FORT RICHARDSON
CERCLA FEDERAL FACILITY AGREEMENT
RECOMMENDED ACTION

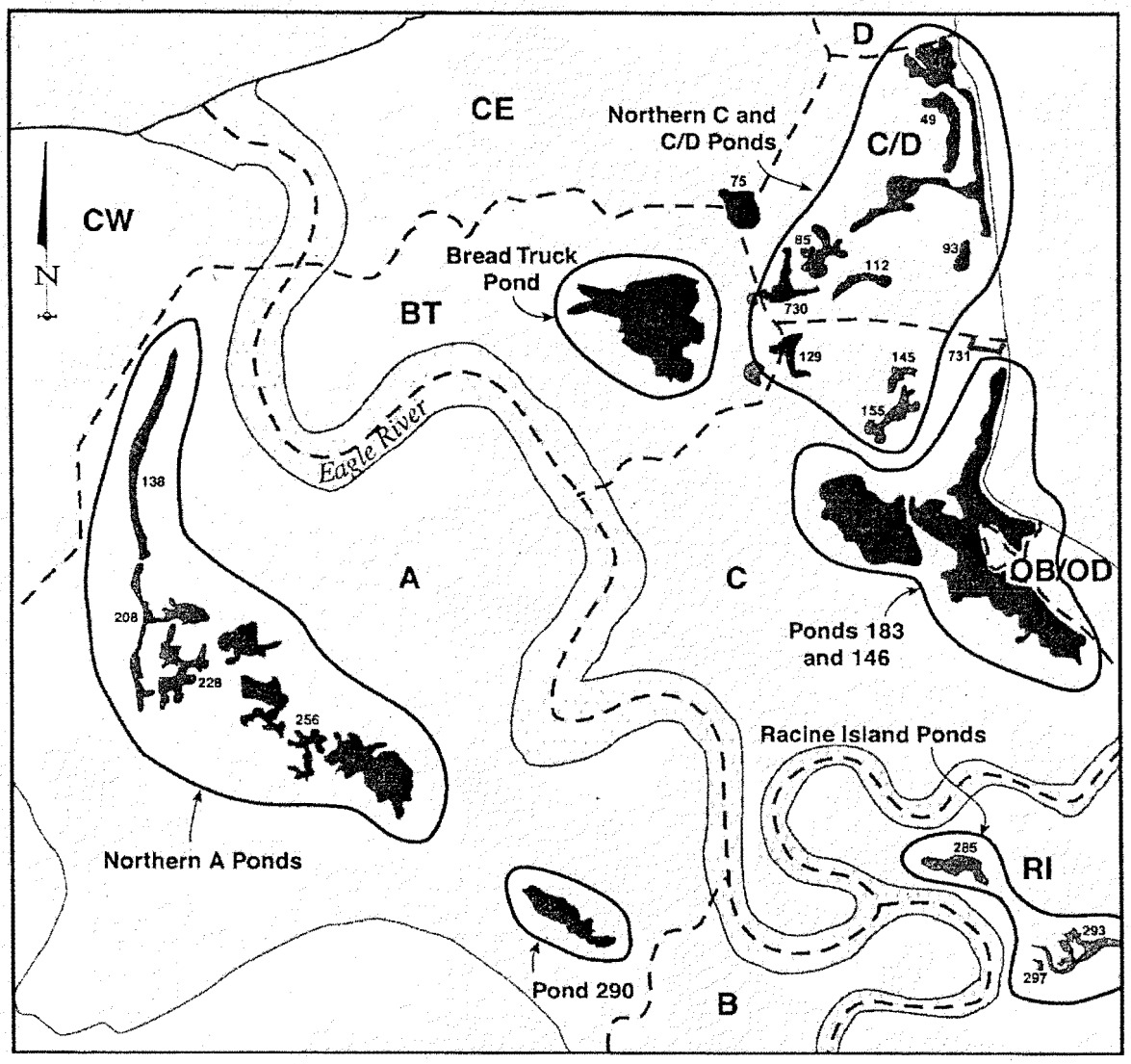
INTERIM DECISION SUMMARY
EAGLE RIVER FLATS IMPACT AREA

Purpose: Provide a status of the areas of Eagle River Flats (ERF) that have achieved the remedial action objectives (RAO) under CERCLA for portions of Eagle River Flats (ERF) OUC.

Background: Evaluation of available historical information, field work, review of analytical data and bird mortality have shown the areas west of Eagle River, Northern A and Pond 290, have meet the remedial action objectives consistently since 2002 under the Eagle River Flats Record of Decision.

