

## FY1995 Contaminant Study Proposal

**I. STUDY TITLE**

CO-Nonpoint source pollution on the Rocky Mountain Arsenal National Wildlife Refuge.

**II. STUDY OBJECTIVE:**

To determine the extent of nonpoint source pollution to water bodies on the Rocky Mountain Arsenal National Wildlife Refuge (Arsenal).

**III. BACKGROUND/JUSTIFICATION:**

Legislation was passed in 1992 (Rocky Mountain Arsenal National Wildlife Refuge Act) to make the Rocky Mountain Arsenal a National Wildlife Refuge after cleanup by the U.S. Army (Army) and Shell Chemical Company (Shell) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). In the interim, the U.S. Fish and Wildlife Service (Service) is directed to manage the Arsenal as if it were a refuge.

The Arsenal can be divided into four major hydrologic systems: Irondale Gulch, First Creek, Highline Lateral, and the noncontributing watershed. Irondale Gulch and First Creek traverse the Arsenal from a southeasterly to northwesterly direction toward the valley of the South Platte River. Under normal hydrologic conditions, only First Creek flows beyond the Arsenal's northern boundary where it enters the O'Brien Canal. However, the U.S. Army Corps of Engineers (Corps) predicts that flood flows in Irondale Gulch would extend beyond the northwest boundary into Commerce City during infrequent (e.g., 100-year or larger) flow events. The Highline Lateral is the downstream terminus of the Highline Main Canal, which conveys surface water diverted from the South Platte River. At the Arsenal, water from the Highline is used to fill five constructed wetlands and supplement natural runoff into four man-made lakes (Upper Derby Lake, Lower Derby Lake, Lake Ladora, and Lake Mary). Because the Highline is elevated above the surrounding terrain along much of its length, there is little storm water influence. An undetermined area of each basin does not contribute to surface runoff during smaller events due to interior drainage and high porosity of the sandy loam soils.

Surface water features include four lakes and five constructed wetlands previously mentioned, a stormwater detention and infiltration facility (Havana Ponds), several "natural" wetlands, swales and depressions, one intermittent creek (First Creek), and several interceptors and ditches that convey runoff from urban areas upstream.

Upper Derby Lake currently is maintained empty to protect shorebirds from exposure to contaminants found in the sediment. The presence of these contaminants is due to accidental chemical discharges from production facilities at the Arsenal.

Havana Ponds were constructed to detain and infiltrate runoff diverted from its normal southwesterly drainage pattern by the extension of the north-south runway at Stapleton Airport. They receive storm drainage from an area previously developed for residential, commercial, and light industrial purposes immediately south of the Arsenal, east of Havana

Street, and north of Interstate 70. Principal inflows are the Havana Street and Joliet Street Interceptors. In a previous monitoring study of Havana Ponds, the Army detected concentrations of zinc, chlordane, and DDT in water exceeding some numerical standards for the protection of aquatic life. These contaminants likely accumulated from urban nonpoint source pollution.

The Uvalda Ditch is another potential nonpoint source of pollution. It drains a predominantly residential area of the Montbello subdivision of Denver, and has been an ongoing source of pollution mostly in the form of plastic containers, polystyrene foam, and other "floatables." This ditch joins the Highline Lateral before it flows into Lower Derby Lake.

Although the ditches and interceptors provide only limited habitat for fish and wildlife, they supply water to the more valuable lacustrine, palustrine, and riparian habitats on the Arsenal. First Creek provides good quality riparian habitat which is used extensively by bald eagles as a winter roosting area. During the winter of 1993-1994 as many as 31 bald eagles were observed on the roost. Plans are being formulated to rehabilitate portions of First Creek degraded by past human activities.

The U.S. Geological Survey (USGS) routinely monitors the quality of surface water entering the Arsenal and has documented concentrations of zinc (up to 1100 ug/L) above acute LC50's for some aquatic life. Other contaminants, such as chromium, lead, and nickel, have also been detected. Areas upstream from the Arsenal are being developed for commercial and industrial purposes in response to construction of the new Denver International Airport east of the Arsenal. These areas are expected to yield larger volumes of runoff and higher concentrations of contaminants than the undeveloped lands they are replacing.

As reported by the Denver Regional Council of Governments, high concentrations of heavy metals, nutrients, organics, and suspended solids have been measured in surface waters of the Denver metropolitan area. Increased amounts these water-borne contaminants may impact aquatic resources on the Arsenal, particularly during storm events.

