

**CRAB ORCHARD NATIONAL WILDLIFE REFUGE
MARION, ILLINOIS**

EXPLANATION OF SIGNIFICANT DIFFERENCES

EXPLOSIVES/MUNITIONS MANUFACTURING AREA OPERABLE UNIT SITE COC-4

MAY 1999

INTRODUCTION

Upon completion of the Remedial Investigation and Feasibility Study for the Explosives/Munitions Manufacturing Area Operable Unit (EMMA OU) at Crab Orchard National Wildlife Refuge (NWR), located in Marion, Illinois, a Record of Decision (ROD) for the EMMA OU was signed by USEPA on February 19, 1997. The ROD concluded that no further remedial action was required at twelve of the fifteen EMMA OU sites, and concluded remedial actions were required at two sites (COC-3 and COP-4). The remaining site (COC-4), although it did not pose unacceptable risk to human health, was specifically deferred from a remedy selection in that ROD so that ecological risk at Site COC-4 could be further evaluated.

The remedy in the ROD focused on preventing direct contact with contaminated soils through excavation and offsite treatment and/or disposal, placement of a soil cover over remaining affected soils, and use of institutional controls to protect the integrity of the soil cover.

This Explanation of Significant Differences (ESD) identifies the remedial alternative selected for Site COC-4 of the EMMA OU. This ESD provides the rationale for a no action alternative. Studies conducted at the Site indicate no remedial action is necessary at the site to protect human health and the environment. Publication of a no action alternative for Site COC-4 in this decision document presents a significant (but not fundamental) difference to a component of the remedy to be implemented for the EMMA OU. This ESD is being issued by the U.S. Army Corps of Engineers (USACE), the lead agency for remedial activities at the EMMA OU, and the U. S. Environmental Protection

Agency (USEPA), in consultation with the Illinois Environmental Protection Agency (IEPA) and the U. S. Fish and Wildlife Service (USFWS).

USACE and USEPA are issuing this ESD as part of their public participation responsibilities under Section 117(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly referred to as "Superfund", as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This ESD summarizes information that can be found in greater detail in the 1998 Ecological Evaluation Report, and the 1994 Remedial Investigation/Baseline Risk Assessment Report. Copies of these reports are located in the Administrative Record. The public is encouraged to review this ESD and related documents available in the Administrative Record to gain a more comprehensive understanding of the site and the CERCLA activities conducted there.

SITE BACKGROUND

The Crab Orchard NWR was included on the National Priorities List (NPL) in 1987. The NPL is a list of USEPA's most serious hazardous waste sites identified for remedial action. The USFWS, an agency of the U.S. Department of the Interior (USDOI), manages the Refuge. The Refuge is currently divided into six separate operable units (OUs) and a removal action. The Water Towers project is the removal action. The OUs are the Polychlorinated Biphenyl Area OU, the Metals Area OU, the Miscellaneous Area OU, the Additional & Uncharacterized Sites OU, the Lake Monitoring OU, and the EMMA OU.

The Crab Orchard NWR is located approximately 5 miles west of Marion, Illinois. The land that is now



occupied by the eastern portion of the Refuge was transferred to the War Department for construction of the former Illinois Ordnance Plant (IOP), also known as the Crab Orchard Ordnance Plant. The ordnance plant was constructed in 1941 for the U. S. Army as part of its National Defense Program. It's major activity consisted of 2,4,6-trinitrotoluene (TNT) melt-pour operations. Various munitions and munitions items, including 500-pound bombs, anti-tank mines, and 155 millimeter (mm) shells, were produced at the plant. The ordnance plant was closed in 1945, shortly after the end of World War II, and was transferred to the War Assets Administration (WAA). The plant was decontaminated, and a portion of the property was leased to private industrial tenants. Ownership of the property was transferred to the USDO in 1947. According to a 1980 Archive Search Report (USATHAMA, 1980), the private tenant uses were for production of electrical equipment, boats, corrugated boxes, plated metal parts, and explosives.