Location: Eagle River Flats is divided into nine areas for investigation purposes: A, B, C, C/D, D, Racine Island (RI), Bread Truck (BT), Coastal East, and Coastal West (Fig. 1). To define areas most likely to contain white phosphorus, investigations focused on (1) areas with the most craters, (2) areas preferred by the waterfowl at risk (dabblers), and (3) areas where carcasses were observed. The sediments in the open ponds in these areas were extensively sampled for white phosphorus using methods specifically developed for this project. Field studies tested the feasibility and effectiveness of using radio tracking to identify duck movement at ERF.

Background: In 1982, unusually high numbers of dead waterfowl were discovered in the wetlands of ERF. In 1989, firing into ERF was halted because of the potential that the ordnance was contaminating the environment and causing the waterfowl deaths. In 1990, after extensive investigation, it was discovered that ingestion of particles of white phosphorus, a component in smoke munitions, was the cause of waterfowl deaths at ERF. Unburned particles from exploded white phosphorus munitions can rain down and become buried in the wet, soft mud. Dabbling waterfowl can pick up the particles of highly poisonous white phosphorus as they are sieving the mud for food such as seeds and invertebrates. White phosphorus is the only constituent of concern. No other explosive components or compounds of concern were found during the investigations.



Identified in ROD as contaminated or potentially contaminated with white phosphorus

Confirmed contaminated or newly identified as contaminated with white phosphorus

Tested and confirmed as uncontaminated with white phosphorus

Undergoing remediation

Remediated

Figure 1. Pond groups.

As a result of the discoveries at ERF, the Army stopped using white phosphorus during training at wetland impact areas nationwide in 1990. In 1991, the ERF impact area was reopened, with restrictions to conduct firing only during winter months when the ground surface is frozen and there is an ice cover present. The munitions used in winter are high explosives and illumination rounds only; they do not contain white phosphorus.

The distribution of white phosphorus particles is not uniform throughout sediments at ERF. The dispersion of the white phosphorus particles is affected by the nature of detonations in an area and whether munitions are detonated on land or over water. Some areas were used more frequently as targets and therefore received higher amounts of white phosphorus. In addition to differences in the distribution of white phosphorus, particle sizes sieved from sediments vary greatly, ranging from less than 0.25 mm to 4 mm.

Record of Decision: Remedial Action Objectives

Pond draining by pumping was chosen as the preferred alternative for remediating contaminated areas of ERF. This was reflected in the Record of Decision (ROD) signed in October 1998.

The major components of the preferred remedy for OU-C as given in the ROD are listed below. Pond remediation treatment will occur between 1999 and 2003 and will be followed by long-term monitoring until 2018.

Treat white-phosphorus-contaminated sediment by draining ponds with pumps for five summers beginning in 1999. Pumping will allow the sediments to dry and the white phosphorus to sublime and oxidize. The treatment season will begin in May and end in September. A pond elevation survey will be conducted to determine the optimal pump placement. To enhance drainage, explosives may be used to make small sumps for the pumps and shallow drainage channels. These shallow drainage channels will enhance the hydraulic connectivity between ponds to encourage drainage.

The remedial action objectives (RAOs) for the ERF are designed to accomplish the following:

Within five years of the ROD being signed, reduce the dabbling duck mortality rate attributable to white phosphorus to 50 percent of the 1996 mortality rate attributable to white phosphorus. Radio tracking and aerial surveys suggest that about 1000 birds died from white phosphorus at ERF in 1996. Therefore, the allowable number of duck deaths from white phosphorus would be approximately 500.

Within 20 years of the ROD being signed, reduce the mortality attributable to white phosphorus to no more than 1 percent of the total annual fall population of dabbling ERF ducks. Currently that population is about 5000. Therefore, the allowable number of duck deaths from white phosphorus would be approximately 50. This long-term goal could be adjusted based on future population studies conducted during the monitoring program.

These objectives will be achieved by reducing the areas of white-phosphorus-contaminated sediments and reducing the exposure of dabbling ducks to white phosphorus particles. Reducing the exposure will reduce the availability of white phosphorus to ducks, which in turn will reduce duck deaths.

Summary of Remediation Work

Pre-ROD

In 1994, Pond 285 (0.9 acres) on Racine Island was capped and filled as part of a treatability study. In 1995 and 1996, small areas of contaminated sediments (less than 1.5 acres total) were removed from Pond 146 by a remote-controlled dredge during a treatability study. In 1996, Pond 109 (8.2 acres) was drained by a blasted ditch. In 1997, Pond 293 (1.5 acres) on Racine Island was drained by a blasted ditch. Also in 1997, a single pump system was used to temporarily drain Pond 183 in Area C as part of an initial treatability study. In 1998, a full-scale treatability study was conducted using six pump systems. Pumps were deployed in Ponds 183, 155, and 146 in Area C and Ponds 290, 256, and 258 in Area A. After the 1998 season, Pond 290, a small isolated pond in Area A with limited contamination, was determined to be remediated after only one season. The success of remediating this pond after one season was encouraging but not thought to be the norm for other ponds. A rough estimate, based on optimal remediation conditions (soil type, precipitation, tidal flooding, extent and distribution of contamination, and temperature), is three years.

