



**ACTION MEMORANDUM
FOR
REMOVAL ACTION AT SITE 22A**

**MISCELLANEOUS AREAS OPERABLE UNIT
CRAB ORCHARD NATIONAL WILDLIFE REFUGE
SUPERFUND SITE**

MARION, ILLINOIS (WILLIAMSON COUNTY)

PREPARED BY:

**U.S. DEPARTMENT OF THE INTERIOR
U.S. FISH & WILDLIFE SERVICE
CRAB ORCHARD NATIONAL WILDLIFE REFUGE**

April 1996



**DECLARATION FOR THE ACTION MEMORANDUM
CRAB ORCHARD NATIONAL WILDLIFE REFUGE
MISCELLANEOUS AREAS OPERABLE UNIT
SITE 22A**

SITE NAME AND LOCATION

Sangamo/Crab Orchard National Wildlife Refuge
Marion, Illinois

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected removal action for Site 22A, Miscellaneous Areas Operable Unit (MISC OU) at the Crab Orchard National Wildlife Refuge Site near Marion, Illinois, which was chosen in accordance with Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Contingency Plan (NCP). The information supporting this decision is contained in the Administrative Record file for Site 22A.

ASSESSMENT OF THE SITE

Based on the findings of the Remedial Investigation (RI) Report (1996) for Site 22A of the MISC OU prepared by Woodward Clyde, soil and biota have been affected at Site 22A. The site contains semivolatiles such as pentachlorophenol and dioxin compounds above background concentrations. From the receptors evaluated, potential ecological risks to the mouse, robin, fox, quail, and hawk are identified. Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.


DESCRIPTION OF THE SELECTED ACTION

The action for Site 22A addresses the principle threats posed through removal to the maximum extent practicable of contaminated soils and containment of the residues. The major component of the action include: 1) excavation of contaminated soils; 2) on-site disposal of contaminated soils in the landfill constructed for the Metals Areas Operable Unit; and 3) backfilling with clean soil/rock.

This action is considered "time critical" because there are less than six months prior to remediation due to pending closure of the landfill. This is an opportunity to accelerate remediation and provide for rapid risk reduction. This removal action will be conducted by the Lead Department, U.S. Fish and Wildlife Service, on behalf of the Department of the Interior.

DECLARATION

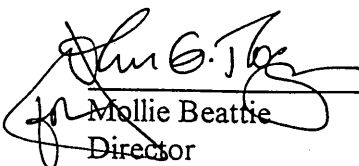
The action is protective of human health and the environment, attains Federal and State requirements that are legally applicable or relevant and appropriate for this action, and is cost-effective.



Bonnie R. Cohen
Assistant Secretary
Policy, Management and Budget
Department of the Interior

4/17/96

Date



Mollie Beattie
Director
U.S. Fish and Wildlife Service
Department of the Interior

4/17/96

Date

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**ACTION MEMORANDUM
FOR
TIME-CRITICAL REMOVAL ACTION AT SITE 22A
MISCELLANEOUS AREAS OPERABLE UNIT
CRAB ORCHARD NATIONAL WILDLIFE REFUGE SUPERFUND SITE
MARION, IL (WILLIAMSON COUNTY)**

April 1996

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I. PURPOSE

The purpose of this Action Memo is to document approval of the proposed removal action described herein for Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard National Wildlife Refuge (CONWR) Superfund Site, Marion, IL (Williamson County). Site 22A is also referred to as the former Wood Post Treatment Facility. The proposed removal action would minimize potential unacceptable risk posed by pentachlorophenol and dioxins to the public health or welfare, and the environment. The proposed response action consists of excavation of contaminated soils and disposal in the on-site landfill constructed for the Metals Areas Operable Unit. This action is considered "time critical" because there is less than six months prior to remediation due to pending closure of the Metals OU landfill. This is an opportunity to accelerate remediation and provide for rapid risk reduction. This removal action will be conducted by the U.S. Fish and Wildlife Service, on behalf of the Department of the Interior.

II. SITE CONDITIONS AND BACKGROUND

This section details the removal site evaluation. The removal site evaluation provides an overview of the site's history and current characteristics, reports the nature of the contamination, evaluates the potential pathways of exposure, and assesses the potential risk to human health and the environment.

A. Site Description

Crab Orchard National Wildlife Refuge (CONWR) is located approximately 5 miles west of Marion, Illinois and is bordered by Illinois Route 13 to the north and Interstate 57 to the east. CONWR is near the center of the southern tip of Illinois, with the Mississippi

River about 25 miles to the west and the Ohio River about 55 miles to the east/southeast. (EE/CA, Parsons Engineering Science, August 1995) (Refer to Figure 1-1)

The refuge consists of 43,500 acres and encompasses Crab Orchard Lake, a 7,000-acre man-made reservoir. The topography of the northern portion of the CONWR is relatively uniform, characterized by flat to moderately sloping areas.

The area was the former Illinois Ordnance Plant (IOP) operated by the War Department. The former IOP consisted of approximately 22,480 acres. The IOP was a load, assemble, and pack facility and produced high explosive general purpose bombs, anti-tank mines and shells/projectiles. Ownership of the property was transferred to the Department of the Interior in 1947.

CONWR has four broad management objectives and uses: wildlife management, agricultural development, recreational use, and industrial use. Recreational activities at the CONWR include camping, hiking, swimming, boating, fishing, and hunting. Agricultural uses include farming and livestock grazing in the summer. In the winter, the agricultural areas are used as a sanctuary for migratory geese and other waterfowl. Current industrial usage of the former IOP site includes explosives, sporting goods, woodworking, and other light manufacturing. The ammo igloos are used as storage warehouses. (EE/CA, Parsons Engineering Science, August 1995).

Site 22A is located in Area 4 of an industrial complex.

1. Removal site evaluation

The removal site evaluation includes a removal preliminary assessment. The information for the preliminary assessment is readily available from the Remedial Investigation (RI) for the Miscellaneous Areas Operable Unit, Crab Orchard National Wildlife Refuge Superfund Site. (Woodward Clyde, 1996). The RI describes the history of Site 22A, characterizes the types and levels of contaminants, potential pathways of exposure, and the potential risk to human health and the environment.

The Site 22A was part of the former shop and maintenance yard (Old Refuge Shop) for the Refuge. Site 22A consists of an area where sign and fence posts were treated with diesel fuel containing pentachlorophenol and allowed to drip dry (O'Brien and Gere, 1988).

This site was investigated as part of the Miscellaneous Areas Operable Unit. Phase I of the RI reported elevated concentrations above preliminary levels of concern (Woodward Clyde 1994). The final RI (Woodward Clyde, 1996) reports that levels of pentachlorophenol, dioxins, and other co-contaminants present in the soils pose a potential risk to ecological receptors above criteria established by USEPA for potential adverse

effects. Additionally, if a more intensive use occurs by site workers, a potential unacceptable risk to humans could result.

2. Physical location

Site 22 A is located north of Crab Orchard Lake as depicted on Figure 1-2. The site is located in an industrial complex (Area 4) west of Route 148 South and approximately ½ mile south of the intersection of Route 148 South and Old Highway 13. Area 4 is located within the closed sanctuary of Crab Orchard National Wildlife Refuge, thus access is restricted to the general public. The majority of the site is situated immediately west outside the fence of the Old Refuge Shop Complex. A portion of the site is located along the north side inside the fence. This site is adjacent to an unnamed channel which flows into Pigeon Creek (Refer to Figure 1-3). The unnamed channel was remediated for cadmium, chromium, lead, and cyanide contamination as part of the Metals Operable Unit by the Department of the Interior in Fall - Winter 1995.

3. Site characteristics

A portion of the site within the fenced area of the Old Refuge Shop Complex is currently used for staging equipment by U.S. Fish and Wildlife Service and a tenant. The rest of the site is an open field which may be mowed periodically for maintenance of utilities (sewer lines).

Former wood treatment operations conducted by the U.S. Fish and Wildlife Service are believed to have caused the contaminated soils. Most likely, the posts were dipped into a tank of the wood preservative. The tank is believed to have been located in a small building/shed. The posts were set out to dry in a gravel area which extended from the building to the west. The area of concern at Site 22A is the area surrounding the small building/shed and the gravel pad.

Aerial photos indicate that the building and gravel area were not present in 1951, but were present from 1960 through 1971 (USDA, 1951, 1960, 1965, and 1971; USGS, 1963) (Refer to Figure 1-5). The 1960 photo indicates that additional activities, possibly related to the post treating operations, occurred in an area approximately 20 feet due east of the former building. The site area is estimated to be two acres. There is currently no physical evidence of the building at the site, and the gravel pad is overgrown with vegetation (Woodward Clyde, 1996).

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

The RI (Woodward Clyde, 1996) included the collection and analysis of surface soils, subsurface soils, sediment, groundwater, and biota. The RI was conducted in two phases; Phase I which was conducted in early 1993, and Phase II which was conducted in two stages from December 1993 through December 1994. Phase I activities included the sampling and analysis of soil and sediment. Phase II RI activities included installation of groundwater monitoring wells, sampling and analysis of groundwater, additional sampling and analysis of soil, sediment, and biota. The RI reports the presence of concentrations of hazardous substances as defined by section 101 (14) of CERCLA. Concentrations of pentachlorophenol upward to 3200 ug/kg (or 3.2 ppm), dioxin toxic equivalents upward to 3.8 ppb, and other semivolatiles, several pesticides, and a group of metals were reported in surface soils. Dioxin toxic equivalents are the conversion of concentrations of various compounds of dioxins to a number representative of 2,3,7,8 tetrachlorodibenzo-p-dioxin. Low levels of acetone (possibly a laboratory artifact) and dioxins/furans were measured in some of the groundwater samples; the detection of dioxins/furans may reflect suspended solids in the samples.

The elevated concentrations of hazardous contaminants may impact human health and the environment via several potential pathways. The pathways which offer the greatest potential threat for the transport of the compounds of concern are identified as the pathways of concern. Based upon Phase I data, the pathways of concern are fugitive dust emissions, foot traffic, surface runoff, and leaching into shallow groundwater. Phase II data indicated the presence of contamination in surface soils and subsurface soils to depths of at least 10 feet as well as in shallow groundwater. In addition, the analyses of grass samples showed the presence of dioxins/furans. Based on these new data, transport by groundwater and dispersal of vegetation should be added to the list of potential pathways of concern identified during Phase I. Table 1 lists the specific contaminants and maximum concentrations reported. Figures 5-10 thru 5-12 report the contaminants and concentrations associated with the sampling locations. The highest concentrations reported are immediately upgradient to the bank of the unnamed channel.

5. NPL status

Site 22A is one of several areas under investigation/remediation for the Crab Orchard National Wildlife Refuge CERCLA Site. The Crab Orchard National Wildlife Refuge was listed on the NPL as published in July 22, 1987 Federal Register (52 FR 27620).

6. Maps, pictures and other graphic representations

Please refer to appendices.

B. Other Actions to Date

1. Previous actions

- o A meeting was held in March 1994 to provide information to the public on the results of the Phase I investigation and the next steps of the process.
- o Any contamination which may have migrated into the unnamed channel north of the site has been remediated as part of the Metals Areas Operable Unit. As part of the Metals Areas remediation, storm water diversion berms were constructed to prevent storm water from entering the channel. Along the northern area of Site 22A in Summer 1995, a berm was placed on plastic above ground and remains intact. This measure minimizes potential contaminants from entering into the unnamed channel.

2. Current actions

- o A removal action is proposed to minimize potential risks from pentachlorophenol and dioxin contamination.

C. State and Local Authorities' Roles

1. State and local actions to date

This site is part of the Miscellaneous Areas Operable Unit due to Illinois Environmental Protection Agency's (IEPA) request to the Department of the Interior for inclusion in the Federal Facility Agreement.

The RI field activities were conducted under the oversight of Illinois Environmental Protection Agency. The RI report was reviewed by IEPA through the Federal Facility Agreement process.

2. Potential for continued State/local response

The U.S. Fish and Wildlife Service will continue to consult with the other agencies of the Federal Facility Agreement to ensure actions are conducted in compliance with regulatory standards and relevant and appropriate guidelines.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

CERCLA section 104(a) authorizes removal responses "whenever (A) any hazardous substance is released or there is a substantial threat of such a release into the environment,

or (B) there is a release or substantial threat of release into the environment of any pollutant or contaminant which may present an imminent and substantial danger to the public health or welfare.”

A. Threats to Public Health or Welfare

It is important to understand what these contaminants through various pathways of concern mean in terms of potential risk to human health and the environment.

A baseline risk assessment completed as part of the RI considered ingestion, dermal contact, and inhalation pathways for exposure of occasional site workers, hypothetical construction workers, and hypothetical recreational receptors to soil, groundwater, surface water, fish and deer meat.

Risk is reported in terms of noncarcinogenic hazard index and excess lifetime cancer risk. If the calculated noncarcinogenic index does not exceed 1.0, no potential adverse effects are expected. Likewise, USEPA established a target range of 1×10^{-6} to 1×10^{-4} cancer risk for exposure to chemicals released from hazardous waste sites.

For site workers the highest calculated noncarcinogenic hazard index was 0.009 which does not exceed 1. The highest excess lifetime cancer risk calculated for site workers was 3×10^{-5} . This is within USEPA’s target range. The primary contributor to the risk was dermal contact with dioxin and dioxin-like compounds in surface soil. If a more intensive exposure of longer hours and/or more direct contact with soils occurs, this could potentially create an unacceptable risk for site workers.

For construction workers, the highest calculated noncarcinogenic hazard index was 0.006 which is below 1. The highest excess lifetime cancer risk calculated for construction workers was 1×10^{-6} . This is within USEPA’s target range. The primary contributors to risk were ingestion and dermal contact with dioxin and dioxin-like compounds in soil.

The highest calculated noncarcinogenic hazard index for recreational receptors/trespassers was 0.001 which is less than 1.0. The highest excess lifetime cancer risk calculated for recreational receptors/trespassers was 1×10^{-5} . This is within USEPA’s target range. The primary contributor to the risk was ingestion of deer meat containing dioxin and dioxin-like compounds. The risk is conservatively estimated because Site 22A is approximately 2 acres in size while the average deer grazing range is approximately 240 acres.

B. Threats to the Environment

The risk assessment of the RI for Site 22A evaluated two scenarios, the Likely Maximum Exposure (LME) and the Central Tendency Exposure (CTE). The LME scenario evaluated exposures based on a more conservative approach using the maximum

concentrations reported while the CTE scenario evaluated exposure from average concentrations. The results conclude the presence of dioxins in soils and sediments at this site could pose a potential risk, based on a toxicity equivalent basis, to most of the environmental receptors (mouse, robin, quail, fox, and hawk) evaluated. For the LME exposure, the calculated hazard quotient ranges upward to 13,000 for mice, 4 orders of magnitude greater than 1. One (1) is a number established for potential of adverse effects. Based on the LME scenario, the other contaminants of concern at this site include total PCB Aroclors, 4,4-DDT, 4,4-DDE, 4,4-DDD, pentachlorophenol, mercury, selenium and zinc for the robin; and pentachlorophenol, mercury, selenium and zinc for the mouse. For the CTE scenario, the contaminants of interest are reduced to dioxins, mercury, and selenium for the mouse, and dioxins for the robin. (Refer to Table 2 for a list of the calculated results of potential risk.) The potential risk from mercury and selenium are conservatively estimated because the toxicity of these contaminants was based on their organic forms which tend to be the most toxic forms. No evidence exists to suggest the form of mercury or selenium present at the site.

A study of "Starlings as Avian Model and Monitors of Remedial Effects at Crab Orchard National Wildlife Refuge" is being conducted by Southern Illinois University at Carbondale (Halbrook, 1995). The nest boxes for the Metals Sites were located in the area of Site 22A due to its proximity to the Metals Site. The preliminary results indicates increased liver EROD activity, and severe anemia, and high mortality observed in chicks prior to 15 days post-hatch at the Metals site as compared with reference sites. The study cites "cadmium is bioaccumulating in starlings at the metals site, however, no evidence of toxic levels is observed. Lead and cadmium concentrations in pre-15 day old chicks and lead in 15 day old chicks were not different among sites." Although the study focused on Metal and PCB contamination, it is not known to what extent impacts of pentachlorophenol and dioxin contamination from Site 22A may have been reflected in this data.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

1. Proposed action description

It is proposed that a removal action be completed to minimize the potential risks to site workers and the environment. The proposed action consists of excavation and removal of

contaminated soils and disposal in the landfill constructed for the Metals Areas Operable Unit. It is suggested that a barrier be placed to discourage use by burrowing animals and covered with clean backfill. This would be a time-critical removal action as authorized by Section 14.5 of the Federal Facilities Agreement as signed by the Department of the Interior.

The concentrations of pentachlorophenol and dioxins are below land ban criteria. The Service believes the construction of the landfill is suitable for receipt of these materials. The landfill for the Metals Areas Operable Unit was constructed in accordance with 35 Illinois Administrative Code 811 requirements as approved by USEPA and IEPA. These requirements include placement of a subgrade, combination of clay liner and geosynthetic liner, and leachate collection in accordance to specifications. Additionally, Woodward-Clyde, March 8, 1996, reviewed the suitability of certain near surface soils at Site 22A for disposal in the landfill designed for the Metals Areas OU and to verify the capacity of the landfill to receive the soils.

The evaluation for potential ground water impacts concludes that the materials are not expected to leach at concentrations exceeding the maximum allowable leachate concentrations reported in the Groundwater Impact Assessment (GIA) (Woodward-Clyde 1994). Although 4,4-DDT, manganese, and silver were not included in the GIA model, these contaminants are not expected to leach at concentrations of concern. Acetone detected is believed to be a laboratory artifact.

To accommodate the volume of soil from the site, the landfill cover slope would be increased from the current 5% slope. The area of concern is an estimated 2 acres. Based on latest available data, a risk management decision has been made to remove 2.5 feet. Other waste management streams include protective equipment, such as tyvek suits, gloves, and booties and decontamination equipment and liquids. The decontamination liquids will be treated for compliance with discharge criteria. The current plan is to directly load the excavated soil into the trucks for hauling. Should intermittent storage be necessary, it will be completed in accordance with Illinois's standards for management of piles. Stormwater diversion berms will be constructed to manage surface water run-on and contain surface water run-off. This removal will generate approximately 5300 cubic yards of soil for disposal into the on-site landfill. It is recommended that the slopes not exceed 13%. Increasing the slope to 13% would provide for an approximate capacity of 14,000 cubic yards, more than adequate for the volume of contaminated soils from Site 22A based on the proposed excavation. The design should be modified to require placement of a geonet to provide drainage in the cap for additional stability. Off-site disposal from the Refuge is not required since the material will be disposed of in the Metals Areas Operable Unit landfill located off Ogden Road. The proposed area of excavation is delineated on Figure 1.