The Refuge currently comprises an area of approximately 43,500 acres of forested land, pine plantations, cultivated lands, and industrial areas. There are three lakes within the Refuge, including Crab Orchard Lake. Surface water from the EMMA OU sites eventually drains to Crab Orchard Lake. Fifteen individual sites were investigated within the EMMA OU. These sites are grouped into three discrete areas. The first area of ten sites are located in the Crab Orchard Cemetery (COC) area, so named due to the proximity of Hampton Cemetery. The second area of four sites are in the Crab Orchard Plant (COP) area, near the Group II load line and the former Ammonium Nitrate Plant. The last site is in the explosives storage bunker area.

CRAB ORCHARD CEMETERY SITE 4 (COC-4)

Site COC-4 is a rectangular area of approximately 250 by 600 feet (1.4 hectares) located on the south shore of Crab Orchard Lake, west of Wolf Creek Road, near the Hampton Cemetery. The site is a heavily wooded area with a number of shallow man-made depressions scattered throughout. A deeper man-made depression located at the north end of the site retains water and has become a pond. These depressions are thought to be the result of detonation disposal of ordnance materials.

Soil samples exhibited TNT above detection limits. Numerous metals were detected in soil samples including beryllium, cadmium, calcium, cobalt, copper, iron, magnesium, nickel, silver, and zinc. Sediment samples collected from the depression exhibited

detectable levels of antimony, beryllium, cadmium, copper, iron, and TNT.

Surface water samples collected from the man-made depression exhibited detectable metal concentrations including aluminum, barium, calcium, chromium, cobalt, copper, iron, magnesium, manganese, nickel, potassium, sodium, vanadium, and zinc. The groundwater samples collected from this site exhibited detectable concentrations of chloride, sulfate, TNT, barium, iron, lead, and potassium.

DESCRIPTION OF SIGNIFICANT DIFFERENCES AND THE BASIS FOR THOSE DIFFERENCES

This ESD addresses Site COC-4, one of fifteen sites in the EMMA OU. The remaining fourteen sites were addressed separately in the ROD for Crab Orchard National Wildlife Refuge Explosives/Munitions Manufacturing Area Operable Unit, April 22, 1996 (signed February 19, 1997). That ROD described the selected remedial alternatives for Sites COC-3 and COP-4, and provided for a "No Action" alternative for all remaining sites except Site COC-4. This ESD will supplement and complete the remedy selection process for the EMMA OU sites by providing for a no action alternative for Site COC-4. The Remedial Investigation report, Baseline Risk Assessment report, and other documentation contained in the EMMA OU Administrative Record remain applicable to Site COC-4 as well.

SUMMARY OF SITE RISKS

The EMMA OU Remedial Investigation fieldwork at COC-4 detected only one explosive and 22 inorganic compounds. TNT was the only explosive detected and was found in soil, groundwater, and sediment samples. Inorganics were detected in all site media: soils, groundwater, surface water and sediment. The EMMA OU Baseline Risk Assessment, completed in 1994, focused on three media: soil, surface water and sediment. Although groundwater was found to contain detectable levels of contaminants none were determined to be a concern or a potential future threat because of lack of exposure potential. For the evaluated media, the Baseline Risk Assessment determined that there was no potential for unacceptable risks to the human receptors that were considered: adult workers, adult and child recreational users.

For ecological receptors the Baseline Risk Assessment also indicated there was no potential for risk to the

following chosen indicator species; white-tailed deer, bald eagle, and the red-tailed hawk. However, the Baseline Risk Assessment did indicate there was a potentially unacceptable risk for bobwhite quail to TNT in the soil. In order to further evaluate this potential risk for bobwhite quail to TNT a remedial alternative decision on Site COC-4 was deferred in the April 22, 1997 EMMA OU ROD.