1999

In 1999, full-scale remediation using pond draining by pumping began. Five pump systems were deployed in five of the ponds treated in 1998. Treatment of a new pond in Area C/D (Pond 730) was started with the freed-up pump system from Pond 290. The ponds treated in 1999 were Ponds 183, 155, and 146 in Area C; Pond 730 in Area C/D; and Ponds 256 and 258 in Area A.

2000

In 2000, full-scale remediation continued using six pump systems deployed in the same ponds as in 1999: Ponds 183, 155, and 146 in Area C; Pond 730 in Area C/D; and Ponds 256 and 258 in Area A. After remediation was completed in 2000, Ponds 256 and 258 in Area A were judged to be remediated based on the sampling and monitoring program.

2001

In 2001, full-scale remediation continued using six pump systems. One of the two freed-up pump systems used previously in Pond 256 and 258 was moved to a pond complex farther north in Area A, Ponds 226/246. The second pump system was installed in Pond 75 at the border of Area C/D and Coastal East. The other four pump systems continued to be deployed in Ponds 183, 155, and 146 in Area C and in Pond 730 in Area C/D. After remediation was completed in

2001, Pond 183 in Area C was judged to be remediated based on the monitoring program.

2002

In 2002, full-scale remediation continued using six pump systems. One pump system was installed in the newly identified contaminated area in Northern C marsh. The other five pump systems were deployed in the same locations as in 2001. One pump was deployed in Ponds 226/246 in Area A, one each in Ponds 155 and 146 in Area C, one in Pond 730 in Area C/D, and one in Pond 75 at the border of Area C/D and Coastal East. After remediation was completed in 2002, Ponds 226/246 in Area A, Pond 75 in Coastal East, and Pond 146 in Area C were judged to be remediated based on the monitoring program.

2003

In 2003, full-scale remediation continued using six pump systems. Three pump systems were installed in three newly formed large sumps in the contaminated area in Northern C marsh. The other three pump systems were deployed in same locations as in 2002. One pump each was deployed in Ponds 146 and 155 in Area C, and one in Pond 730 in Area C/D. Even though Pond 146 was remediated in 2002, the pump was redeployed to help dewater the Northern C marsh. After remediation was completed in 2003, Pond 730 in Area C/D was judged to be remediated based on the monitoring program. Other treated ponds contained just small, localized areas of contamination.