Further sampling is needed to better delineate the extent of soil contamination. Samples

will be collected prior to mobilization to refine the area of excavation. Post verification sampling will be performed. EPA approved sampling plans will be modified to reflect sampling method and locations. Based on sampling results, Figure 1 may be revised. Residual levels of pentachlorophenol and dioxins are expected to remain after completion.

2. Contribution to remedial performance

The proposed removal action will, to the maximum extent practicable, contribute to the efficient performance of any long-term remedial action through removal of contaminated soils and placement of a cover. The cover will add further protection by minimizing contact with residual contamination. This site has been identified by the RI as posing a potential risk and is thus recommended for consideration of evaluation of cleanup in the Feasibility Study. No further action is anticipated to be required due to implementation of the proposed removal action.

3. Description of alternative technologies

Other alternative technologies considered in addition to the proposed removal action of land disposal include 1) incineration, 2) bioremediation, 3) asphalt capping, and 4) no further action.

Incineration is the most costly of the options. Treatability studies would need to be completed to assess the ability to achieve destruction rate efficiencies for low levels of dioxins. A more intensive monitoring effort would be required including completion of a trial burn. The implementation of remediation would be dependent on the availability of an incinerator. This process is more complex, increasing the time for implementation. Approximately 10 months would be required for implementation. Additionally, there are members of the community expressly opposed to incineration. Although, this alternative would permanently destroy the contaminants, this alternative is not the preferred proposed method. On-site incineration costs alone are projected upward to \$3,000,000. If the material was shipped off-site, a facility which could accept the material would need to be identified. Other costs including engineering, sampling/analysis, excavation, backfilling/restoration, erosion control, etc. are estimated at \$300,000.

Bioremediation would be less costly than incineration and has been used to treat contaminants such as pentachlorophenol. Treatability studies would need to be conducted to assess effectiveness on dioxins and to ensure any breakdown products at residual levels were not toxic to the environment. Treatability studies would increase the time and cost. Remediation is projected to take from 1-2 years for implementation. Although this alternative provides for some degree of treatment, this alternative is not the preferred proposed method due to its uncertainty. Treatment costs alone are projected upward to \$700,000. Other costs including engineering, sampling/analysis, excavation, backfilling/restoration, erosion control and etc. are estimated at \$300,000.

Asphalt capping is a viable alternative. It would remove the pathway for exposure and allow use of the area for industrial purposes, such as staging area for equipment. Asphalt, however, would need to be maintained through application of a sealer and visual inspection for cracks due to freezing and thawing and vegetation. In addition, institutional controls would need to be enforced to prevent any type of intrusive activities. Asphalt capping is believed to be approximately the same cost as disposal in the landfill over the long term. Site preparation and paving costs are projected upward to \$200,000. Maintenance costs are projected at \$20,000/3 years for application of sealer and inspections for indefinite period. This remedy could be implemented within 4 months. This alternative is not the preferred proposed method due to the additional long term maintenance required.

The alternative, no further action, is not the preferred alternative. The pathway for exposure to ecological receptors would remain. Releases could result over time through migration of contaminants off-site. In addition, the area of use by site workers would need to be restricted to ensure that an unacceptable risk is not created. Institutional controls prohibiting invasive activities would need to be enforced.

4. Engineering Evaluation\Cost Analysis

As this is a time critical removal, an Engineering Evaluation\Cost Analysis is not required.

5. Applicable or relevant and appropriate requirements (ARARs)

The overall goal of remediation at Site 22A is to minimize the potential human health and ecological risks associated with contaminants in soil by implementing appropriate action. Remediation of soil will reduce any input of contaminants to surface water and groundwater by removing the potential source of the contaminants. The NCP, amended pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), establishes the process for determining appropriate remedial actions at those sites listed on the NPL (Superfund sites). Amendments to CERCLA by the Superfund Amendments and Reauthorization Act of 1986 (SARA) further define the process for determining appropriate remedial actions at Superfund sites and the degree of remediation to be achieved by these remedial actions. The purpose of these requirements is to make CERCLA response actions consistent with other pertinent federal or state public health and environmental requirements.

Section 121 of CERCLA requires, in part, that if any hazardous substances will remain onsite at the conclusion of a remedial action under CERCLA, the level or standard of control that must be met for hazardous substances remaining on site is at least that of any applicable or relevant and appropriate requirement, criteria, or limitation under any Federal environmental law, or any more stringent standard, promulgated pursuant to a State environmental statute. These standards of control are termed "applicable or relevant

and appropriate requirements” or ARARs. Determination of ARARs is site-specific and depends on the location of the site, remedial actions under consideration, and chemical contaminants of concern. Remedial action selected for a particular site must comply with federal ARARs, and state ARARs to the extent that they are more stringent than their federal counterparts. CERCLA Section 121 (d) provides for waivers from ARARs under certain circumstances. Applicable requirements are defined in the NCP as those “promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site” [40 Code of Federal Regulations (CFR) 300.50]. A requirement is applicable if there is a “one-to-one correspondence between the requirement and the circumstances at the site...” [53 Federal Register (FR 51437)]. The NCP defines relevant and appropriate requirements as those “that, while not ‘applicable’ to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site” (40 CFR 300.5). Additionally, a requirement is relevant and appropriate if it addresses problems or situations that are generally pertinent to the conditions at the site (i.e., the requirement is relevant) and the requirement is well-suited to the particular site (i.e., the requirement is appropriate) (53 FR 51436, 51437). Relevant requirements are not potential ARARs unless their use is appropriate given the conditions at the site (50 FR 47912, 47918). Whether a requirement is appropriate depends upon the nature of the substances at the site, the site characteristics, the circumstances surrounding the release, and the ability of the action to address the release. The most important criteria used to assess whether a requirement is appropriate is whether the purpose for which the requirement was created is similar to the specific objectives of the CERCLA action and whether the actions or activities regulated by the requirement are similar to the remedial action contemplated at the CERCLA site (50 FR 51346).

ARARs are classified as chemical-specific, action-specific, and location-specific. ARARs are considered when assessing the effectiveness of the alternatives in contributing to the protection of human health and the environment.

Another category of potential remediation goals is the “to be considered” (TBC) advisories and guidance. TBCs are non-promulgated advisories, guidance, or other criteria issued by federal and state governments that are not legally binding and do not have the status of potential ARARs (USEPA, 1988a).

Chemical-specific ARARs are usually technology- or risk-based numerical limitations or methodologies that, when applied to site-specific conditions, result in the establishment of acceptable concentrations of a chemical that may be found in or discharged to the environment.

Location-specific ARARs are the restrictions placed on the concentration of hazardous

substances or the conduct of activities solely because they occur in special locations. These requirements relate to the geographical or physical positions of sites rather than to the nature of the contaminants or the proposed remedial actions.

Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances. These requirements typically define acceptable treatment, storage, and disposal procedures for hazardous substances during the implementation of the response action.

a. Chemical-specific ARARs

The purpose of this section is to discuss potential chemical-specific ARARs. A potential chemical-specific ARAR is a chemical-specific concentration limit set by either federal or state environmental laws for a given environmental medium. Examples for groundwater include MCLs and MCLGs established pursuant to the Safe Drinking Water Act. Examples for surface water are Ambient Water Quality Criteria (AWQC) established pursuant to the Clean Water Act.

The removal will address the soil pathway of concern. Promulgated chemical-specific ARARs do not exist for soil; however, health-based “To Be Considered” have been developed by Illinois Environmental Protection Agency, “Tiered Approach to Cleanup Objectives Guidance Document”, January 1996. Table 3 summarizes cleanup objectives for contaminants based on various scenarios. Through excavation of soils, it is believed these goals will be achieved.

b. Action-specific ARARs

The purpose of this section is to discuss the action-specific requirements that might be considered as ARARs for the removal action. Potential action-specific ARARs are standards that establish restrictions or controls on particular kinds of remedial activities related to management of hazardous substances or pollutants. These requirements are triggered by the particular remedial activities as opposed to the specific chemicals present at a site. Examples of potential action-specific ARARs include closure regulations, pretreatment standards for discharges to publicly owned treatment works (POTWs), and direct discharges to surface water.

RCRA Land Disposal Restrictions

RCRA regulates the treatment, storage, and disposal aspects of hazardous wastes. The soil contains pentachlorophenol and dioxins. Levels present are below land disposal restrictions of 40 CFR Part 268. These materials will be managed as a special waste. Therefore, these materials may be placed in the on-site landfill constructed for Metals Areas Operable Unit.

Illinois Special Waste Requirements

The soils will be managed as special wastes pursuant to the Illinois Waste Management Rules (35 IAC 808). In addition, there are management requirements for waste piles (35 IAC 722 and 725). The requirements for transportation of special waste (35 IAC 809.101-.802), in addition to the application and manifesting requirements of 35 IAC 808, will be applicable to any action involving offsite treatment, handling, transportation or disposal of the soils. For Site 22A, manifesting and transportation requirements will be complied with. The onsite landfill constructed for the Metals Areas Operable Unit substantially meets the technical requirements of Parts 810 through 815.

Clean Air Act

Pursuant to Section 109 of the Clean Air Act (CAA), USEPA has established primary and secondary National Ambient Air Quality Standards (NAAQS). Enforcement of the NAAQS is executed by individual states through development of the State Implementation Plans (SIPs). In Illinois, air emissions are regulated under Title 35 IAC, Subtitle B: Air Pollution. Activities will be evaluated to assess whether applicable requirements will be triggered for compliance with this regulation.

Illinois Fugitive Emissions

If the action involves the use of temporary storage piles, this requirement may be triggered. Section 212.304 of Title 35 IAC (Subtitle B) requires control of fugitive particulate matter in excess of 45.4 megagrams per year (Mg/yr) by cover or surfactant solution or water spraying on a regular basis if the storage pile is located within a facility whose potential particulate emissions exceed 90.8 Mg/yr. This requirement does not apply if it can be demonstrated that the fugitive particulate emissions do not cross the property line by direct wind action or reentrainment.

Illinois Water Pollution Control Rates

These regulations establish effluent standards (35 IAC Subtitle C Part 304) and permitting procedures (35 IAC Subtitle C Part 309) for wastewater discharges to surface water. Remedial actions that include the discharge of residual treatment streams to surface water will be required to meet the requirements of Part 304. A permit pursuant to Part 309 will not be required for any onsite discharges as Site 22A is part of an NPL site.

DOT Requirements

Department of Transportation (DOT) requirements regulate the interstate and intrastate shipment of hazardous materials. Onsite transport of hazardous materials on Route 148 would require compliance with the substantive requirements of manifesting such as documentation regarding the materials being transported and the health and safety issues associated with potential spills/releases.

c. Location-specific ARARs

The location-specific ARARs are discussed in this section. Potential location-specific ARARs are those requirements that establish restrictions on activities or limitations on contaminant levels on the basis of site characteristics or the physical characteristics of the surrounding area. Examples of potential location-specific ARARs include siting laws for landfills; laws regarding development or other activities in wetlands, historic preservation laws; and laws for the protection of endangered species.

Protection of Wildlife

The protection of wildlife resources during control or modification of a stream or other body of water is addressed by the Fish and Wildlife Coordination Act. This act requires a department or agency of the United States to consult with the USFWS and the state wildlife resources agency in order to conserve wildlife resources during such actions. Because a federal agency is a potentially responsible party at the Miscellaneous OU, these requirements are applicable if a stream or other body of water is to be controlled or modified as part of an action at the site.

Protection of Wetlands

Executive Order 11990, Protection of Wetlands, requires federal agencies to take action to avoid adversely affecting wetlands wherever possible under federally undertaken, financed, or assisted construction. Construction is defined as “draining, dredging, channelizing, filling, diking, impounding, and related activities and any structure or other facilities.” The requirements of Executive Order 11990 are applicable if the proposed action include construction in wetlands.

Clean Water Act

Section 404 of the CWA and the regulations at 40 CFR 230 promulgated pursuant to this section address the discharge of dredge or fill material into aquatic ecosystems, including wetlands. The regulations are applicable to the specification of disposal sites for discharges of dredged or fill material into waters of the United States. Because it is conceivable that areas adjacent to an unnamed stream will be excavated and backfilled, Section 404 and the subsequent regulations at 40 CFR 230 would be applicable. However, because Site 22A is part of an NPL site, only the substantive requirements of the regulations need to be complied with. The administrative portion of these requirements does not require compliance.

Endangered Species Act

The Endangered Species Act (16 USC 1531, 50 CFR 200, 50 CFR 402) requires action to conserve endangered species in critical habitats where endangered or threatened species depend. Endangered species, including the bald eagle, inhabit the refuge. These actions

include consultation with the USFWS. The USFWS will complete a Section 7 consultation. Therefore, the provisions of this act are legally applicable for actions undertaken at the site.

Migratory Bird Treaty

The Migratory Bird Treaty (16 CFR Chapter 7) empowers the Department of the Interior to preserve game birds and other wild birds. It prohibits the unlawful taking, killing, capture, or possession of any migratory bird, nest, egg, or part thereof. It also empowers the USDO I to determine when, and to what extent, the taking, killing, capture, or possession of a migratory bird is lawful. The treaty also addresses unlawful domestic and international transport of migratory birds. Because migratory birds are known to inhabit the refuge, these promulgated regulations are applicable.

Archaeological and Historic Preservation

The Archaeological and Historic Preservation Act (16 USC 469, 40 CFR 6.30 (c)) requires actions to recover and preserve artifacts within areas where such actions as the alteration of the terrain may cause irreparable harm, loss, or destruction of significant artifacts. Native American artifacts, however, have been found on areas of the refuge; therefore, this act is applicable to the remediation. Remedial activities will cease if any archeological or historic artifacts are discovered. An independent professional qualified in the fields of archeology and historic preservation will conduct a review of the work planned.

Human Skeletal Remains Protection Act

The Human Skeletal Remains Protection Act (Illinois Revised Statutes 1989, ch. 127, pars. 2661 et seq.) requires actions to be taken for the handling of skeletal remains resulting from unexpected discovery during construction activities, through natural erosion, and by intentional looting and vandalism. Because Native American artifacts have been discovered on the refuge, there is a potential for Native American remains to be uncovered. This act is applicable to the removal actions if human skeletal remains are discovered during onsite excavation. Remedial activities will cease if any human skeletal remains are discovered.

Wilderness Act

The Wilderness Act (16 USC 1131-1136, 50 CFR 35.1) administers federally-owned wilderness areas to ensure they are left unaffected. Approximately 4,000 acres of land in the southern section of CONWR has been designated a wilderness area. However, Site 22A is not located in the designated wilderness area; therefore, this act is not applicable or relevant and appropriate for activities at Site 22A.

National Environmental Policy Act

The purpose of the National Environmental Policy Act (42 USC 4321) is to declare a national environmental policy; to promote efforts that will prevent or eliminate damage to

the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality. To comply with this Act, agencies of the federal government shall include in every major federal action significantly affecting the quality of the human environment a detailed statement by the responsible official on the environmental impact of the proposed action; any adverse environmental effects that cannot be avoided should the proposal be implemented; alternatives to the proposed action; the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented. The identification of ARARs and the evaluation of developed remedial alternatives with respect to their compliance with ARARs complies with the requirements of this Act [40 CFR 300.430(a)(2)(3)]. In addition, the requirements of 40 CFR 300.415 (m)(2) for community relations for removal actions will be complied with.

National Wildlife Refuge System Administration Act

The National Wildlife Refuge System Administration Act (NWRSA) of 1966 (16 U.S.C. 668dd) authorizes the use of any area within the system for any purpose whenever such use is compatible with the major purposes for which the area was established. For a description of the purposes for which the refuge was created, see 61 Stat. 770 dated August 5, 1947.

Crab Orchard National Wildlife Refuge Creation

Crab Orchard National Wildlife Refuge Creation (61 Stat. 770 dated Aug 5, 1947) established Crab Orchard NWR for the conservation of wildlife, and for the development of agricultural, recreational, industrial, and related purposes. This act transferred the lands associated with the Crab Orchard NWR and the IOP to the Secretary of the Interior for administration, development, and disposition consistent with the needs of agriculture, industry, recreation, and wildlife conservation. Lands under this act are administered by the Secretary of the Interior through the USFWS. This act is applicable or relevant and appropriate with actions implemented.

Refuge Recreation Act

The Refuge Recreation Act (16 USC 460k-4) allows for the recreational use of refuges, assuming that the use is compatible with, and will not prevent accomplishment of, the primary purposes of the refuges. Potential remedial actions to be taken at Site 22A would not be defined as recreational. Therefore, the Refuge Recreation Act is not an ARAR.

Protection of Cultural Resources

Executive Order 11593, Protection of Cultural Resources, requires that (1) all property under federal jurisdiction or control, federal agencies will survey and nominate all historic properties to the National Register and maintain and preserve these properties; and (2) for every action funded, licensed, or executed by the federal government, federal agencies will

ask the Secretary of the Interior to determine if any property in the area to be impacted is eligible for the National Register. The determination of eligibility process is faster than the nomination process and gives the same protection as nomination to the National Register. If the federal action will substantially alter or destroy a historic property, the agency must have the property recorder by the Historic American Buildings Survey or the Historic American Engineering Record (McGraw-Hill, 1977). There are no sites within the Crab Orchard Refuge that are listed on the National Register. Several surveys have been conducted for various projects at the refuge. Many archeological sites within the refuge have been surveyed and studied by Southern Illinois University at Carbondale (SIUC). The requirements of this Act will be complied with prior to onsite activities.

Executive Order 11644 - Use of Off-Road Vehicles on Public Lands

This Executive Order establishes policies and procedures that will ensure that the use of off-road vehicles on public lands will be controlled so as to protect the resources of the land; and to preserve public health, safety, and welfare, and minimize use conflicts. Off-road equipment such as excavation equipment that may be utilized during the removal action taken may potentially be considered “off-Road vehicles.” Therefore, the provisions of this executive order are legally applicable for actions undertaken. The USFWS has determined excavation equipment is necessary to complete the removal action. An Environmental Protection Plan will be implemented.

