrative Record File available at or near the site.

To ensure that the public has access to the Administrative Record File, the file must be reasonably available for public review during normal business hours. The record file should be treated as a noncirculating reference document. This will allow the public greater access to the volumes and also minimize the risk of loss or damage. Individuals may photocopy any documents contained in the record file, according to the photocopying procedures in place at the Romulus Town Hall.

The documents in the Administrative Record File may become damaged or lost during use. If this occurs, please notify the Public Affairs Officer at Seneca Army Depot at (607) 869-1235. Periodically, additional supplemental volumes and indexes will be added by Seneca Army Depot staff.

The Administrative Record File will be maintained at this local repository until further notice. The Army welcomes comments at any time on documents contained in the Administrative Record File.

The Army may hold formal public comment periods at certain stages of the response process. The public is urged to use these formal review periods to submit their comments.

Questions, comments, and requests for further information concerning the Administrative Record File, should be forwarded to: Jerry Whitaker, Seneca Army Depot, Public Affairs Office, Romulus, New York, 14541-5001, or call (607) 869-1235.

ENGINEERING-SCIENCE, INC.

Prudential Center • Boston, Massachusetts 02199 • (617) 859-2000 • Fax: (617) 859-2043

March 11, 1993

Mr. Michael Stahl
CEHND-PM-E
U.S. Army Corps of Engineers
Huntsville Division
106 Wynn Drive
Huntsville, AL 35805

SUBJECT: **Delivery Order J, Open Burning Grounds, February Monthly Field Report**

Dear Mr. Stahl:

This letter is intended to update you regarding the current status of Delivery Order J, at the Seneca Army Depot (SEAD). The objective of this delivery order is to implement the Open Burning (OB) grounds workplan. ES received EPA and NYSDEC comments on the PSCR submittal, and prepared an addendum to the original workplan, which was submitted to EPA on or about September 23, 1992. ES and the COE negotiated a cost proposal based upon this workplan addendum. ES recieved approval of the workplan addendum from NYSDEC, however, EPA had additional comments. Following negotiations conducted during a phone conference call on or about December 16, 1992, EPA agreed to allow Phase 2 fieldwork. An additional addendum, addendum #2, of the original workplan was prepared to incorporate these final EPA comments. Following COE approval, the addendum changes were issued to both EPA and NYSDEC on January 5, 1993. Since the work described in addendum #2 involves out of scope work, a contract modification is required. ES proceeded with the Phase 2 fieldwork, as described in the oringinal SOW but ES is awaiting approval of this contract modification before proceeding with the additional field tasks.

Field mobilization began on November 30, 1992 and fieldwork was performed during December and a portion of January. The site was demobilized during January. The following describes the current tasks which have been completed:

SOW 1	The workplan has been revised and approved,
SOW 2	UXO site clearance continues, as required,
SOW 3	All berm excavations have been completed,
SOW 4	Pad borings have been completed, however, additional shallow borings will be performed as part of the contract modification,
SOW 5	All grid borings have been performed,
SOW 6	Low hill excavations and sampling has been completed but additional samples will be collected as part of the modification,
SOW 7	All overburden wells have been installed,
SOW 8	All groundwater levels have been determined,
SOW 9	All surface water samples have been collected,

SOW 10	The biotic assessment has been delayed until spring as part of the workplan addendum negotiations with EPA and NYSDEC,
SOW 11	The runoff delineation has been performed,
SOW 12	All downwind soil samples have been collected,
SOW 13	All background borings have been performed,
SOW 14	Groundwater sampling is currently on-going,
SOW 15	Soil analyses data has been received from Aquatec for most of the samples submitted,
SOW 16	Groundwater samples are being submitted now.

Groundwater sampling protocols have been finalized between the COE, EPA and NYSDEC. Groundwater sampling, originally scheduled for the first thru third weeks in February, was delayed until the first week in March as a result of a concern raised by NYSDEC pertaining to turbidity. NYSDEC will not permit groundwater data from filtered monitoring wells to be used to determine compliance with ARARs, i.e. clean-up standards. As a result, low turbidity groundwater samples are a necessity in order to avoid a remedial action where unnecessary. The first round of groundwater data, which included batch filtered and unfiltered samples, indicated a large difference between the concentrations of heavy metals. Non-filtered, turbid samples always contained higher concentrations of heavy metals. ES proposed to alter the order of sampling and to eliminate the use of bailers for sampling. Turbidity usually increases as sampling time increases because the water in the well has not settled as much. Bailers cause a "surge" effect in the well which disturbs the sediment in the well and the surrounding well sand pack causing turbid samples. Following a series of correspondences and phone negotiations an agreement was achieved. Sampling commenced during the first week in March. Field reports indicates that turbidity values are less that the 50 NTU cutoff value for most of the wells sampled so far.