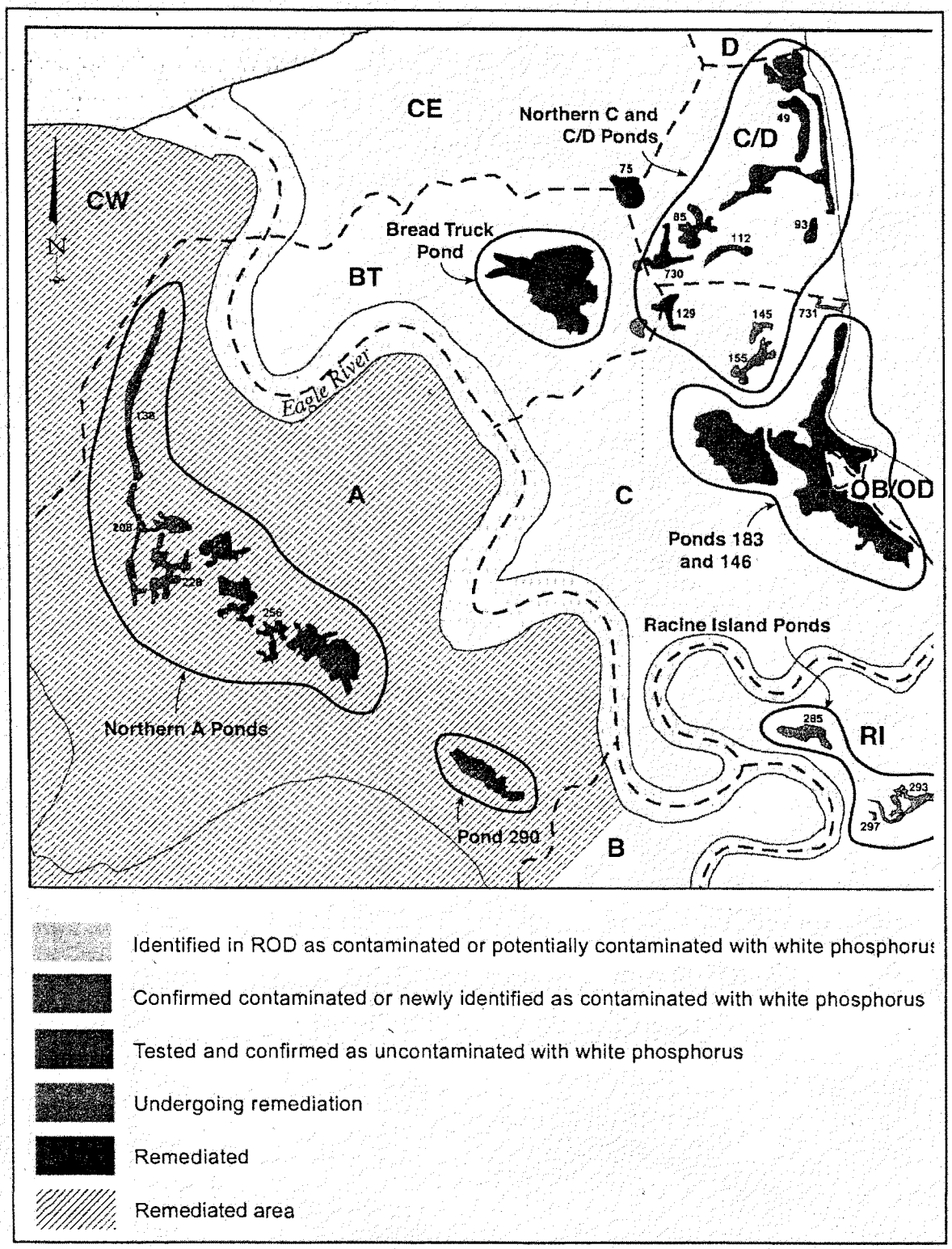
2004

In 2004 limited remediation was undertaken using one pump system in Pond 146 in Area C. Because of the interconnected drainage ditches installed over the last three years, the pump was very effective in dewatering most of Area C including Pond 155 and the Northern C marsh. Despite monthly flooding tides, warm and dry conditions throughout most of the summer produced good remediation conditions.

Summary:

A systematic, qualitative approach has been used to determine the disposition of this area of Eagle River Flats. This decision is based on Superfund objectives. If at any time, additional information becomes available which alters the information used in this decision, the source will be reevaluated.

Based on the results of the remedial action work at ERF, the shaded area west of Eagle River as indicated in shaded area of figure 2 below, there is no evidence that this area poses an unacceptable risk to human or ecological health. This area of ERF has met the RAO's as indicated in the ROD. This summary document will become part of the administrative record for OUC as designated by the Federal Facility Agreement and be used in developing the five year review.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Ponds 183
and 146
Racine Island Ponds
285
RI
293
297
Northern A Ponds
Pond 290
B
Identified in ROD as contaminated or potentially contaminated with white phosphorus
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Tested and confirmed as uncontaminated with white phosphorus
Undergoing remediation
Remediated
Remediated area

Figure 2

Approvals: The following project managers, representing their respective agencies which are signatories to the Federal Facility Agreement, concur with this evaluation.

Louis Howard
Alaska Department of Environmental Conservation
Remedial Project Manager

11/08/05
Date

Bill Adams
US Environmental Protection Agency
Remedial Project Manager

11/8/05
Date

Cristal Fosbrook
US Army Garrison, Alaska
Remedial Project Manager

11/8/05
Date

EAGLE RIVER FLATS
SELECTED REFERENCES

A full list of references can be found in the August 2004 Annual Report or the Administrative Record

CH2MHill (2004) Draft Outline of approach for redefining long-term RAO at ERF. Technical Memorandum. CH2MHill, Anchorage, Alaska.

Collins, C.M. and D.W. Cate (Eds.) (2004) Remediating and monitoring of white phosphorus contamination at Eagle River Flats(Operable Unit C), Fort Richardson, Alaska. FY03 Final Report. CRREL Contract Report to US Army Garrison Alaska, Directorate of Public Works. August 2004.

NWRC (2004) Interim waterfowl mortality monitoring report, Operable Unit C–Eagle River Flats Impact Area Fort Richardson, Alaska. Contract Report to U.S. Army Garrison, Alaska, Directorate of Public Works. USDA/APHIS/WS, National Wildlife Research Center, Fort Collins, CO. August 2004. 362 pp.

USA CRREL. (2004) 2003 Remedial Progress Report: Operable Unit C-Eagle River Flats. CERCLA Document. US Army Garrison Alaska, Fort Richardson.