B. Project Schedule and Estimated Costs

1. Project Schedule

Tasks	Status/Time Frame
Removal Site Evaluation.....	Completed
Action Memorandum.....	Completed
Fact Sheet/News Release.....	Ten Days
Sampling/Analysis.....	Two Weeks
Scope of Work.....	April 5, 1996
Request for Proposal/Negotiation	Two Weeks
Notice to Proceed.....	Three Days
Mobilization/Site Preparation.....	Three Days
Excavation/Transporting.....	Fifteen Days
Closure of Landfill and Site Restoration.....	Three Weeks (June 1996)
Submittal of Closure Report and agency review.....	June 1996
Final Approved Closure Report for Removal Action.....	August 1996

It is assumed that existing plans may be modified to account for new contaminants. If additional review time is needed, the schedule will need to be modified accordingly.

2. Estimated Costs

Total Cleanup Contractor Costs \$278,400
(This cost category includes CERCLA
Coordinator estimates for IAGs with
the U.S. Army Corps of Engineers and their
indefinite quantity contracts and a 20% contingency.

Other Costs

Sampling/Closure Report
USFWS costs, and a 20% contingency. \$103,200

VI. COMMUNITY RELATIONS

For actions where, based on the site evaluation, the agency determines that a removal is appropriate, and that less than six months exists before on-site removal activity must begin, the agency shall:

- 1) Publish a notice of availability of the administrative record file in a major local newspaper of general circulation within 60 days of initiation of on-site removal activity;
- 2) Provide a public comment period, as appropriate, of not less than 30 days from the time the administrative record file is made available for public inspection; and
- 3) Prepare a written response to significant comments.

In addition, the Service plans to issue a news release and publish a fact sheet to keep the public informed.

VII. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The Service believes the most responsible and cost effective manner to mitigate risks at the site is to remove contamination and dispose of the contaminated soil in the landfill constructed for the Metals Areas Operable Unit. If there is a change in the situation creating delays, the Service will not be able to implement this specific alternative due to unavailability of use of the landfill for Metals Areas Operable Unit. The Service would need to proceed with closure of the landfill. Delayed action at the site would prolong exposure to ecological receptors at potential unacceptable risks. Contamination could

spread from the site to a nearby stream. Remedial alternatives for the site would then need to be fully evaluated in the Feasibility Study for the Miscellaneous Areas Operable Unit. In the interim, some type of deterrent for wildlife usage and institutional controls on human access must be implemented.

VIII. OUTSTANDING POLICY ISSUES

The removal could involve nationally significant and precedent-setting cleanup issues, emphasizing cleanup of dioxins, however this is a unique and site-specific situation. All other cleanup issues should be based on site-specific information.

IX. ENFORCEMENT

The contamination at the site may be the result of Service activities during the 1960's and early 1970's when the Service operated a wood pole treatment facility. At present, no other potential responsible parties have as yet been identified at this time. The potentially responsible party search is currently taking place. In this instance, as the Federal Facility owner/operator, potentially responsible party, and the Natural Resource Trustee, the Service will perform the necessary removal action promptly and properly.

X. RECOMMENDATION

This decision document represents the selected removal action for Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard National Wildlife Refuge, in Cartersville/Marion, Williamson County, IL, developed in accordance with CERCLA as amended, and not inconsistent with the NCP. This decision is based on the administrative record for the site.

Conditions at the site meet the NCP section 300.415(b)(2) criteria for a removal. The total project ceiling if approved will be \$358,400 and will be completed by August 1, 1996.

XI. REFERENCES

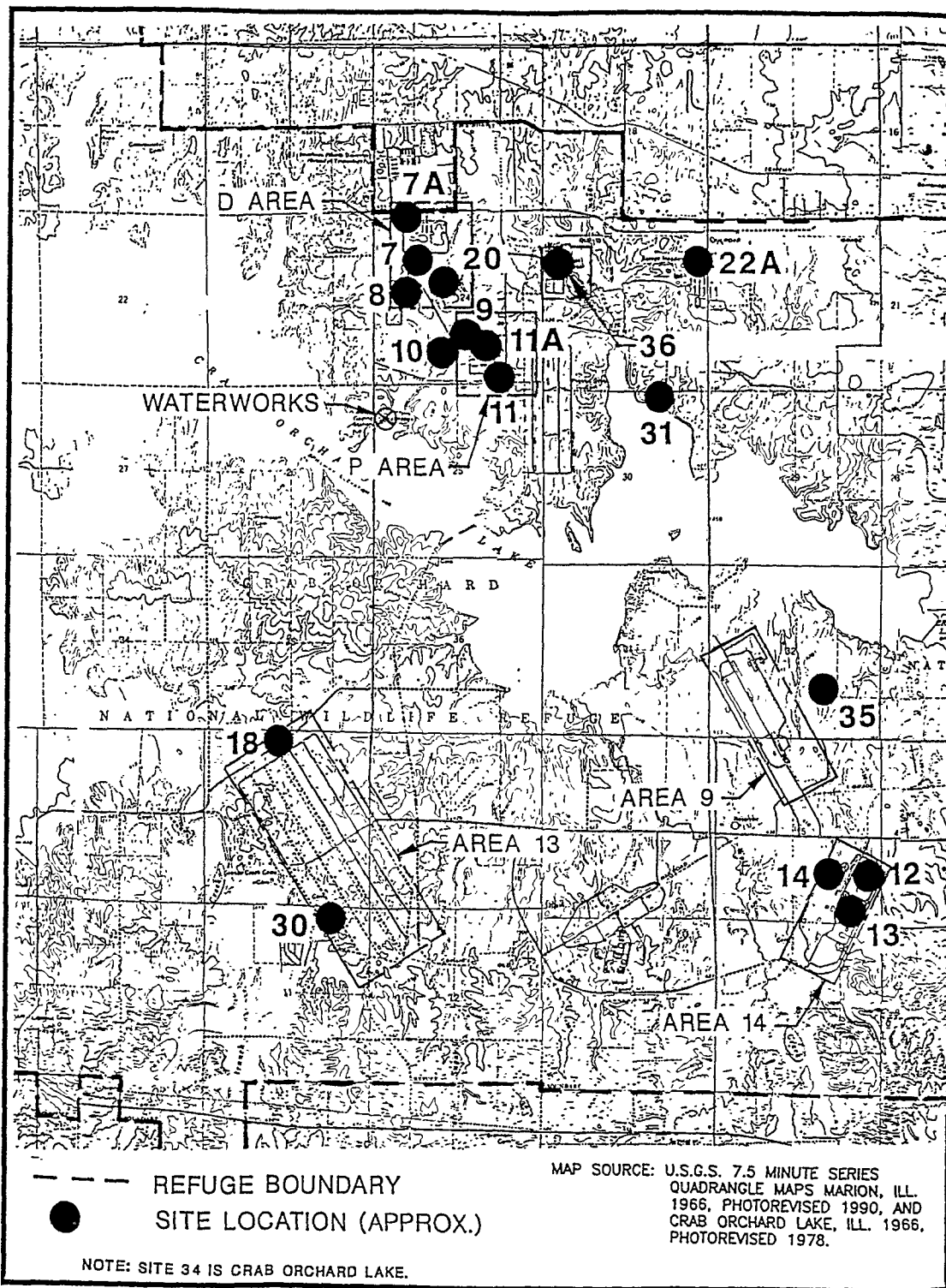
- Federal Facility Agreement for the Crab Orchard National Wildlife Refuge between
Department of the Interior, Department of Army, U.S. Environmental Protection Agency,
and Illinois Environmental Protection Agency, August 1991
- O'Brien and Gere. 1989. Feasibility Study Report for Crab Orchard National Wildlife Refuge
- Woodward-Clyde. 1994. Phase Remedial Investigation Report, Miscellaneous Areas Operable
Unit, Crab Orchard National Wildlife Refuge.
- Woodward-Clyde. 1994. Groundwater Impact Assessment for Metals Areas Operable Unit,
Crab Orchard NWR.
- Woodward-Clyde. 1996. Remedial Investigation, Miscellaneous Areas Operable Unit,
Crab Orchard National Wildlife Refuge.
- Woodward-Clyde. Correspondence dated March 8, 1996 reviewing suitability of materials from
Site 22A for disposal into the Metals Areas Operable Unit Landfill.
- Parsons Engineering Science. 1995. EE/CA Investigation Work Plan -- Operational Plan, Former
Illinois Ordnance Plant.

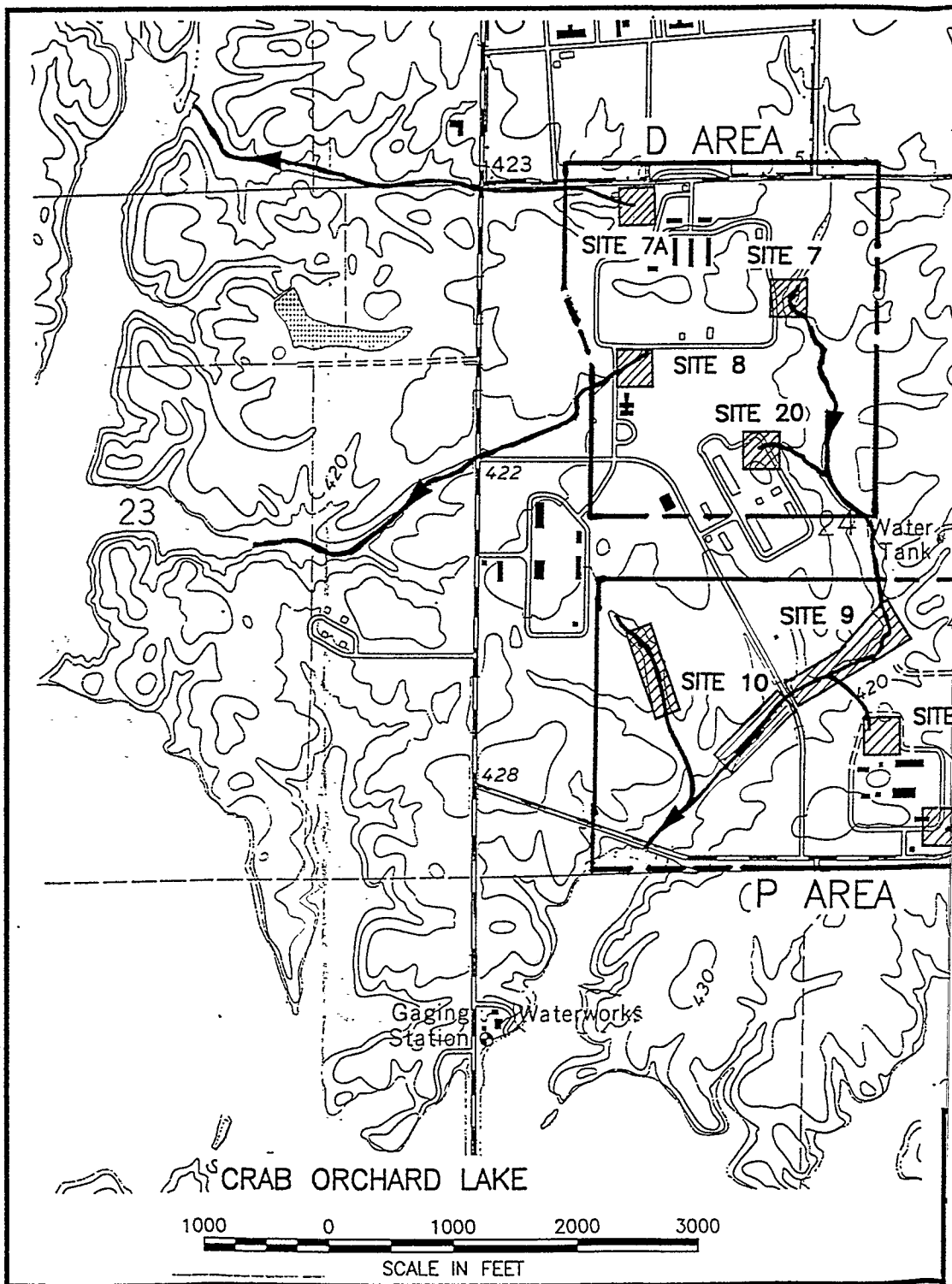
APPENDIX A

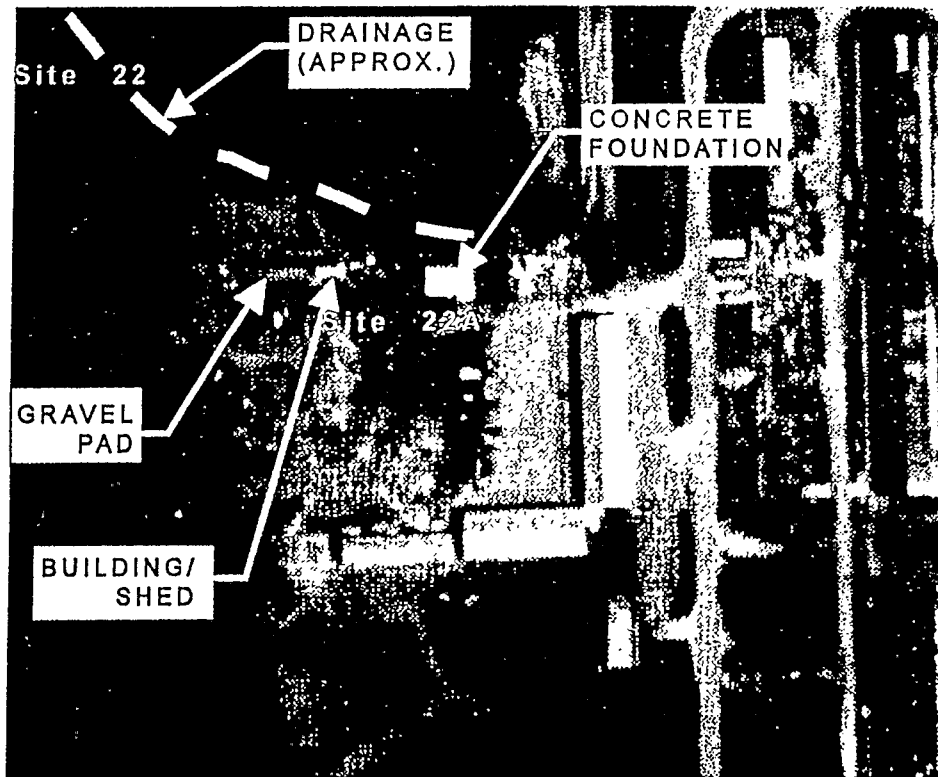
FIGURES

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- Figure 1-2 Location of Sites of Miscellaneous Areas Operable Unit, Crab Orchard NWR
- Figure 1-3 Sites Location North of Crab Orchard Lake, Miscellaneous Areas Operable Unit, Crab Orchard NWR
- Figure 1-5 1960 Aerial Photograph, Site 22A
- Figure 1 Draft Excavation Plan for Site 22A
- Figure 5-10 Detected VOC, SVOC, Pesticide, PCB, Metal, and Cyanide Concentrations, Shallow Soils, Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard NWR
- Figure 5-11 Detected Dioxin/Furan Concentrations, Shallow Soil and Vegetation, Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard NWR
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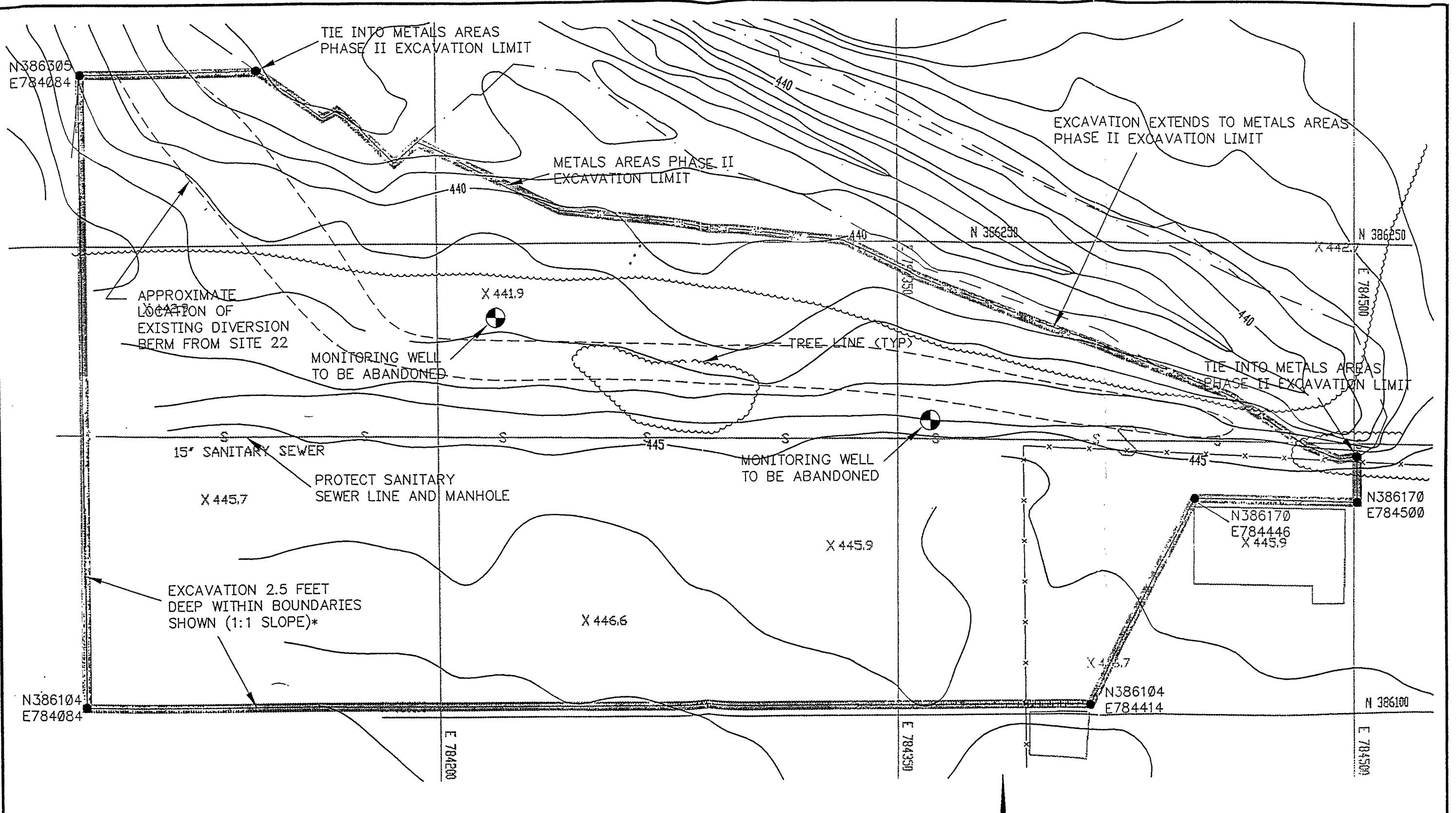