ES is awaiting approval to proceed with the contract modification tasks.

Please feel free to contact me at 617-859-2492 if you have any questions regarding this matter.

Sincerely,

ENGINEERING-SCIENCE, INC.

Michael Duchesneau,P.E.
Project Manager

cc: Mr. Kevin Healy, COE Huntsville
Mr. Randall Battaglia, SEAD
Mr. John Biernacki, DESCOM
Mr. K. Hoddinott, USAEHA
Ms. Wilson, CETHA-IR-S
CEMRD-EP-C

ENGINEERING-SCIENCE, INC.

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March 11, 1993

Mr. Michael Stahl
CEHND-PM-E
U.S. Army Corps of Engineers
Huntsville Division
106 Wynn Drive
Huntsville, AL 35805

SUBJECT: **Delivery Order K, Ash Landfill, February Monthly Field Report**

Dear Mr. Stahl:

This monthly field report describes the recent field activities, conducted in January and February, associated with the remedial investigation currently underway at the Ash Landfill. ES received EPA and NYSDEC comments on the PSCR submittal, and prepared an addendum to the original workplan, which was submitted to EPA on or about September 4, 1992. The COE issued a SOW and negotiated a cost proposal based upon this workplan addendum with ES. ES recieved approval of the workplan addendum from NYSDEC, however, EPA had additional comments. An additional addendum, addendum #2, of the original workplan was prepared to incorporate these final EPA comments. Following negotiations conducted during a phone conference call on or about November 18, 1992, EPA approved the Phase 2 fieldwork. Since the work described in addendum #2 involves out of scope work, a contract modification was required. ES proceeded with the Phase 2 fieldwork, as described in the original SOW but ES is awaiting approval of the contract modification before proceeding with the additional field tasks.

The activities are being conducted in full compliance with the requirements of the Engineering-Science (ES) Phase 2 workplan addendum and the addendum letter of November 19, 1992.

Field mobilization commenced on November 30, 1992. Field sampling began the week of December 6, 1992. Following a slight Christmas break, additional field tasks were completed during the first and second week in January. Some original, approved, field tasks have not been performed because ES is awaiting the notice to proceed with the field tasks identified in the contract modification. For example, the remaining 4 soil borings to be performed in the Ash Landfill have not been performed since these borings will be located based upon a soil gas survey which is part of the contract modification. Further, since additional wells are planned as part of the contract modification, groundwater sampling has been postponed since the sampling round should sample all the wells at once. In summary, this project has ceased activities since ES is awaiting approval to proceed with the contract modification.

The following summarizes the SOW field tasks were performed in December and in January:

SOW Task 1 The workplan addendum was completed in November,
SOW Task 2 Completed all 5 test pits in the Ash Landfill,
SOW Task 3 Completed all 5 test pits in the Non-Combustible Fill Landfill (NCFL),
SOW Task 4 Performed 4 of the required 8 soil borings in the Ash Landfill,

SOW Task 5 Completed all 5 soil borings in the NCFL
SOW Task 6 None of the 7 overburden wells has been installed,
SOW Task 7 Completed the Photo-Linement Analysis,
SOW Task 8 Completed the Fracture Trace Analysis,
SOW Task 9 The seismic survey has not started, since it will be deleted as part of the cost modification,
SOW Task 10 The downhole geophysics has not started, since it will be deleted as part of the cost modification,
SOW Task 11 The installation of bedrock wells has not started, since it will be amended as part of the cost modification,
SOW Task 12 Sampling of the groundwater wells has not begun since additional wells will be installed as part of the cost modification,
SOW Task 13 Aquifer Charaterization has not begun since all the monitoring wells are not installed,
SOW Task 14 All surface water/sediment samples have been collected,
SOW Task 15 Surveying has been performed for the test pits and the soil borings performed to date,
SOW Task 16 Soil sample data from the 9 soil borings performed has been received from Aquatec,
SOW Task 17 No groundwater samples have been submitted to Aquatec.

Groundwater sampling protocols have been negotiated and finalized with EPA and NYSDEC. These protocols will be implemented for all groundwater sampling activities at this site.

If you have any questions regarding this or any other project, please, do not hesitate to call me at 617-859-2492.

Sincerely,

PARSONS MAIN, INC.

Michael Duchesneau, P.E.
Project Manager

cc: Mr. Kevin Healy, COE Huntsville
Mr. Randall Battaglia, SEAD
Mr. Tim Toplisek, DESCOM
Mr. K. Hoddinott, USAEHA
Ms. Wilson, CETHA-IR-S
CEMRD-EP-C

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March 11, 1993

Mr. Michael Stahl
CEHND-PM-E
U.S. Army Corps of Engineers
Huntsville Division
106 Wynn Drive
Huntsville, AL 35805

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