The Baseline Risk Assessment report concluded ecological risk, if any, to quail was due to ingestion of seed from plants grown in soil contaminated with TNT. Ecological Risk Indices (ERIs) calculated in the Baseline Risk Assessment were 100 for Reasonable Maximum Exposure (RME) and 30 for Reasonable Average Exposure (RAE). The USACE further evaluated that pathway and contaminant following the same methodology used at other EMMA OU sites. The results of that evaluation were reported in the June 1998 "Ecological Evaluation of Risk to Quail from TNT-Contaminated Soil" report. This report included updated information on toxicity factors, current research on plant uptake of TNT, and translocation of TNT to various plant organs. The report also discussed vadose zone fate and transport mechanisms of TNT in soils, factors affecting exposure point concentrations, and application of current USEPA and U.S. Army risk assessment guidance. Re-evaluation of risk to quail at COC-4 indicated assumptions concerning both the exposure point concentration and the toxicity factor used in the Baseline Risk Assessment were overly conservative by two to three orders of magnitude. Ecological Risk Indices for quail at COC-4 calculated with current toxicity factors and revised exposure point concentrations for TNT in seed (ERIs of 0.01 (RME) and 0.001 (RAE)) indicate that ingestion of seeds from plants grown in TNT-contaminated soils at COC-4 would not pose an unacceptable risk to quail at COC-4, and would not have a negative impact that would significantly reduce the quail populations (or populations of quail predators) at Crab Orchard NWR. An ERI less than one indicates that the contaminant is unlikely to cause adverse ecological effects. Potential risk to quail at COC-4 is very unlikely to have any ecological significance to quail populations at Crab Orchard NWR due to the small size of COC-4 (1.4 hectare), estimated population density of 0.67 quail/hectare, and abundant adjacent preferred habitat at the Refuge.

SUPPORT AGENCY COMMENTS

Comments from USEPA, USFWS, and IEPA were solicited for this ESD. USEPA and IEPA concurred

with this ESD. No comment was received from USFWS

AFFIRMATION OF THE STATUTORY DETERMINATIONS

Based upon the findings reported in the June 1998 "Ecological Evaluation of Risk to Quail from TNT-Contaminated Soil", conducted as part of the EMMA OU, it is concluded that conditions at Site COC-4 pose no current or potential threat to human health or the environment and no additional remedial actions need to be implemented.

USACE and USEPA are selecting a no action alternative for COC-4. Because the human health and ecological risk assessment concluded that the site poses no unacceptable risk to potential human and ecological receptors, no further action is necessary at the site. Considering the new information that has been developed and the change that has been made to the selected remedy for the EMMA OU, the USACE, USEPA, USFWS, and IEPA believe that the remedy remains protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective.

PUBLIC PARTICIPATION ACTIVITIES

The public is encouraged to review this ESD and related documents available in the Administrative Record. The Administrative Record, which contains the information upon which this no action alternative is based, is available for review at the following locations:

Southern Illinois University Morris Library
Fifth Floor
Carbondale, IL 62901
Contact: Reference Librarian
(618) 453-2683

USEPA- Region V
77 West Jackson Blvd, 7th Floor
Chicago, IL 60604-3590
Contact: Eileen Deamer
(312) 886-1728

Additionally, four information repositories have been established where the public may review documents on the EMMA OU site. These repositories contain copies of the laws that apply to these activities, copies of the

Remedial Investigation (RI), Baseline Risk Assessment (BRA), Feasibility Study (FS), and the Ecological Evaluation of Risk to Quail from TNT-Contaminated Soil reports, and other supporting documents. The information repositories are found at the following locations:

Marion Carnegie Public Library
206 South Market Street
Marion, IL 62959
(618) 993-5935

Carbondale Public Library
405 West Main Street
Carbondale, IL 62901
(618) 457-0354