SOURCE: PHOTOGRAPH BHK-3W-85 TAKEN
MAY 1, 1960 SCALE RATIO 1:20,000
(USDA, 1960)

120 0 120
APPROXIMATE SCALE IN FEET


CLIENT/PROJECT W-C/CRAB ORCHARD RI/IL		TITLE 1960 AERIAL PHOTOGRAPH SITE 22A		
DRAWN MRM	CHECKED <i>WCB</i>	REVIEWED <i>WCB</i>	DATE 2-24-95	SCALE AS SHOWN
FILE NAME 8168157	JOB NO. 933-8168	DWG NO.	FIGURE 1-5	

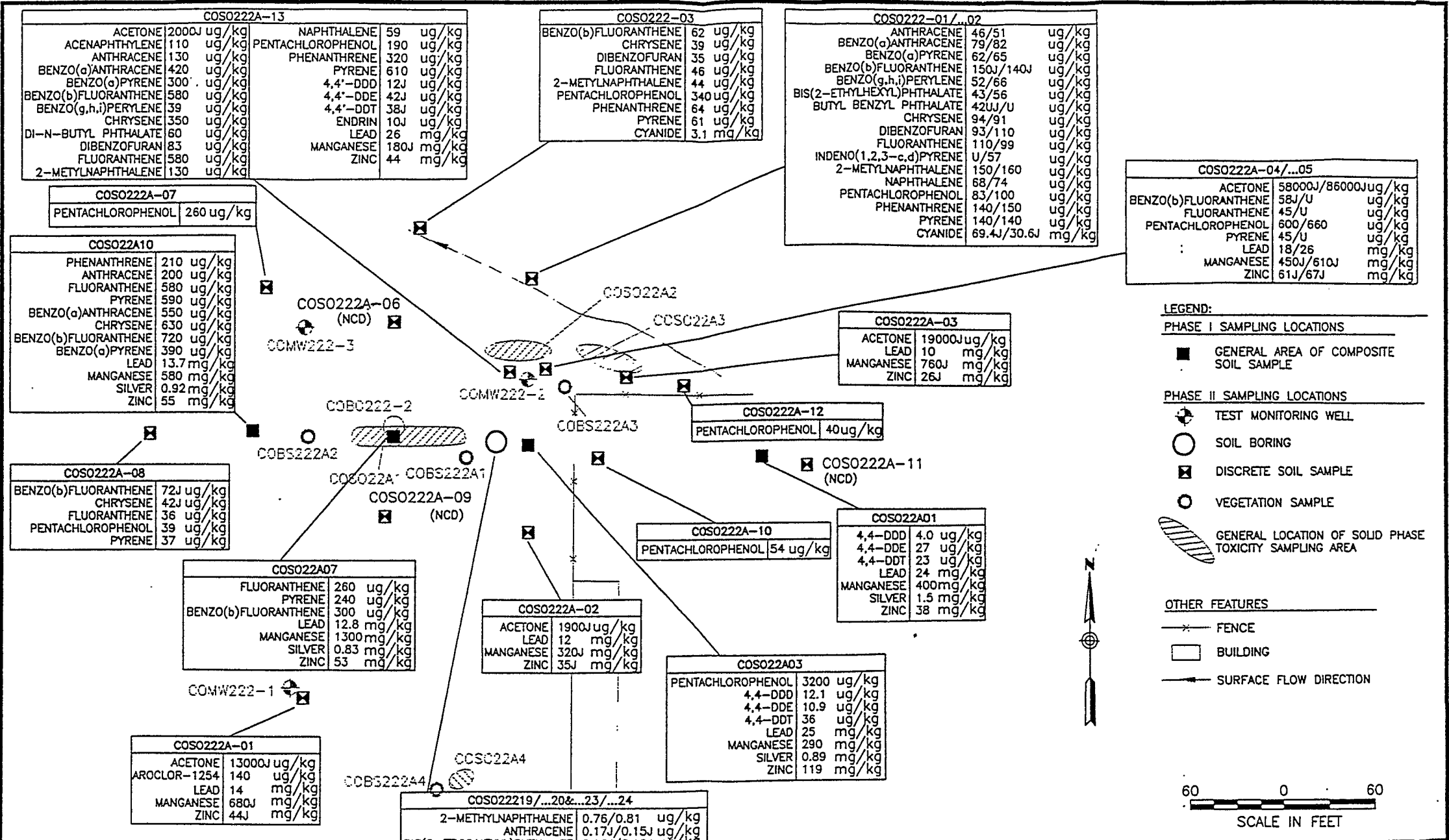
File: F:\C3M11X\TASK35\FIG1A.DWG Last edited: 03/28/96 @ 1:40 p.m. @ WCC-ST. LOUIS



*NOTE: EXCAVATION SHALL EXTEND 2.5 FEET BELOW GRADE IN ALL AREAS EXCEPT FOR AREA BENEATH EXISTING SITE 22 DIVERSION BERM, WHERE IT SHALL EXTEND 2.5 FEET BELOW THE BOTTOM OF THE BERM.



CRAB ORCHARD NATIONAL WILDLIFE REFUGE		PROJECT NO. C3M11X
Woodward-Clyde  Consultants <small>Engineering & sciences applied to the earth & its environment</small>		
DRN. BY: bdl 3-13-95 DSGN. BY: <i>Mj</i> 3-28-96 CHKD. BY: <i>h</i>	Excavation Site 22A	FIG. NO. 1



NOTE:

1. THE METAL CONCENTRATIONS FOR SOIL, SEDIMENT AND SLUDGE REPORTED ON THIS FIGURE ARE ONLY THOSE WHICH EXCEED BACKGROUND. SEE BASELINE RISK ASSESSMENT FOR DETAILS OF BACKGROUND.
2. J=ESTIMATES VALUE; U=NONDETECTED VALUE; NCD=NO COMPOUNDS DETECTED IN THE SAMPLE.
3. SAMPLES COLLECTED BETWEEN DEPTHS OF 0 AND 2 FEET.

TITLE
SITE 22A
DETECTED VOC, SVOC, PESTICIDE, PCB, METAL AND CYANIDE CONCENTRATIONS
SHALLOW SOILS

CLIENT/PROJECT
 W-C/CRAB ORCHARD RI/IL

DATE	2-28-95	JOB NO.	933-8168
SCALE	AS SHOWN	DWG. NO.	
FILE NAME	8168140	FIGURE NO.	5-10

COSO222A-13

ACETONE	200J	ug/kg	NAPHTHALENE	59	ug/kg
ACENAPHTHYLENE	110	ug/kg	PENTACHLOROPHENOL	190	ug/kg
ANTHRACENE	130	ug/kg	PHENANTHRENE	320	ug/kg
BENZO(a)ANTHRACENE	420	ug/kg	PYRENE	610	ug/kg
BENZO(a)PYRENE	300	ug/kg	4,4'-DDD	12J	ug/kg
BENZO(b)FLUORANTHENE	580	ug/kg	4,4'-DDE	42J	ug/kg
BENZO(g,h,i)PERYLENE	39	ug/kg	4,4'-DDT	38J	ug/kg
CHRYSENE	350	ug/kg	ENDRIN	10J	ug/kg
DI-N-BUTYL PHTHALATE	60	ug/kg	LEAD	26	mg/kg
DIBENZOFURAN	83	ug/kg	MANGANESE	180J	mg/kg
FLUORANTHENE	580	ug/kg	ZINC	44	mg/kg
2-METHYLNAPHTHALENE	130	ug/kg			

COSO222-03

BENZO(b)FLUORANTHENE	62	ug/kg
CHRYSENE	39	ug/kg
DIBENZOFURAN	35	ug/kg
FLUORANTHENE	46	ug/kg
2-METHYLNAPHTHALENE	44	ug/kg
PENTACHLOROPHENOL	340	ug/kg
PHENANTHRENE	64	ug/kg
PYRENE	61	ug/kg
CYANIDE	3.1	mg/kg

COSO222-01/...02

ANTHRACENE	46/51	ug/kg
BENZO(a)ANTHRACENE	79/82	ug/kg
BENZO(a)PYRENE	62/65	ug/kg
BENZO(b)FLUORANTHENE	150J/140J	ug/kg
BENZO(g,h,i)PERYLENE	52/66	ug/kg
BIS(2-ETHYLHEXYL)PHTHALATE	43/56	ug/kg
BUTYL BENZYL PHTHALATE	42U/U	ug/kg
CHRYSENE	94/91	ug/kg
DIBENZOFURAN	93/110	ug/kg
FLUORANTHENE	110/99	ug/kg
INDENO(1,2,3-c,d)PYRENE	U/57	ug/kg
2-METHYLNAPHTHALENE	150/160	ug/kg
NAPHTHALENE	68/74	ug/kg
PENTACHLOROPHENOL	83/100	ug/kg
PHENANTHRENE	140/150	ug/kg
PYRENE	140/140	ug/kg
CYANIDE	69.4J/30.6J	mg/kg

COSO222A-04/...05

ACETONE	5800J/8600J	ug/kg
BENZO(b)FLUORANTHENE	58J/U	ug/kg
FLUORANTHENE	45/U	ug/kg
PENTACHLOROPHENOL	600/660	ug/kg
PYRENE	45/U	ug/kg
LEAD	18/26	mg/kg
MANGANESE	450J/610J	mg/kg
ZINC	61J/67J	mg/kg

COSO222A-07

PENTACHLOROPHENOL	260	ug/kg
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COSO222A10

PHENANTHRENE	210	ug/kg
ANTHRACENE	200	ug/kg
FLUORANTHENE	580	ug/kg
PYRENE	590	ug/kg
BENZO(a)ANTHRACENE	550	ug/kg
CHRYSENE	630	ug/kg
BENZO(b)FLUORANTHENE	720	ug/kg
BENZO(a)PYRENE	390	ug/kg
LEAD	13.7	mg/kg
MANGANESE	580	mg/kg
SILVER	0.92	mg/kg
ZINC	55	mg/kg

COSO222A-08

BENZO(b)FLUORANTHENE	72J	ug/kg
CHRYSENE	42J	ug/kg
FLUORANTHENE	36	ug/kg
PENTACHLOROPHENOL	39	ug/kg
PYRENE	37	ug/kg

COSO222A07

FLUORANTHENE	260	ug/kg
PYRENE	240	ug/kg
BENZO(b)FLUORANTHENE	300	ug/kg
LEAD	12.8	mg/kg
MANGANESE	1300	mg/kg
SILVER	0.83	mg/kg
ZINC	53	mg/kg

COSO222A-01

ACETONE	13000J	ug/kg
AROCOR-1254	140	ug/kg
LEAD	14	mg/kg
MANGANESE	680J	mg/kg
ZINC	44J	mg/kg

COSO222A-02

ACETONE	1900J	ug/kg
LEAD	12	mg/kg
MANGANESE	320J	mg/kg
ZINC	35J	mg/kg

COSO222A-10

PENTACHLOROPHENOL	54	ug/kg
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COSO222A03

PENTACHLOROPHENOL	3200	ug/kg
4,4-DDD	12.1	ug/kg
4,4-DDE	10.9	ug/kg
4,4-DDT	36	ug/kg
LEAD	25	mg/kg
MANGANESE	290	mg/kg
SILVER	0.89	mg/kg
ZINC	119	mg/kg

COSO22219/...20&...23/...24

2-METHYLNAPHTHALENE	0.76/0.81	ug/kg
ANTHRACENE	0.17J/0.15J	ug/kg
BIS(2-ETHYLHEXYL)PHTHALATE	0.16J/0.12J	ug/kg
FLUORANTHENE	0.15J/0.12J	ug/kg
FLUORENE	0.38J/0.31J	ug/kg
NAPHTHALENE	0.48/0.68	ug/kg
PENTACHLOROPHENOL	13/16	ug/kg
PHENANTHRENE	1.4J/1.1J	ug/kg
PHENOL	0.2J/0.21	ug/kg
PYRENE	0.13J/0.12J	ug/kg
LEAD	25.3/20.1	mg/kg
ZINC	96.2/89.3	mg/kg

COSO222A-03

ACETONE	19000J	ug/kg
LEAD	10	mg/kg
MANGANESE	760J	mg/kg
ZINC	26J	mg/kg

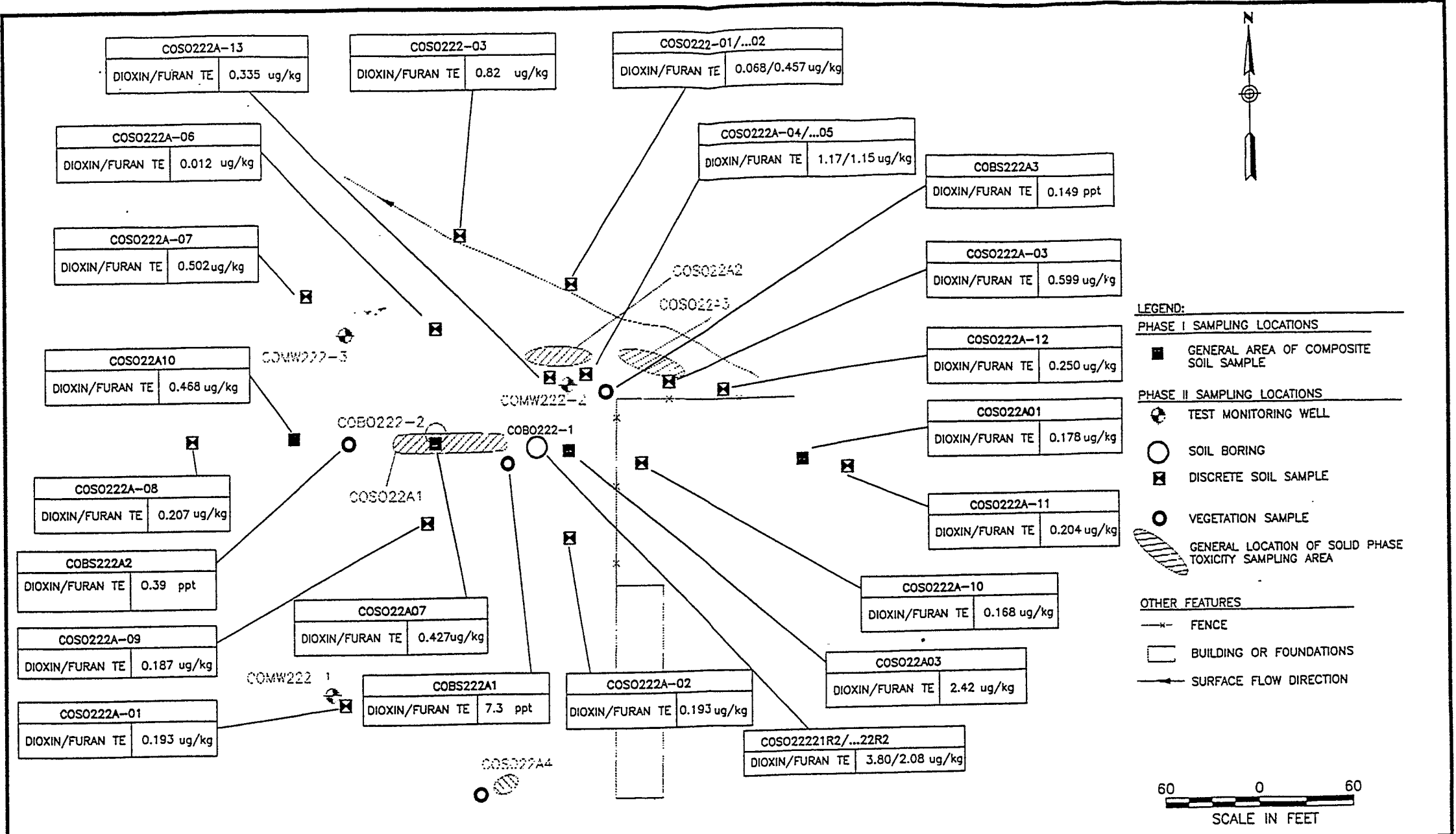
COSO222A-12

PENTACHLOROPHENOL	40	ug/kg
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COSO222A-11 (NCD)

COSO222A01

4,4-DDD	4.0	ug/kg
4,4-DDE	27	ug/kg
4,4-DDT	23	ug/kg
LEAD	24	mg/kg
MANGANESE	400	mg/kg
SILVER	1.5	mg/kg
ZINC	38	mg/kg



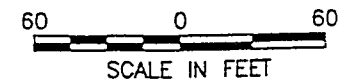
NOTES:

1. TE=SUM OF TOXICITY EQUIVALENTS (RELATIVE TO 2,3,7,8-TCDD) FOR ALL DIOXIN OR FURAN COMPOUND DETECTED. SEE BASELINE RISK ASSESSMENT FOR DETAILS.
2. SAMPLES COLLECTED BETWEEN DEPTHS OF 0 AND 2 FEET.
3. PPT = PARTS PER TRILLION.
4. "R2" IN SAMPLE ID INDICATES THE SAMPLE WAS REANALYZED.