The Service currently has a biomonitoring program at the Arsenal to examine the effects of existing contamination due to past chemical munitions and pesticide manufacturing. This biomonitoring program has both terrestrial and aquatic components. However, the Service is funded only to examine the seven Contaminants of Concern (five organochlorine pesticides, arsenic, and mercury) selected by consensus of the involved responsible parties.

The Service has been working with USGS to obtain data on contaminants in water entering the Arsenal, but may need to collect samples off-post to determine sources and solutions to this contamination. In addition, the Service suspects that some of these contaminants are being deposited in sediments. The main water bodies of concern are Havana ponds, which have shown contamination in previous investigations, and First Creek because of patterns of bald eagle winter use and Service plans to create or enhance habitat in the future that may be used by other migratory birds. Waterfowl and shorebirds already use Havana ponds and the lakes

extensively during migration (documented by regular Service surveys). Contaminants accumulating in sediments could impact their food sources or directly affect these birds. As surrounding development increases, habitats on the Arsenal will become increasingly important for migratory birds in this region. The proposed investigation will help identify and prevent future impacts to water quality likely to result from increasing development. This study may be expanded in the future to include invertebrate sampling and to determine direct impacts to migratory birds.

#### **IV. METHODS**

Sites for sampling water quality off the Arsenal will be identified with the help of USGS and the City and County of Denver. Three sites will be sampled during storm events for a total of nine water samples. In addition, samples of sediment will be collected from Havana Ponds and First Creek. All samples will be analyzed for metals and petroleum hydrocarbons. Sediment samples will be collected after the ice thaws in the spring, after runoff events in the spring and summer, and in the fall. Three samples will be collected from each water body at each sampling event for a total of 24 samples. This will allow the Service to determine if contaminants accumulate in sediments as water flows onto the Arsenal during runoff events throughout the season.

Samples will be collected in I-Chem glass jars certified for metals and petroleum hydrocarbon analyses. Water and sediment samples will be refrigerated immediately after collection and shipped on ice to the laboratory for chemical residue analysis. Quality Assurance/Quality Control and Standard Operating Procedures will be outlined and given in the first interim progress report.

Sediments also will be tested for acute toxicity using second-instar Chironomid (midge) larvae at the laboratory facility on the Arsenal. Midge larvae can be obtained from a laboratory culture at Colorado State University. They will be exposed for 10 days to 200 ml of sediment with 700 ml overlying water.

#### **V. ROLES AND RESPONSIBILITIES**

Service staff stationed at the Arsenal will perform all data collection and report writing.

#### **VI.A. PARTNERSHIPS**

No partnerships are currently in place, although the Service will work with USGS and possibly the City and County of Denver on this issue.

#### **VI.B. ECOSYSTEM**

The Arsenal is in the Platte/Kansas River ecosystem unit and lies within the South Platte River Basin. The Platte River system is home to a variety of migratory birds and endangered species, including the bald eagle, interior least tern, piping plover, and whooping crane. First Creek is the only stream that flows off the Arsenal under normal flow conditions, and is hydrologically connected to the South Platte River. If flows increase in the future due to development in the watershed, or during infrequent flood events, water from First Creek, as well as Irondale Gulch, may contribute to the Platte River drainage.

**VII. SCHEDULE**

Field work will begin after the ice thaws in 1995 and continue through October 1996. Samples will be submitted and toxicity testing will take place immediately after each collection. The Service will provide an interim report at the end of the 1995 season and a final report at the end of the 1996 season, at which time the Service will evaluate the potential water quality impacts and need for further monitoring.

**VIII. REPORTS AND PUBLICATIONS**

An interim report will be provided at the end of the 1995 season to the Regional and Washington offices and a final report at the end of the 1996 season. The final report will detail significant findings and recommend management actions if impacts are found.

**IX. OPERATIONAL COST ESTIMATES**

Supplies	\$ <u>1500.00</u>
Equipment	\$ <u>0.00</u>
Overhead	\$ _____
Other (specify)	\$ _____
Total Operational	\$ <u>1500.00</u>

**X. ANALYTICAL COST ESTIMATES**

Field Office	\$ _____
PACF	\$ <u>18,369</u>
Total Analytical	\$ <u>18,369</u>
GRAND TOTAL	\$ <u>19,869</u>

XI. APPROVALS

Submitted by: \_\_\_\_\_ Date: \_\_\_\_\_

Reviewed by: Richard Roy Date: 8/1/94

(Science)

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

(Science)

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_

(Management)

Reviewed by: \_\_\_\_\_ Date: \_\_\_\_\_