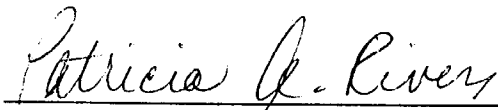
Crab Orchard National Wildlife Refuge
RR 3 Box 328
Marion, IL 62959
Contact: Leanne Moore
(618) 997-5491

Department of Justice
Marion Federal Penitentiary
Bureau of Prisons
RR 5, Little Grassy Road
Marion, IL 62959
(618) 964-1441

EFFECTIVE DATE

This ESD shall be effective on the date of last signature by a representative of either USACE or USEPA. The Agencies each represent that the individuals who have signed this ESD on behalf of their Agency have the actual authority to represent their Agency for purposes of the matters addressed in this ESD and their execution shall be considered to be binding upon their Agency.

ON BEHALF OF THE UNITED STATES ARMY CORPS OF ENGINEERS

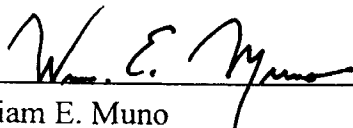


5 Nov 99

Patricia A. Rivers, P.E.
Chief, Environmental Division
Directorate of Military Programs
U.S. Army Corps of Engineers

Date

ON BEHALF OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY



Jan. 11, 2000

William E. Muno
Director, Superfund Division
U.S. Environmental Protection Agency Region V

Date

GLOSSARY

Administrative Record: A collection of documents containing all the information and reports generated during the entire phase of investigation and cleanup at the Site and used to make a decision on the selection of the preferred alternative under CERCLA.

Baseline Risk Assessment (BRA): An evaluation of the risk posed to human health and the environment should no action be taken.

Carcinogenic Risk: Cancer risks are expressed as numbers reflecting the increased chance that a person will develop cancer if exposed to chemicals or substances. For example, EPA's acceptable risk range is 1×10^{-4} to 1×10^{-6} . This means that the probability of cancer should not be greater than 1 in 10,000 chance to a 1 in 1,000,000 chance above background.

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA): A federal law, commonly referred to as the Superfund Program, passed in 1980 that provides for the cleanup and emergency response in connection with numerous existing inactive hazardous waste disposal sites that endanger public health and safety of the environment.

Ecological Risk Assessment: An evaluation of the risk posed to the environment if no action is performed at the site.

Ecological Risk Index (ERI): A ratio of the Estimated Daily Intake to the Critical Toxicity Value.

Explanation of Significant Differences: A decision document that documents post-ROD significant changes made to a component of a remedy in the ROD.

Exposure Pathways: Describes the course a chemical or physical agent takes from the source to the exposed individual. Elements of the exposure pathway are: (1) the source of released chemical; (2) the contaminated medium (e.g., soil); (3) a point of contact with the contaminated medium; and (4) an exposure route (e.g., ingestion, inhalation) at a contact point.

Hazard Index (HI): A number indicative of non-carcinogenic health effects, which is the ratio of the existing level of exposure to an acceptable level of

exposure. A value equal to or less than one indicates that the human or ecological population is not likely to experience adverse effects.

Operable Unit (OU): A discrete portion of a site or a discrete action representing an incremental step in the investigation and remediation of hazardous substances at a facility.

Record of Decision (ROD): A legal document that describes the cleanup action or remedy selected for a site, the basis for the choice of that remedy, and public comment on alternative remedies.

Remedial Action: Implementation of plans and specifications, developed as part of the design, to remediate a site.

Remedial Investigation (RI): Part of a study of a facility that supports the selection of a remedy for a site where hazardous substances have been disposed. The RI identifies the nature and extent of contamination at the facility.

Site: The facility and any other areas in close proximity to the facility where a hazardous substance, hazardous waste, hazardous constituent, pollutant, or contaminant from the facility has been deposited, stored, disposed of, or placed or has migrated or otherwise come to be located.

Superfund Amendments and Reauthorization Act (SARA): An amendment to CERCLA enacted in 1986.