TITLE		SITE 22A DETECTED DIOXIN/FURAN CONCENTRATIONS SHALLOW SOIL AND VEGETATION			
CLIENT/PROJECT	W-C/CRAB ORCHARD RI/IL	DRAWN	NAP	DATE	4-19-95
		CHECKED	WCB	SCALE	AS SHOWN
		REVIEWED	WCB	FILE NAME	8168171
				JOB NO.	933-8168
				DWG. NO.	
				FIGURE NO.	5-11



- LEGEND:**
- PHASE I SAMPLING LOCATIONS**
- GENERAL AREA OF COMPOSITE SOIL SAMPLE
- PHASE II SAMPLING LOCATIONS**
- ⊕ TEST MONITORING WELL
 - SOIL BORING
 - ⊠ DISCRETE SOIL SAMPLE
 - VEGETATIVE SAMPLE
 - ▨ GENERAL LOCATION OF SOLID PHASE TOXICITY SAMPLING AREA
- OTHER FEATURES**
- *- FENCE
 - BUILDING OR FOUNDATIONS
 - SURFACE FLOW DIRECTION



COMW222302 (DEC. 94)	
TOTAL TCDD	5.10 ppt
TOTAL TCDF	0.37 ppt
SELENIUM	5.7 ug/l

COMW222201/...401 (AUG. 94)	
ACETONE	UJ/25 ug/l
SELENIUM	10.3/U ug/l

COMW222202/...402 (DEC. 94)	
BIS(2-ETHYLHEXYL)PHTHALATE	U/2J ug/l
TOTAL TCDD	5.19/5.99 ppt
TOTAL TCDF	0.34/0.38 ppt
SELENIUM	7.2/6.2 ug/l

COMW222301 (AUG. 94)	
ACETONE	3J ug/kg
AROCLOR-1254	0.47J ug/kg
SELENIUM	6.5 ug/l

COS022A02 (2.4'-2.7')	
DIOXIN/FURAN TE	0.179 ug/kg
4,4'-DDE	6.0 ug/kg
4,4'-DDT	6.9 ug/kg
LEAD	15 mg/kg
MANGANESE	1600 mg/kg
SILVER	1.4 mg/kg
ZINC	36 mg/kg

COS022A04 (1.5'-2.0')	
DIOXIN/FURAN TE	0.231 ug/kg
LEAD	14 mg/kg
MANGANESE	890 mg/kg
SILVER	1.4 mg/kg
ZINC	40 mg/kg

COS022A11 (2.2'-2.5')	
DIOXIN/FURAN TE	0.377 ug/kg
LEAD	9.1 mg/kg
MANGANESE	370 mg/kg
SILVER	1.5 mg/kg
ZINC	59 mg/kg

COS022234&...35&...36 (1.5'-2.0')	
DIOXIN/FURAN TE	0.212 ug/kg
LEAD	17.1 mg/kg
ZINC	42.6 mg/kg

COS022237&...38&...39 (4.5'-5.0')	
DIOXIN/FURAN TE	0.042 ug/kg
LEAD	10 mg/kg
ZINC	81.3 mg/kg

COS022240&...41&...42 (7.0'-7.5')	
DIOXIN/FURAN TE	0.015 ug/kg
BIS(2-ETHYLHEXYL)PHTHALATE	0.09J ug/kg
LEAD	22.9 mg/kg
ZINC	35 mg/kg

COS022243&...44&...45 (9.5'-10.0')	
DIOXIN/FURAN TE	0.0018 ug/kg
LEAD	8.3 mg/kg
ZINC	30.4 mg/kg

COS022A08/...13 (2.0'-2.5')	
DIOXIN/FURAN TE	0.226/0.23 ug/kg
LEAD	13/16 mg/kg
MANGANESE	1600/1140 mg/kg
SILVER	1/1.6 mg/kg
ZINC	45/42 mg/kg

COS022225&...26&...27 (2.0'-3.0')	
2-METHYLNAPHTHALENE	0.09J ug/kg
PENTACHLOROPHENOL	26 ug/kg
PHENANTHRENE	0.05J ug/kg
DIOXIN/FURAN TE	0.018 ug/kg
LEAD	14.6 mg/kg
SILVER	1B mg/kg
ZINC	82.5 mg/kg

COS022228&...29&...30 (6.0'-6.5')	
2-METHYLNAPHTHALENE	0.23J ug/kg
PENTACHLOROPHENOL	5.1 ug/kg
PHENANTHRENE	0.2J ug/kg
DIOXIN/FURAN TE	0.292 ug/kg
LEAD	8.1 mg/kg
ZINC	26 mg/kg

COS022231&...32&...33 (8.5'-9.0')	
2-METHYLNAPHTHALENE	0.23J ug/kg
PENTACHLOROPHENOL	4.1J/4.6J ug/kg
PHENANTHRENE	0.23J/0.23J ug/kg
DIOXIN/FURAN TE	0.084 ug/kg
LEAD	6.5 mg/kg
ZINC	31.3 mg/kg

COMW222101 (AUG. 94)	
ACETONE	2J ug/kg

COMW222102 (DEC. 94)	
TOTAL TCDD	5.15 ppt
TOTAL TCDF	0.38 ppt
SELENIUM	8.8 ug/l

- NOTES:**
1. THE METAL CONCENTRATIONS FOR SOIL, SEDIMENT AND SLUDGE REPORTED ON THIS FIGURE ARE ONLY THOSE WHICH EXCEED BACKGROUND. SEE BASELINE RISK ASSESSMENT FOR DETAILS OF BACKGROUND.
 2. J=ESTIMATED CONCENTRATION; U=NONDETECTED CONCENTRATION; B=ANALYTE DETECTED IN BLANK; NA=NOT ANALYZED; NCD= NO COMPOUNDS DETECTED IN THE SAMPLE; P=>25% DIFFERENCE BETWEEN PRIMARY AND SECONDARY COLUMN.
 3. N=ANALYSIS INDICATES THE PRESENCE OF AN ANALYTE FOR WHICH THERE IS PRESUMPTIVE EVIDENCE TO MAKE "TENTATIVE IDENTIFICATION".
 4. TE=SUM OF TOXICITY EQUIVALENTS (RELATIVE TO 2,3,7,8-TCDD) FOR ALL DETECTED DIOXIN OR FURAN COMPOUND. SEE BASELINE RISK ASSESSMENT FOR DETAILS.

CLIENT/PROJECT		TITLE	
W-C/CRAB ORCHARD RI/IL		SITE 22A DETECTED CONCENTRATIONS SUBSURFACE SOIL AND GROUNDWATER	
DRAWN	NAP	DATE	3-20-95
CHECKED	WGB	SCALE	AS SHOWN
REVIEWED	WGB	FILE NAME	8168170
		JOB NO.	933-8168
		DWG. NO.	
		FIGURE NO.	5-12

APPENDIX B

TABLES

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Table 1

Maximum Detected Concentrations In Soil Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard NWR		
COMPOUND	SAMPLE	CONCENTRATION(mg/kg dry)
Aluminum	1993	10300
Arsenic	26	11
Barium	1993	330
Beryllium	1993	0.8
Cadmium	1993	1.04
Chromium	26	23.7
Cobalt	1993	17
Copper	26	20.5
Iron	1993	22000
Lead	5	26
Manganese	1993	1600
Mercury	1993	0.26
Nickel	26	18.5
Selenium	24	2.3
Silver	1993	1.6
Thallium	1993	0.55
Vanadium	1993	42
Zinc	1993	119
2-Butanone(MEK)	1993	0.005
2-Methylnaphthalene	2	0.16
Aroclor (Total)	1	0.14
2378 TCDD Equivalent	21r2	0.003801318
4,4 - DDD	1993	0.0121
4,4 - DDE	13	0.042
4,4 - DDT	13	0.038
Endrin	13	0.01
Acetone	5-MEDIUM	86
Acenaphthylene	13	0.11
Anthracene	1993	0.2
Benzo(a)anthracene	1993	0.55
Benzo(a)pyrene	1993	0.39
Benzo(b)fluoranthene	1993	0.72
Benzo(ghi)perylene	2	0.066
Bis(2-ethylhexyl)phthalate	2	0.056
Chrysene	1993	0.63
Dibenzofuran	2	0.11
Di-n-butyl phthalate	13	0.06
Fluoranthene	1993	0.58
Fluorene	19	0.00038
Indeno(123-cd)pyrene	2	0.057
Methylene Chloride	6	0.065
Naphthalene	2	0.074
Pentachlorophenol	1993	3.2
Phenanthrene	13	0.32
Phenol	20	0.00021
Pyrene	13	0.61

Table 2

**Contaminants with Hazard Quotients Greater than One
Site 22A, Miscellaneous Areas Operable Unit
Crab Orchard National Wildlife Refuge CERCLA Site**

Constituent	Scenario	Hazard Quotient for Mouse	Hazard Quotient for Robin	Hazard Quotient for Fox	Hazard Quotient for Quail	Hazard Quotient for Hawk
2,3,7,8-TCDD	LME	13,000	4,000	35	5	19
	CTE	200	23	1	0.02	0.7
Pentachlorophenol	LME	4	2	<1	<1	<1
	CTE	0.3	0.03	<1	<1	<1
Mercury	LME	46	19	<1	<1	<1
	CTE	4	0.4	<1	<1	<1
Selenium	LME	18	13	<1	<1	<1
	CTE	5	0.8	<1	<1	<1
	BKG	25	18	<1	<1	<1
Zinc	LME	2	12	<1	<1	<1
	CTE	0.2	0.2	<1	<1	<1
	BKG	2	10	<1	<1	<1
4,4-DDD	LME	<1	7	<1	<1	<1
	CTE	<1	0.2	<1	<1	<1
4,4-DDE	LME	<1	23	<1	<1	<1
	CTE	<1	0.6	<1	<1	<1
4,4-DDT	LME	<1	21	<1	<1	<1
	CTE	<1	0.7	<1	<1	<1
Aroclor (Total)	LME	<1	4	<1	<1	<1
	CTE	<1	1	<1	<1	<1

LME represent Likely Maximum Exposure
 CTE represents Central Tendency Exposure
 Hazard Quotient >1 represents potential adverse effects

**Table 3
Cleanup Objectives Summarized for
Constituents Identified for Site 22A
Miscellaneous Areas Operable Unit
Crab Orchard National Wildlife Refuge**

		Groundwater Cleanup Objective (mg/L)		Soil Cleanup Objectives (mg/kg)				ADL
				Route-specific values for surface soils		Migration to groundwater groundwater route values		
CAS No.	Chemical Name	Class I Baseline	Class II Baseline	Ingestion	Inhalation	Class I	Class II	
	Dioxin/furan toxicity equivalent	---	---	---	---	---	---	---
117-81-7	Bis (2-ethylhexylphthalate	0.006	0.06	46	210	11	110	*
72-55-9	4,4-DDE	0.00004	0.0002	2	---	0.5	2.5	*
50-29-3	4,4-DDT	0.00012	0.0006	2	80	1	5	*
7439-96-5	Manganese	0.15	10.0	3,900	35,400	0.15	10.0	*
87-86-5	Pentachlorophenol	0.001	0.005	3	---	0.01	0.05	2.4
	Phenanthrene	---	---	---	---	---	---	---
7440-22-4	Silver	0.05	---	390	---	0.05	---	*
7440-66-6	Zinc	5.0	10	23,000	---	5.0	10	*
	2-Methylnaphthalene	---	---	---	---	---	---	---
67-64-1	Acetone	0.7	0.7	7,800	62,000	8	8	*
	Apenaphthylene	---	---	---	---	---	---	---
120-12-7	Anthracene	2.1	10.5	23,000	---	4,300	21,500	*
56-55-3	Benzo(a)anthracene	0.00013	0.00065	0.9	---	0.7	3.5	*
50-32-8	Benzo(a)pyrene	0.0002	0.002	0.09	---	4	40	*
205-99-2	Benzo(b)fluoranthene	0.00018	0.0009	0.9	---	4	20	*
	Benzo(g,h,i)perylene	---	---	---	---	---	---	---
218-01-9	Chrysene	0.0015	0.0075	88	---	1	5	*
	Dibenzofuran	---	---	---	---	---	---	---
206-44-0	Fluroanthene	0.28	1.4	3,100	---	980	4,900	*
91-20-3	Naphthalene	0.025	0.039	3,100	---	30	47	*
129-00-0	Pyrene	0.21	1.05	2,300	---	1,400	7,000	*
72-20-8	Endrin	0.002	0.01	23	---	0.4	2.0	*
	Aroclor-1254	---	---	---	---	---	---	---
108-95-2	Phenol	0.1	0.1	47,000	---	49	49	*
193-39-5	Indeno - pyrene	0.00043	0.00215	410,000	3,400	35	175	*
57-12-5	Cyanide	0.2	0.6	1,600	0.2	0.6	*	

Based on the Illinois Environmental Protection Agency Bureau of Land -- Tiered Approach to Cleanup Objectives Guidance Document

APPENDIX C
REMOVAL SITE EVALUATION

**REMOVAL SITE EVALUATION
FOR SITE 22A
MISCELLANEOUS AREAS OPERABLE UNIT
CRAB ORCHARD NATIONAL WILDLIFE REFUGE**

The U.S. Fish and Wildlife Service (Service) has completed a removal site evaluation for Site 22A, Miscellaneous Areas Operable Unit, Crab Orchard National Wildlife Refuge. The removal site evaluation includes a removal preliminary assessment. Contaminants posing a potential risk to ecologic receptors include pentachlorophenol, dioxins, and other co-contaminants. Additionally, if a more intensive use occurs by site workers, a potential unacceptable health risk could result.

INTRODUCTION

The information for the removal preliminary assessment is readily available from the Remedial Investigation (RI) (Woodward Clyde, 1996). The objectives of the removal preliminary assessment are:

- ◆ Identification of the source and nature of the release or threat of release;
- ◆ Evaluation of factors necessary to make the determination of whether a removal is necessary;
- ◆ Evaluation of the magnitude of the threat;
- ◆ Evaluation by Agency for Toxic Substance Disease Registry (ATSDR) or by other sources, for example, state public health agencies, of the threat to public health; and
- ◆ Determination of whether a non-federal party is undertaking proper response.

IDENTIFICATION OF THE SOURCE AND NATURE OF THE RELEASE OR THREAT OF RELEASE

Site 22 A is a site in the Miscellaneous Areas Operable Unit, Crab Orchard National Wildlife Refuge (Figure 1-1 and Figure 1-2). This site is located north of Crab Orchard Lake as depicted in Figure 1-3. This site was part of the former shop and maintenance yard for the Refuge (Figure 1-5). Site 22A consists of an area where sign posts were treated with diesel fuel containing pentachlorophenol (O'Brien and Gere, 1988). It is believed that the posts were dipped into a tank of the wood preservative, then placed in the open to dry. The tank is believed to have been located in a small building/shed. The posts were set out to dry in a gravel area which extended

from the building to the west. The area of concern at Site 22A is the area surrounding the small building/shed and the gravel pad.

Aerial photos indicate that the building and gravel area were not present in 1951, but were present from 1960 through 1971 (USDA, 1951, 1960, 1965, and 1971; USGS, 1963). In the 1960 and 1963 photos, dark equidimensional items are visible at the perimeter of the gravel pad and are interpreted to be posts stacked on pallets (refer to Figure 1-5). In addition, the 1960 photo indicates that additional activities, possibly related to the post treating operations, occurred in an area approximately 20 feet due east of the former building. In the 1965 and 1971 photos, other unidentifiable items of random size and shape are stored throughout the area; the post treating facility is believed to have been inactive at this time. There is currently no physical evidence of the building at the site, and the gravel pad is overgrown with vegetation (Woodward Clyde, 1996).

EVALUATION OF FACTORS NECESSARY TO MAKE THE DETERMINATION OF WHETHER A REMOVAL IS NECESSARY

The Remedial Investigation by Woodward Clyde, 1996 characterizes the types and levels of contaminants, potential pathways of exposure, and the potential risk to human health and the environment.

The RI included the collection and analysis of surface soils, subsurface soils, sediment, groundwater and biota. The RI was conducted in two phases; Phase I which was conducted in early 1993, and Phase II which was conducted in two stages from December 1993 through to December 1994. Phase I activities included the sampling and analysis of soil and sediment. Phase II RI activities included installation of groundwater monitoring wells, sampling and analysis of groundwater, additional sampling and analysis of soil and sediment, and biota. The RI reports concentrations of pentachlorophenol upward to 3200 ug/kg (or 3.2 ppm) and dioxin toxic equivalent upward to 3.8 ppb in surface soils. Figures 5-10 through 5-12 summarize analytical results of detections for sampling locations.

The site contains elevated concentrations of hazardous contaminants which may impact human health and the environment via several potential pathways. The pathways which offer the greatest potential threat for the transport of the compounds of concern are identified as the pathways of concern. Relevant potential pathways were identified and evaluated for determining objectives for sampling events. During Phase I, dioxins/furans and several semi-volatile constituents (SVOCs) were detected in near-surface soils. Based upon Phase I data, the pathways of concern are fugitive dust emissions, foot traffic, surface runoff, and leaching into shallow groundwater. During Phase II, analyses of surface and subsurface soil samples indicated the presence of SVOCs (including pentachlorophenol), and dioxins/furans in surface soils and subsurface soils to depths of at least 10 feet. Shallow groundwater also contained detectable dioxins/furans which may be associated with particulates (suspended solids) in the samples. In addition, the analyses of grass samples showed the presence of dioxins/furans. Based on these new data, transport by

groundwater and dispersal of vegetation should be added to the list of potential pathways of concern identified during Phase I.

It is important to understand what these contaminants through various pathways of concerns mean in terms of potential risk to human health and the environment.

A baseline risk assessment considered ingestion, dermal contact, and inhalation pathways for exposure of occasional site workers, hypothetical construction workers, and hypothetical recreational receptors to soil, groundwater, surface water, fish and deer meat.

Risk is reported in terms of noncarcinogenic hazard index and excess lifetime cancer risk. If the calculated noncarcinogenic index does not exceed 1.0; therefore, no unacceptable adverse health effects are expected. Likewise, USEPA established a target range of 1×10^{-6} to 1×10^{-4} for exposure to chemicals released from hazardous waste sites.

For site workers the highest calculated noncarcinogenic hazard index was 0.009 which does not exceed 1. The highest excess lifetime cancer risk calculated for site workers was 3×10^{-5} . This is within USEPA's target range. The primary contributor to the risk was dermal contact with dioxin and dioxin-like compounds in surface soil. If a more intensive exposure of longer hours and/or more direct contact with soils occurs, this could potentially create an unacceptable risk for site workers.

For construction workers, the highest calculated noncarcinogenic hazard index was 0.006 which is below 1. The highest excess lifetime cancer risk calculated for construction workers was 1×10^{-6} . This is within USEPA's target range. The primary contributors to risk were ingestion and dermal contact with dioxin and dioxin-like compounds in soil.

The highest calculated noncarcinogenic hazard index for recreational receptors/trespassers was 0.001 which is less than 1.0. The highest excess lifetime cancer risk calculated for recreational receptors/trespassers was 1×10^{-5} . This is within USEPA's target range. The primary contributor to the risk was ingestion of deer meat containing dioxin and dioxin-like compounds. The risk is conservatively estimated because Site 22A is approximately 2 acres in size while the average deer grazing range is approximately 240 acres. Therefore, it is unlikely that a deer would obtain 10 percent of its diet from Site 22A as was assumed in the risk assessment.

The risk assessment for Site 22A reports the presence of dioxins in soils and sediments at this site could pose a risk, based on a toxicity equivalent basis, to most of the environmental receptors (mouse, robin, quail, fox, and hawk) evaluated in the RI. The calculated hazard quotient ranges upward to 13,000 for mice, several orders of magnitude greater than 1. One (1) is established as the number established as for potential of adverse effects. Based on the likely maximum exposure scenario (using the highest concentrations), the other contaminants of concern at this site include total Aroclors, 4,4-DDT, 4,4-DDE, 4,4-DDD, pentachlorophenol, mercury, selenium and zinc for the robin; and pentachlorophenol, mercury, selenium and zinc for the mouse. For the central

tendency exposure (using average concentrations), the contaminants of interest are reduced to dioxins, mercury, and selenium for the mouse, and dioxins for the robin. The potential risk from mercury and selenium are conservatively estimated because the toxicity to these contaminants was based on their organic forms which tend to be the most toxic forms. No evidence exists to suggest the form of mercury or selenium present at the site. Table 1 summarizes the range of concentrations of contaminants. Table 2 lists the calculated potential risk. Please refer to Volume III of the RI for detailed risk assessment information.

EVALUATION OF THE MAGNITUDE OF THE THREAT

The risk assessment concludes there is a potential risk posed by the contaminants, pentachlorophenol, dioxins, and other co-contaminants to ecologic receptors. Additionally, if a higher use occurs by site workers, a potential unacceptable risk could result. The Service proposes that a removal action be implemented to minimize the potential risk.

The proposed remediation area should remove the pentachlorophenol contaminated soils and the soils most seriously contaminated with dioxins and furans to the extent practicable. Any residuals remaining should be covered with clean soil. Additional data are needed to delineate the area of remediation. Samples may be collected during the removal to further refine the proposed approach.

EVALUATION BY AGENCY FOR TOXIC SUBSTANCE DISEASE REGISTRY OR OTHER SOURCES

An evaluation of the potential risk to human health was completed as the baseline risk assessment discussed above. This site has not been evaluated by ATSDR.

DETERMINATION OF WHETHER A NONFEDERAL PARTY IS UNDERTAKING PROPER RESPONSE

The contaminants identified may be the result of U.S. Fish and Wildlife Service activities which occurred prior to the development of environmental laws. At present, no other potential responsible parties have as yet been identified at this time. The potential responsible party search is currently taking place. In this instance, as the Federal Facility owner/operator, potential responsible party, and the Natural Resource Trustee, the Service will perform the necessary removal action promptly and properly.

References

- Federal Facility Agreement for the Crab Orchard National Wildlife Refuge between
Department of the Interior, Department of Army, U.S. Environmental Protection Agency,
and Illinois Environmental Protection Agency, August 1991
- O'Brien and Gere. 1989. Feasibility Study Report for Crab Orchard National Wildlife Refuge
- Woodward-Clyde. 1994. Phase Remedial Investigation Report, Miscellaneous Areas Operable
Unit, Crab Orchard National Wildlife Refuge.
- Woodward-Clyde. 1996. Remedial Investigation, Miscellaneous Areas Operable Unit,
Crab Orchard National Wildlife Refuge.

APPENDIX D
SCOPE OF WORK

**SCOPE OF WORK
REMEDIATION OF SITE 22A**

March 29, 1996

Introduction

Contractor shall provide all equipment, materials, and labor to complete the work described herein. All work shall comply with the General Requirements of the Contract Specifications for Metals Operable Unit, Contract No. DACW 43-95-C-0419 (Metals OU contract), dated December 1994 (Sections 01100 through 01550), and, where applicable, in accordance with the Site Work Requirements of the Metals OU contract (Sections 02100 through 02935). In addition, where applicable, work shall comply with approved work plans and with the approved Quality Assurance Project Plan (QAPP) for remediation of the Metals Areas (R&R International, 1995).

Schedule

It is estimated that it will take about 20 days from notice to proceed (NTP) to completion of excavation and hauling and an additional 10 days for backfilling and seeding. NTP is expected to be given around April 15, 1996. With a 5-day work week, work would be completed around May 24, 1996. This schedule assumes that excessive delays due to weather are not encountered. It also assumes that changes in the Health and Safety Plan can be made immediately upon NTP. *[Note: this schedule assumes that no review time for documents will be required. This would require written agreement of all parties of the FFA. Otherwise, an additional 90 days may be required. If so, the contractor needs to be informed of the timeframe.]*

Scope of Work

Work shall consist of the following items.

Health and Safety Plan

The Contractor's current Health and Safety Plan for remediation of the Metals Areas shall be amended to include the remediation work at Site 22A. The amended Health and Safety Plan is subject to the review of the Contracting Officer. Site 22A is a former wood-treating facility, and the major contaminants of concern are pentachlorophenol and dioxins. Maximum concentrations of constituents detected in soils at the site are shown in Table 1. Contractor shall include Material Safety Data (MSD) sheets in the Health and Safety Plan as applicable.

APR 11 1996

Perimeter Air Monitoring

Perimeter air monitoring is not required for the remediation of Site 22A. The monitoring schedule, as presented in R&R International's QAPP for the Metals OU, does not need to be revised.

Decontamination, Care, and Disposal of Water

All the provisions of the Metals OU contract Specification Section 01500 shall be followed. Contractor shall be responsible for removal of any ponded water, regardless of the source, from areas to be excavated. Contractor shall propose methods of containment of storm water runoff from exposed, contaminated areas (areas that have been cleared) using a system of berms, pumps and storage containers, or other methods. Proposed system shall be capable of containing the runoff from a two-year, 24 hour design storm (approximately 3.7 inches of rainfall in 24 hours). Any proposed earth berms shall be constructed in accordance with the Metals OU contract, Specification Section 2210. The existing diversion berm from remediation of Site 22 (see Figure 1) may be used as part of the storm water containment system, until it needs to be removed as part of the excavation of the site. Sandbags may be used

All water entering the excavation after clearing and prior to reaching the maximum excavation depth shall be considered potentially contaminated and subject to the requirements of the Metals OU contract, Specification Section 01500. After the maximum depth is reached, water that enters the excavation prior to or during backfilling shall not be considered potentially contaminated and may be discharged from the excavation to an area outside of and north or west of the excavation. This discharge water shall not cause ponding or erosion of surface soils. Contractor may, at his discretion use internal berms to separate areas where excavation has been completed and water treatment is not required. *[This should be reviewed by IEPA and/or USEPA.]*

Exclusion zones must be clearly marked, both at Site 22A and the Metals OU disposal landfill. At Site 22A, the entire excavation area must be within the exclusion zone. At the Metals OU disposal landfill, all areas containing contaminated soil (all materials excavated from remediated areas) shall be within the exclusion zone. In addition, an area along the north Metals OU landfill berm adjacent to the contaminated soil fill, and demarcated by the USFWS, shall be included in the exclusion zone. Any vehicles entering or leaving the exclusion zone must be decontaminated in accordance with the Metals OU contract specifications.

At the excavation area, decontamination with water will not be necessary if trucks are kept outside the exclusion zone and loaded by an excavator located within the exclusion zone,

provided that the loading can be accomplished with no spillage. However, provisions must be made for containing spillage of contaminated soil, in the event that it does occur.

Any trucks entering the exclusion zone at the Metals OU disposal landfill shall be decontaminated by using water.

Clearing, Grubbing, and Excavation of Contaminated Soils

Exclusion zones, contamination reduction zones, and support zones shall be established prior to beginning excavation activities, in accordance with the Metals OU contract specifications.

Clear and grub areas to be excavated, in accordance with the Metals OU contract, Specification Section 02110, except for the following:

- The clearing limit shall include the limits of excavation, and only such additional area as required for construction of storm water diversion berms.
- Cleared vegetation taken from a level above the ground surface shall be disposed of in the same area with cleared material from the Old Refuge Shop Channel.
- Other cleared debris taken from a level above the ground surface (such as fencing and monitoring well risers) shall be disposed of off-site in a permitted solid waste disposal facility.

Saw cutting or breaking and removal of concrete foundations may be required.

Excavate in accordance with Figure 1 and the Metals OU contract specifications. Soil from the berm located at Site 22A which was constructed as the diversion berm for remediation of Site 22 shall be excavated and used as backfill for Site 22A. See Figure 1 for the approximate location of the diversion berm, and Figure 2 for the design typical cross section of the berm. Based on field observations, the actual berm geometry is different from the design cross-section. During excavation of the berm, care shall be taken not to damage the 6 mil synthetic liner beneath the berm. After the berm material is excavated, the liner shall be disposed of in the Metals OU disposal landfill.

Any loose concrete, culvert pipe, fencing, or other non-soil and non-organic material found below the existing ground surface and within the limits of the excavation shall be removed and disposed of in the Metals OU disposal landfill. Culvert pipe shall be crushed prior to disposal. If concrete or piping is found which extends beyond the limits of the excavation, the Contracting Officer shall immediately be contacted for direction. Chain-link fencing to be removed shall be replaced in kind. A temporary security fence shall be erected along the

boundary of the excavation, connecting the two end points where the existing fence is to be removed, and shall remain in place during the time the permanent fence is down.

Contractor shall be responsible for protection of all existing utilities and roadways. Utilities and roadways identified during surveying are shown in Figure 1. Note that Figure 1 shows an east-west sanitary sewer that crosses the excavation area. There is also a manhole on the sewer line within the excavation area. Historic construction drawings of the storm sewer system are available from the U.S. Fish and Wildlife Service, and should be reviewed prior to beginning work. These drawings are available for the Contractor's use. The Contracting Officer does not guarantee the accuracy of the historic drawings. Contractor shall verify location of existing utilities prior to construction. No earth moving equipment shall be operated directly over the sanitary sewer after excavation activities begin. In the event that the sewer pipe is encountered during excavation, the excavation shall not extend below the top of the pipe in the immediate vicinity of the pipe; that is, the pipe shall not be exposed.

Disposal

All excavated material shall be transported to the Metals OU disposal landfill and placed in the landfill in accordance with the Metals OU contract specifications. In accordance with the Metals OU contract specifications, no concrete, piping, fencing, or other sharp objects shall be placed in the upper two feet of the Metals OU disposal landfill below the cover geomembrane. This upper 2 feet shall consist of 1.5 feet of contaminated soil overlain by 6 inches of either uncontaminated soil or soil from the Metals OU remediation which meets the requirements of the Metals OU contract specifications. No contaminated soil from Site 22A may be placed in the upper six inches of the landfill below the cover geomembrane. If insufficient soil from the Metals OU is available for the upper 6 inches, clean soil meeting the requirements for soil to be placed in the upper two feet of the Metals OU disposal landfill shall be placed in the upper 6 inches of the landfill, beneath the cover geomembrane. This soil shall be obtained from a site located southeast of the Metals OU disposal landfill (See Figure 3). A composite sample of this soil shall be obtained and tested for TAL/TCL constituents. The R&R International QAPP for the Metals OU shall be followed as applicable for sampling and analysis. Results shall be submitted to the Contracting Officer within 14 calendar days of NTP.

Contractor shall also dispose, into the Metals OU disposal landfill, the contents of approximately six five-gallon buckets located at the fence at Site 22A which contain material from Site 22A. These buckets shall be decontaminated and disposed of in an off-site solid waste landfill. In addition, 20 to 25 empty five-gallon buckets located at the former treatment area for Site 22 shall be decontaminated and disposed of in an off-site solid waste landfill. The contents of several 55-gallon drums shall also be disposed of. *[Need to specify number, contents, and disposal of contents and drums.]*

Disposal--Basic Option

Landfill construction and operation shall comply with the Metals OU contract drawings and specifications, except that elevations may change from those shown in the drawings. On Sheet No. C15 of the Metals OU contract drawings, the easting and northing coordinates shall remain the same, but the elevations shall be adjusted to accommodate the additional fill, with uniform slopes on all sides. Contractor shall comply with daily cover requirements of contract specifications.

Disposal--Option A--Cover Design with Geocomposite Drainage Layer

Landfill construction and operation shall comply with the Metals OU contract drawings and specifications, except that elevations may change from those shown in the drawings; and a geocomposite drainage layer shall be added to the cover design, in accordance with Figures 5 through 8 and the attached specifications for Option A.

On Sheet No. C15 of the Metals OU contract drawings, the easting and northing coordinates shall remain the same, but the elevations shall be adjusted to accommodate the additional fill, with uniform slopes on all sides. Elevations shall also be adjusted to accommodate the slope in the anchor trench, in accordance with Figure 6.

Contractor shall submit a QA/QC Plan for installation of the drainage layer.

Contractor shall comply with daily cover requirements of contract specifications.

Monitoring Well Protection and Abandonment

Two monitoring wells at the site shall be abandoned in accordance with the Metals OU contract, Specification Section 02260. Well logs will be provided by the Contracting Officer. Materials from abandonment of the wells located below existing ground surface, such as casing and concrete, shall be disposed of in the Metals OU disposal landfill.

Site Restoration

Excavations shall be backfilled to the existing grades shown in Figure 1, in accordance with the Metals OU contract specifications. Material stockpiled from the diversion berm from the Site 22 remediation shall be used for borrow. Additional borrow material as necessary to achieve grades shall be obtained from the borrow site located southeast of the Metals OU disposal landfill (shown in Figure 3) . *[USFWS may want to specify other areas.]* Materials from this source used for borrow and compaction (except in parking areas) must meet the

requirements for borrow of the Metals OU contract, Specification Section 02210. For all parking areas, the soil shall be compacted to a density at least 95 percent of maximum dry density of ASTM D698. If this material is not also being used in the upper 6 inches of the Metals OU disposal landfill, it shall be sampled and tested as described under "Disposal", above.

Parking areas are shown on Figure 4. It was assumed that the parking lot will only be used by pick-up trucks and passenger vehicles. The area within the existing chain link fence is also to be restored for parking. All parking areas are to receive a minimum of 6 inches of gravel on top of soil for final grade. Compaction of the gravel shall be performed with at least six passes of a track width of a Caterpillar D6 dozer or larger dozer. Figure 4 also shows the proposed minimum final grades. The minimal final grades are shown as an option to reduce the volume of soil backfill required for the project. Gravel for parking areas shall be obtained at locations specified by the Contracting Officer [*USFWS--need to specify these.*]

Seeding and planting shall comply with Specification Section 02935, as specified for the Old Refuge Shop Channel, except that no trees shall be planted.

Table 1**Summary of Maximum Concentrations of Constituents Detected in Soils at Site 22A**

Constituent	Maximum Concentration (microgram/kg unless noted otherwise)
Dioxin/furan toxicity equivalent	3.8
Bis (2-ethylhexyl)phthalate	56
4,4-DDE	42
4,4-DDT	38
Manganese	1,600 mg/kg
Pentachlorophenol	3,200
Phenanthrene	320
Silver	1.6 mg/kg
Zinc	119 mg/kg
2-Methylnaphthalene	160
Acetone	86,000
Acenaphthylene	110
Anthracene	200
Benzo(a)anthracene	550
Benzo (a)pyrene	390
Benzo(b)fluoranthene	720
Benzo(g,h,i)perylene	66
Chrysene	630
Dibenzofuran	110
Fluroanthene	580
Naphthalene	74
Pyrene	610
Endrin	10J
Aroclor-1254	140
Phenol	0.2J
Indeno - pyrene	57
Cyanide	69 mg/kg

ATTACHMENT A
SPECIFICATIONS FOR OPTION A ONLY

Geocomposite. A geonet and geotextile drainage layer (geocomposite) shall be furnished by the Contractor and placed immediately above the geomembrane as shown on Figure 5. The geocomposite shall consist of geonet with non-woven geotextile heat-bonded to both sides by the manufacturer. No burn-through of the geotextiles will be permitted. No glue or adhesive will be permitted.

The geocomposite will be obtained from an approved manufacturer. The geocomposite shall be placed according to the manufacturer's specifications and Contractor's QA/QC Plan.

The geocomposite shall meet the following criteria:

GEONET MATERIAL PROPERTIES

<u>Property</u>	<u>Test Method</u>	<u>Unit</u>	<u>Qualifier</u>	<u>Value</u>
Resin Density	ASTM D1505	g/cm ³	Minimum	0.940
Resin Melt Index	ASTM D1238	g/10 min	Maximum	1.0
Carbon Black Content	ASTM D1603	%	Minimum	2
Thickness ^a	ASTM D1777	inches	Minimum	0.270
Mass Per Unit Area	ASTM D3776	lbs/ft ²	Minimum	0.220
Transmissivity at 14.5 psi	ASTM D4716 ^b	gal/min/ft	Minimum	5
Tensile Strength	ASTM D1682	lbs/in	Minimum	44

^a10 kPa loading

^bASTM D4716, drainage gradient of 0.1; seating time 15 minutes

GEOTEXTILE MATERIAL PROPERTIES

<u>Property</u>	<u>Test Method</u>	<u>Unit</u>	<u>Qualifier</u>	<u>Value</u>
Fabric Weight	ASTM D3776	Oz/sy	Minimum	5.7
Grab Strength	ASTM D4632	lbs	Minimum	160
Puncture Resistance	ASTM D4833	lbs	Minimum	80
Permittivity	ASTM D4491	sec ⁻¹	Minimum	1.74
AOS	ASTM D4751	US Sieve	Range	70 - 100
Peel Strength of Bond to Geonet	ASTM D413	lbs/in	Minimum	2.0

The geocomposite shall be protected from exposure to sunlight during transport and storage. After placement, the geocomposite shall not be left uncovered for more than two weeks.

Traffic or construction equipment will not be permitted directly on the geocomposite.

Care shall be taken to keep the geocomposite clean and free from debris prior to installation. If the geocomposite is not clean, it should be washed prior to installation.

Adjacent rolls shall be overlapped approximately 4 inches and secured by plastic ties approximately every 5 feet along the roll length. Plastic ties shall be white or other bright color for easy inspection. Metallic ties shall not be allowed. In the corners of the side slopes, where overlaps between rolls of geocomposite are staggered, an extra layer of geocomposite shall be installed from the top to the bottom of the slope.

The Contractor shall place all materials in such a manner that the geocomposite and underlying materials are not damaged.

The geocomposite shall be laid loosely so that placement of the overlying materials will not stretch or tear the geocomposite.

The Contractor must provide documentation that the supplied material meets these specifications.

Field seams should be oriented parallel to the line of maximum slope; i.e., oriented along, not across the slope. In corners and irregularly shaped locations, the number of field seams should be minimized.

Four-Inch Diameter Corrugated Polyethylene Tubing. Four-inch diameter perforated, corrugated polyethylene tubing shall be furnished by the Contractor and placed at the perimeter toe of the slopes to collect any water within the geocomposite, as shown on Figures 6 and 7. Four-inch non-perforated, corrugated polyethylene tubing shall be connected to the perforated tubing at the locations shown on Figure 6. The non-perforated tubing is to discharge to the proposed erosion protection stone area as shown on Figure 8. The tubing shall be placed at a 0.5 percent grade towards the discharge. All drainage tubing shall

conform to the requirement of IDOT Standard Specifications for Road and Bridge Construction, Article 740.11 (perforated) and 740.12 (non-perforated). All couplings used to assemble the drainage tubing network will be in accordance with the manufacturer's recommendations for joining the tubing.

All tubing shall be laid on the geocomposite as shown on the drawings in reasonably close conformity to the line and grade and shall have a full, firm, and even bearing at each joint and along the entire length of the pipe

Movement of construction equipment vehicles and loads over and adjacent to any pipe shall be done at the Contractor's risk.

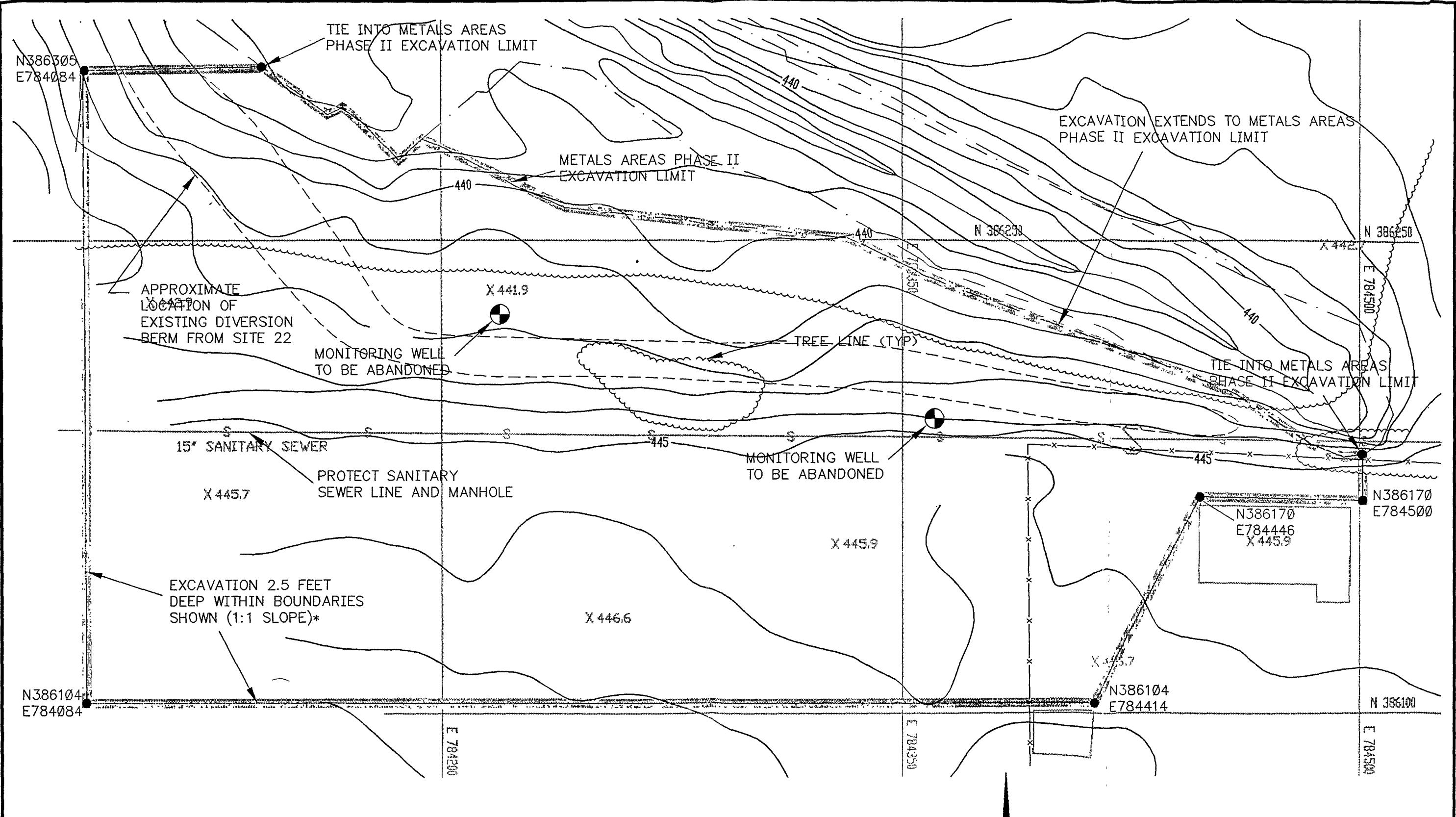
The upgrade end of the tubing shall be closed with solid plastic caps.

Drainage Gravel. Drainage gravel shall be furnished by the Contractor and shall consist of non-angular sand and gravel which conforms to the requirements of IDOT Standard Specifications for Road and Bridge Construction, Article 704.01, Gradation CA16. It shall be gravel, chert gravel, or pit or bank run gravel as defined in IDOT Standard Specifications for Road and Bridge Construction, Article 704.01.

All gravel shall be loosely placed in the anchor/drain trenches as shown in Figure 7 by suitable means approved for use by the Contracting Officer or his representative. Gravel shall not be dumped into place from heights in excess of 2 feet unless alternate means of gravel placement can be demonstrated to the satisfaction of the Contracting Officer or his representative as not being detrimental or injurious to the performance of the underlying strata materials.

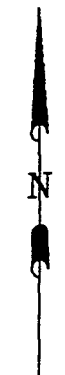
Erosion Protection Stone. Erosion Protection Stone shall be furnished by the Contractor and placed at the drainage discharge points as shown in Figure 8. The stone shall conform to IDOT Standard Specifications for Road and Bridge Construction, Article 705.01, Gradation No. 2.


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EXCAVATION 2.5 FEET DEEP WITHIN BOUNDARIES SHOWN (1:1 SLOPE)*

*NOTE: EXCAVATION SHALL EXTEND 2.5 FEET BELOW GRADE IN ALL AREAS EXCEPT FOR AREA BENEATH EXISTING SITE 22 DIVERSION BERM, WHERE IT SHALL EXTEND 2.5 FEET BELOW THE BOTTOM OF THE BERM.

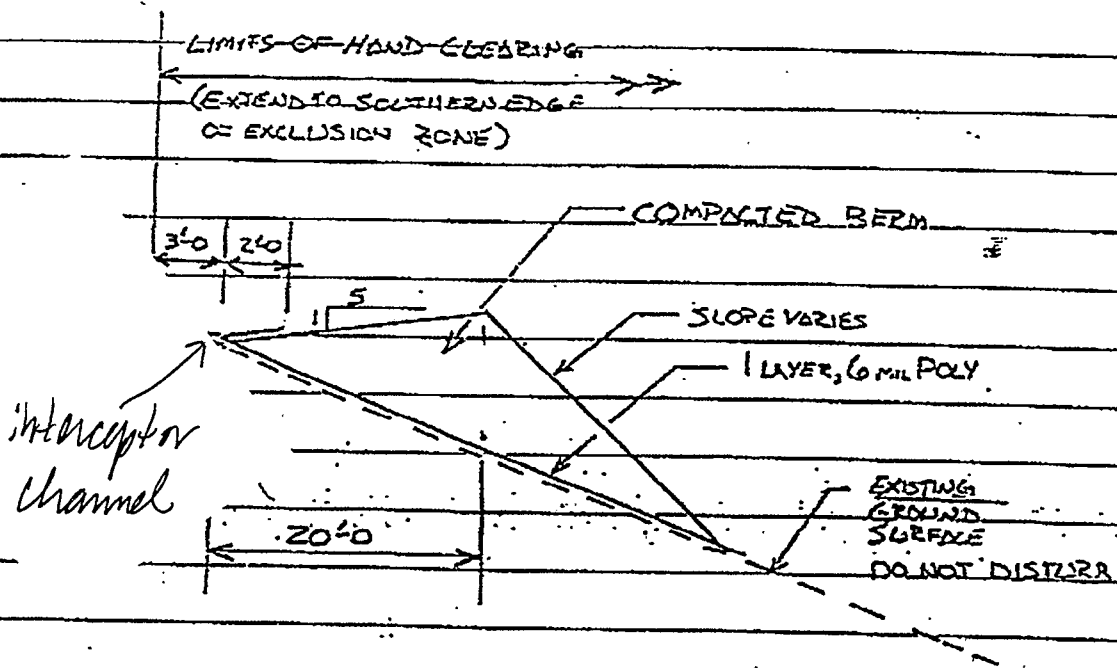


CRAB ORCHARD NATIONAL WILDLIFE REFUGE		PROJECT NO. C3M11X
Woodward-Clyde  Consultants Engineering & sciences applied to the earth & its environment		
DRN. BY: bdl 3-13-95 DSGN. BY: <i>Mjg 3-28-96</i> CHKD. BY: <i>hb</i>	Excavation Site 22A	FIG. NO. 1

CONTRACT NO. DACW43-95-C-0419

REF "C"

MODIFICATION NO. P00002



DETAIL 1

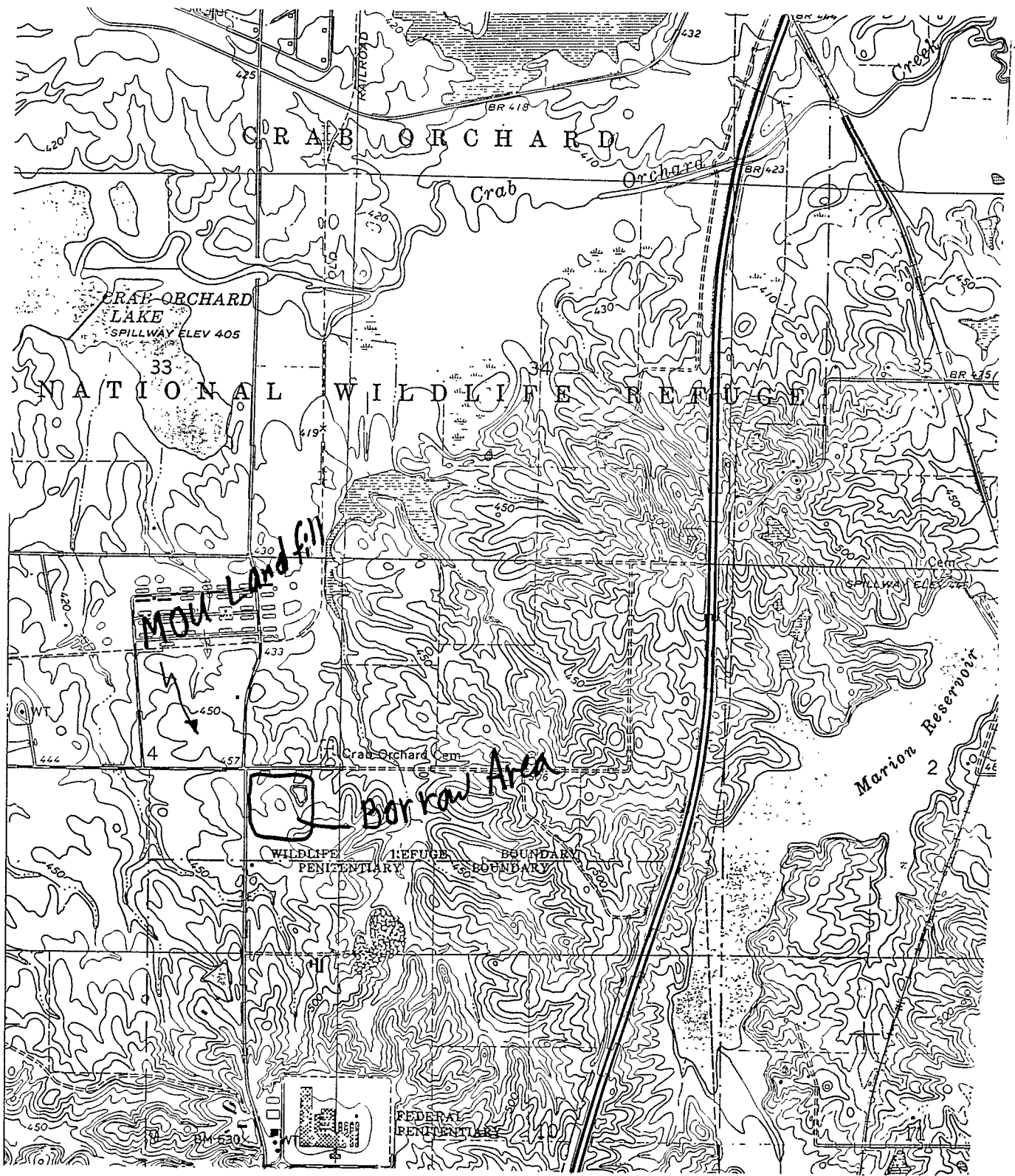
TYPICAL BERM SECTION

SOUTH SIDE OF EXCAVATION

FROM 20 FT. EAST OF STA 1+00 TO

STA 5+10

Figure 2

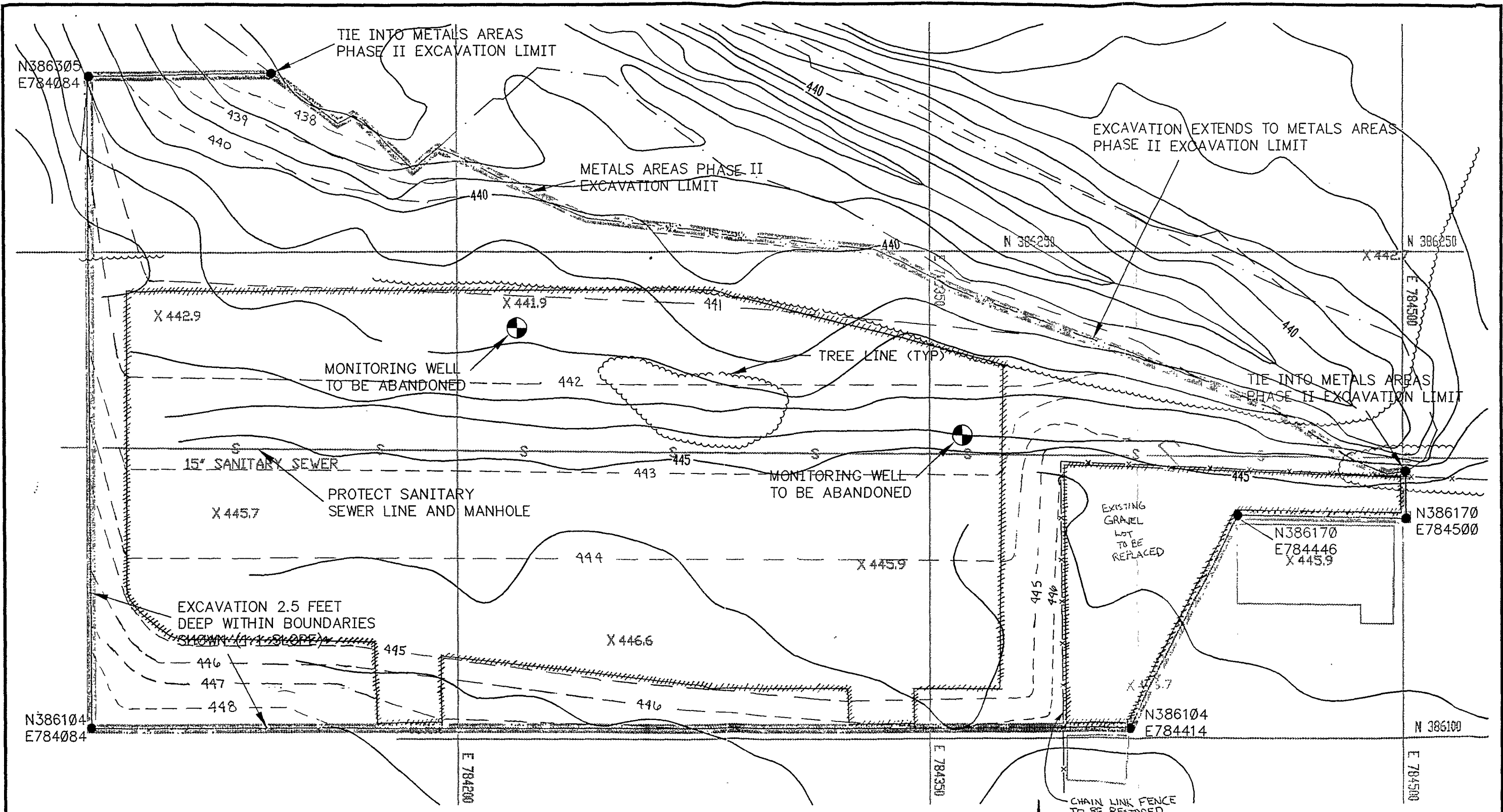


↑ N 1" = 2000'

Base Map - USGS 7.5 minute quad
Marion, IL

Figure 3
Borrow Area

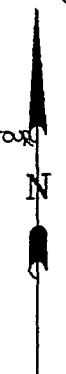
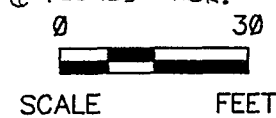
File: F:\C3M11X\TASK35\FIG1A.DWG Last edited: 03/25/96 @ 2:01 p.m. © WCC-ST.LOUIS



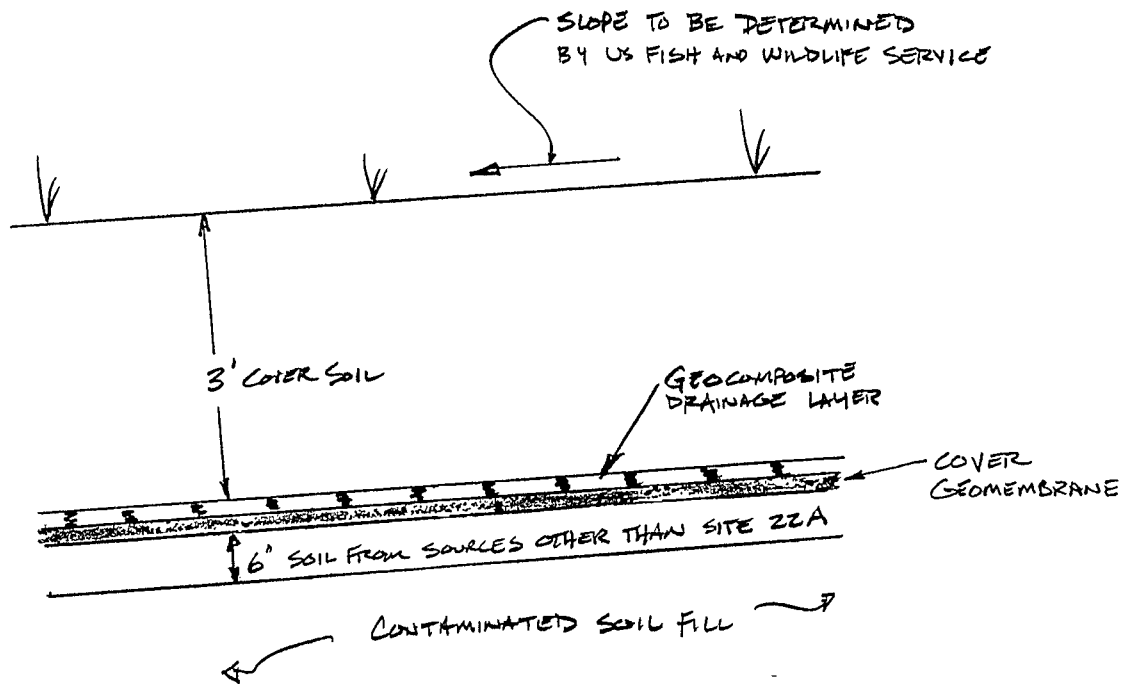
*NOTE: EXCAVATION SHALL EXTEND 2.5 FEET BELOW GRADE IN ALL AREAS EXCEPT FOR AREA BENEATH EXISTING SITE 22 DIVERSION BERM, WHERE IT SHALL EXTEND 2.5 FEET BELOW THE BOTTOM OF THE BERM.

LEGEND

- 445 --- MINIMUM FINAL GRADE CONTOUR
- //////// BOUNDARY OF PROPOSED GRAVEL PARKING LOTS. GRAVEL IS TO BE A MINIMUM OF 6 INCHES THICK.



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Woodward-Clyde Consultants <small>Engineering & sciences applied to the earth & its environment</small>		
DRN. BY: bdl 3-13-95 DSGN. BY: <i>ASH</i> 3.28.96 CHKD. BY: <i>ASH</i>	Excavation Site 22A MINIMUM FINAL GRADE	FIG. NO. 4



CRAB ORCHARD METALS RA

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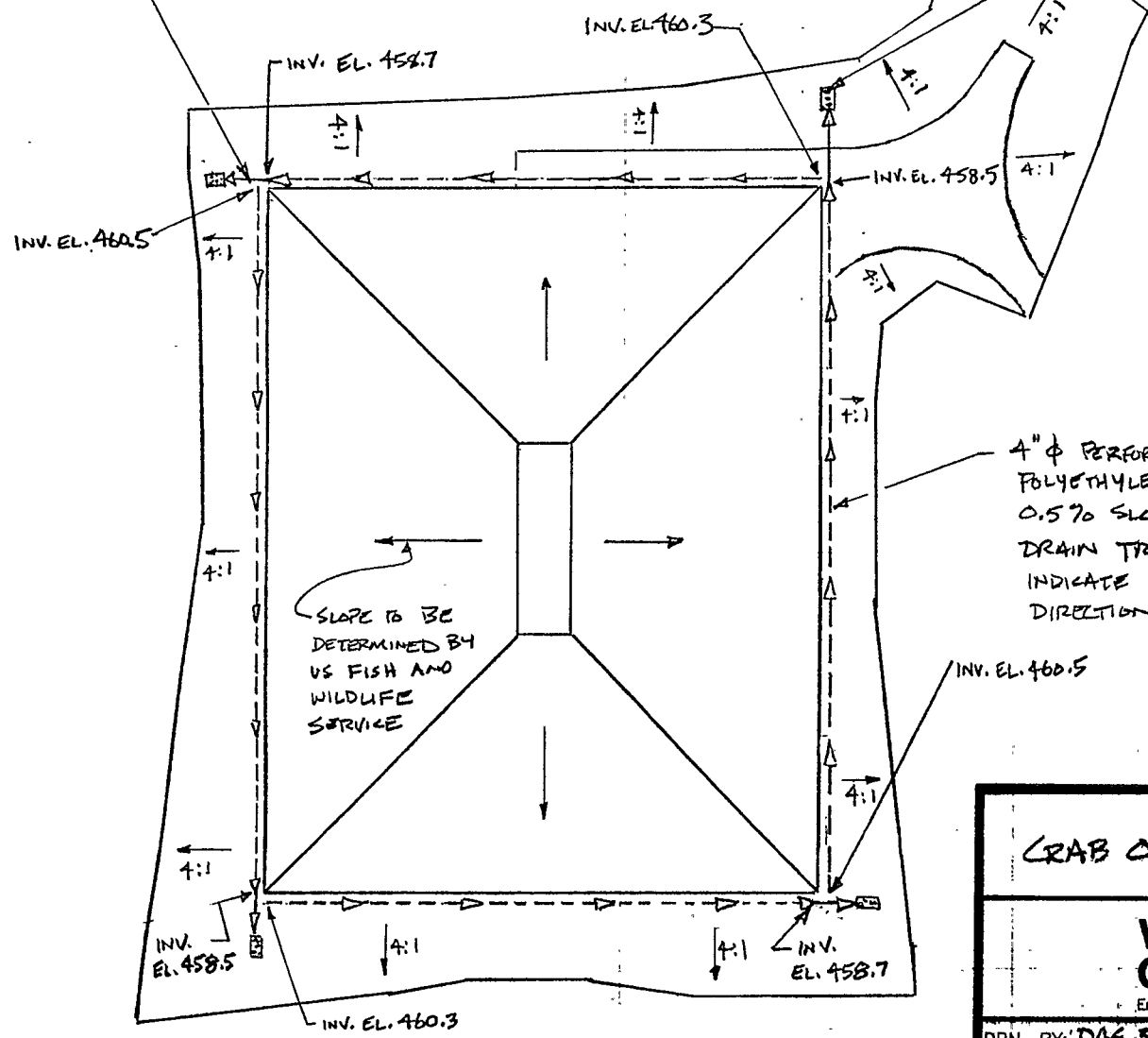
DRN. BY: JAG 3/29/96
DSGN. BY: JAG 3/29/96
CHKD. BY: MCH 3.29.96

TYPICAL COVER DETAIL
COVER DESIGN WITH
GEOCOMPOSITE DRAINAGE LAYER

FIG. NO.
5


4" ϕ CORRUGATED POLYETHYLENE TUBING (NON-PERFORATED) DISCHARGE FROM ANCHOR/DRAIN TRENCH. MAINTAIN 0.5% SLOPE AND DAYLIGHT ONTO 4:1 SLOPE (TYP.) SEE FIGURE 8

EROSION PROTECTION STONE PAD (TYP.) SEE FIGURE 8

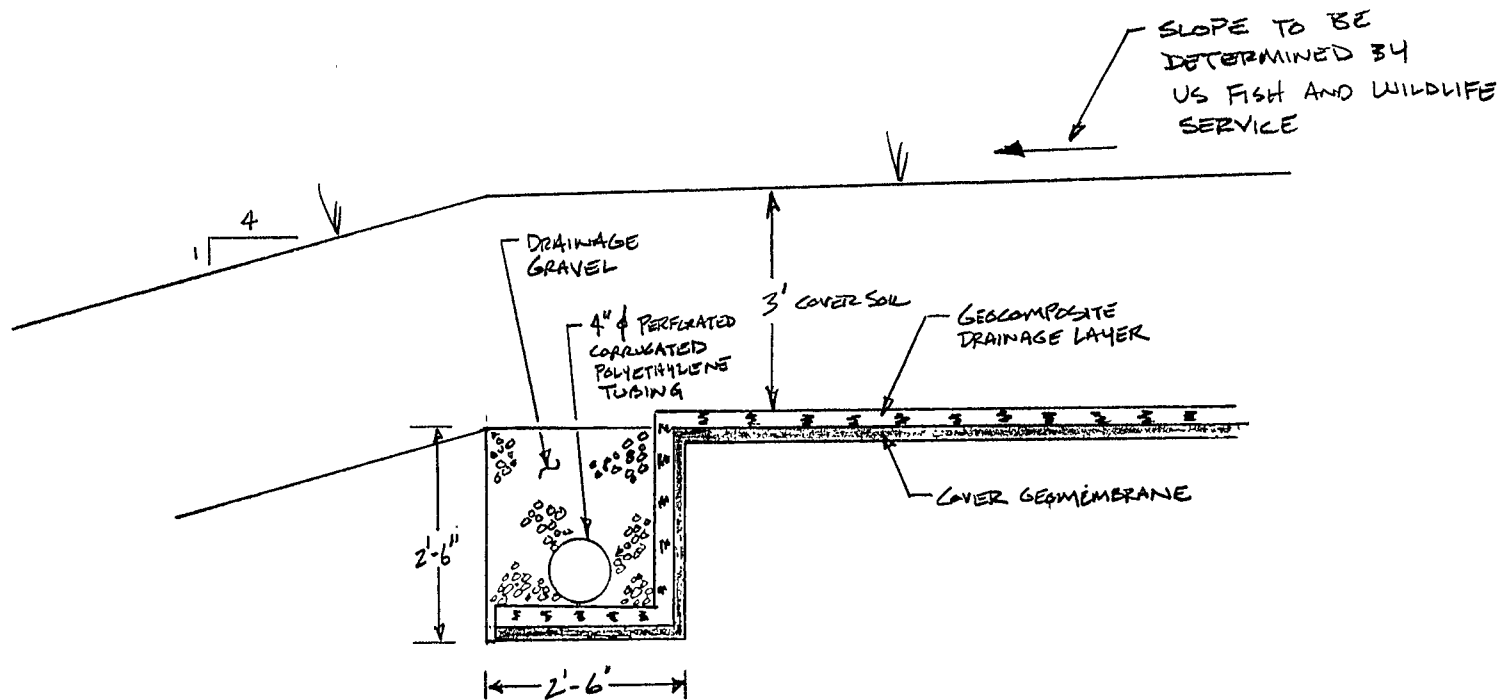


4" ϕ PERFORATED CORRUGATED POLYETHYLENE TUBING AT 0.5% SLOPE IN ANCHOR/DRAIN TRENCH. ARROWS INDICATE DRAINAGE DIRECTION (TYP.)

SLOPE TO BE DETERMINED BY US FISH AND WILDLIFE SERVICE

CRAB ORCHARD METALS RA		PROJECT NO. C3M11X
Woodward-Clyde  Consultants Engineering & sciences applied to the earth & its environment		
DRN. BY: DAS 3/29/96	PLAN SHOWING COVER DRAINAGE COVER DESIGN WITH GEOCOMPOSITE DRAINAGE LAYER	FIG. NO. 6
DSGN. BY: DAS 3/29/96		
CHKD. BY: MCA 3.29.96		

ROYALTY OF ST. LOUIS INC. 856164



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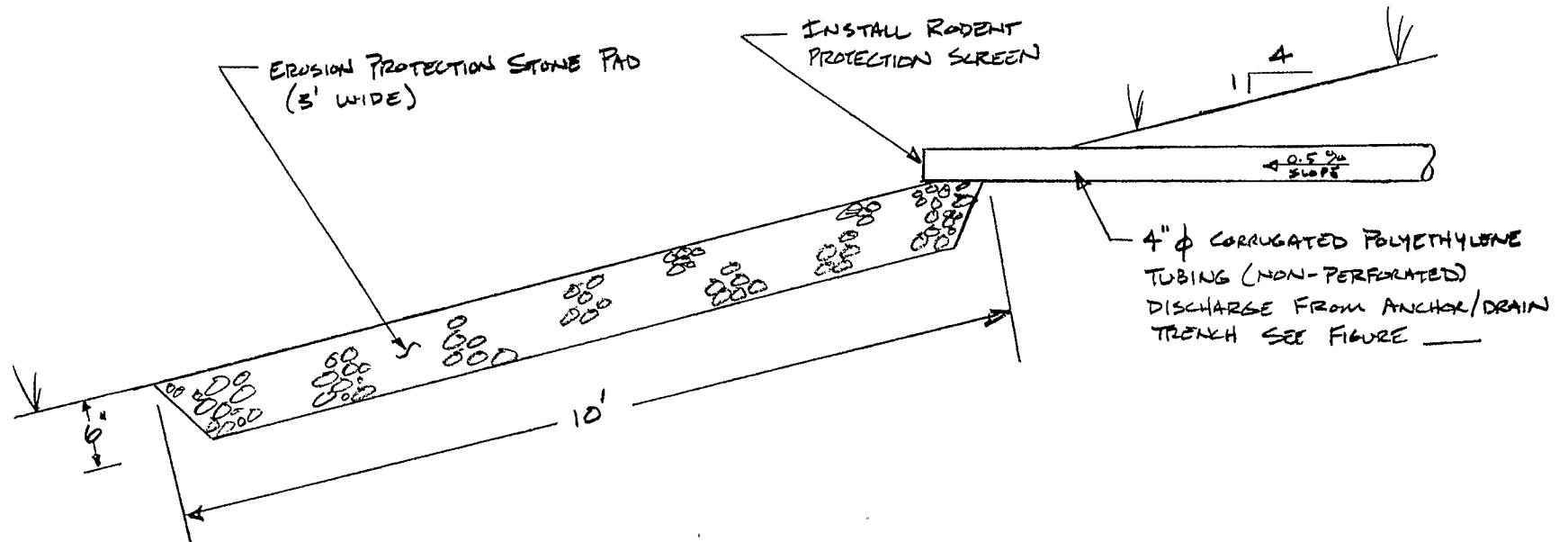
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DRN. BY: DAG 3/29/96
DSGN. BY: DAG 3/29/96
CHKD. BY: MCA 3/29/96

TYPICAL ANCHOR/DRAIN TRENCH DETAIL
COVER DESIGN WITH
GEOCOMPOSITE DRAINAGE LAYER

FIG. NO.

7



CRAB ORCHARD METALS RA

PROJECT NO.

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Engineering & sciences applied to the earth & its environment

DRN. BY: DAS 3/29/96
DSGN. BY: DAS 3/29/96
CHKD. BY: MCH 3/29/96

COVER DRAINAGE DISCHARGE
COVER DESIGN WITH
GEOCOMPOSITE DRAINAGE LAYER

FIG. NO.

8

**Remediation of Site 22A
Bidding Schedule**

ITEM NO.	DESCRIPTION	QTY	UNIT	PRICE	AMOUNT
1	Mobilization/demobilization; modification of Health & Safety Plan, Excavation and Disposal Plan ; runoff control; construction of haul roads; establishment of survey controls; and all work not otherwise covered under items below.	JOB	LS	\$ _____	\$ _____
2	Construction and disposal of decontamination pads; all decontamination activities; care & disposal of water (including treatment if necessary)	JOB	LS	\$ _____	\$ _____
3	Clearing & Grubbing				
	3.1 First 6410 SY	6410	SY	\$ _____	\$ _____
	3.2 Over 6410 SY	5000	SY	\$ _____	\$ _____
4	Excavate, haul, and place soil in landfill (measurement is in place before excavation)				
	4.1 First 5400 CY	5400	CY	\$ _____	\$ _____
	4.2 Over 5400 CY	6000	CY	\$ _____	\$ _____
5	Soil backfill (measurement is in place after compaction) (Quantities may be less - See Note 1)				
	5.1 First 4730 CY	4730	CY	\$ _____	\$ _____
	5.2 Over 4730 CY	6000	CY	\$ _____	\$ _____
6	Gravel backfill (includes final grading for parking) (measurement is in place after compaction)				
	6.1 First 670 CY	670	CY	\$ _____	\$ _____
	6.2 Over 670 CY	400	CY	\$ _____	\$ _____
7	Fine grading, topsoiling, and seeding (for non-parking area)				
	7.1 First 2395 SY	2395	SY	\$ _____	\$ _____
	7.2 Over 2395 SY	5000	SY	\$ _____	\$ _____
8	Removal of concrete structures, if necessary (not including monitoring well abandonment)	35	SY	\$ _____	\$ _____
9	Off-Site disposal of solid waste (above ground waste other than vegetation from clearing)				
	9.1 First 16 CY	16	CY	\$ _____	\$ _____
	9.2 Over 16 CY	8	CY	\$ _____	\$ _____
10	Monitoring well abandonment	2	EA	\$ _____	\$ _____

**Remediation of Site 22A
Bidding Schedule**

ITEM NO.	DESCRIPTION	QTY	UNIT	PRICE	AMOUNT
11	Additional collection and treatment of leachate from landfill	JOB	LS	\$ _____	\$ _____
12	Additional landfill soil (6 inches on top of waste)				
	12.1 First 1730 CY	1730	CY	\$ _____	\$ _____
	12.2 Over 1730 CY	520	CY	\$ _____	\$ _____
13	Temporary Fence	180	LF	\$ _____	\$ _____
<u>ITEMS FOR OPTION A ONLY</u>					
14	Geocomposite for landfill cover				
	14.1 First 14,820 SY	14,820	SY	\$ _____	\$ _____
	14.2 Over 14,820 SY	4446	SY	\$ _____	\$ _____
15	Anchor/drain trench for landfill cover (includes installation, backfill, pipes, etc...)				
	15.1 First 1400 linear FT	1400	LF	\$ _____	\$ _____
	15.2 Over 1400 linear FT	280	LF	\$ _____	\$ _____
16	Discharge trenches (for drain trench in Item 13) (includes installation, backfill, pipes, etc...)				
	16.1 First 105 linear FT	105	LF	\$ _____	\$ _____
	16.2 Over 105 linear FT	20	LF	\$ _____	\$ _____
TOTAL AMOUNT WITHOUT OPTION A					\$ _____
TOTAL AMOUNT INCLUDING OPTION A					\$ _____

Notes:

- 1 An option to backfilling the site to the current grades would be to grade the site as shown in Figure 4. The volume of soil backfill would be reduced from the current estimate by 2700 CY if the new parking area grade is 2 ft below the existing grade. The U.S. Fish and Wildlife Service will make the final decision as to the final grade.
- 2 Quantity for unit priced items is estimated only and the respective unit price will prevail in the event of an overrun or underrun subject to Metals OU Contract Clause "Variation in Estimated Quantities."
- 3 Bid prices must be entered for all items of the schedule. Total amount bids submitted without bid prices being entered on individual items will be rejected. Extensions will be subject to verification by the Government. In case of variation between the unit price and the extensions, the unit price will be considered the bid. In the case of variation between the individual bid item prices and the total amount, the individual bid prices will be considered the bid.

- 4 A modification to a bid which provides for a single adjustment to the total amount bid should state the application for the adjustment to each respective unit price and lump sum price affected. If the modification is not so apportioned, the single adjustment will be applied on a pro rata basis to every bid item on the bidding schedule.