

2.0 HISTORY OF RMA BASIN F

Rocky Mountain Arsenal occupies over 17,000 acres, approximately twenty-seven square miles, of land in Adams County, directly northeast of metropolitan Denver, Colorado. (See Figure 1, installation location map.) The property was purchased by the government in 1942 for use in World War II to manufacture and assemble chemical warfare materials, such as mustard and lewisite, and incendiary munitions. Starting in the 1950's, RMA produced the nerve agent GB (isopropyl methylphosphonofluoridate) until late 1969. Between 1970, and 1982 the mission of RMA concentrated on the destruction of chemical warfare materials. From 1946 to 1982, a major portion of the plant facilities was leased to private industries (including Shell Chemical Co.) for the manufacture of various insecticides and herbicides.

During the 1940's and 1950's, liquid industrial wastes generated at both the Chemical Plants Area and the North Plants Area were routinely discharged into several unlined evaporation ponds (labeled Basins A, B, C, D, and E) located in the center of the installation. (Figure 2 shows locations of previous disposal areas and the Plants Areas in respect to the rest of RMA). Basin F was built to ensure environmentally safe solar evaporative disposal of contaminated aqueous wastes generated in the course of Army and lessee chemical manufacturing and processing activities at RMA. A catalytically blown asphalt membrane was installed to prevent the seepage of ponded wastes through bottom sediments into the underlying groundwater. When finished, the Basin had a maximum holding capacity of 243 million gallons and covered a surface area of 92.7 acres. Initially, from 1956 to 1957 approximately 60 million gallons of liquid wastes were transferred to Basin F. The liquids included process wastes from the manufacture of pesticides, herbicides, insecticides, GB, and hydrazine blending.

After August 1957, Basin F was the only solar evaporative disposal facility in use at RMA. In 1962 and 1963, the Basin was used not only for evaporative disposal, but also for the settling of aqueous wastes prior to their treatment and injection into a deep disposal well. In 1964, the Army subdivided Basin F, creating a surge and settling Basin (F-1) to support deep well disposal operations which continued until 1966. A floating spray raft, installed on Basin F in 1961, was used intermittently until 1966 for the purpose of accelerating the evaporation of retained aqueous wastes. In 1982, following the termination of Basin F as an active facility, the Army removed the underground connecting sewer lines and erected a dike around the existing fluid contents of the Basin in order to prevent further accumulations from sewer line discharges and surface runoff. Pump-fed trickler lines, operational today, were installed to enhance the evaporation of the remaining fluids.

Basin F's potential influence on air quality includes wind blown contaminated particulates from dry portions of the Basin and volatile emissions. In 1981, the U.S. Army Environmental Hygiene Agency collected particulate samples as part of a study to evaluate the potential health hazards associated with fugitive dust migration from dry disposal basins at RMA. The results of the study indicated that the concentrations of contaminants detected in the fugitive dust did not pose a significant health hazard to the general

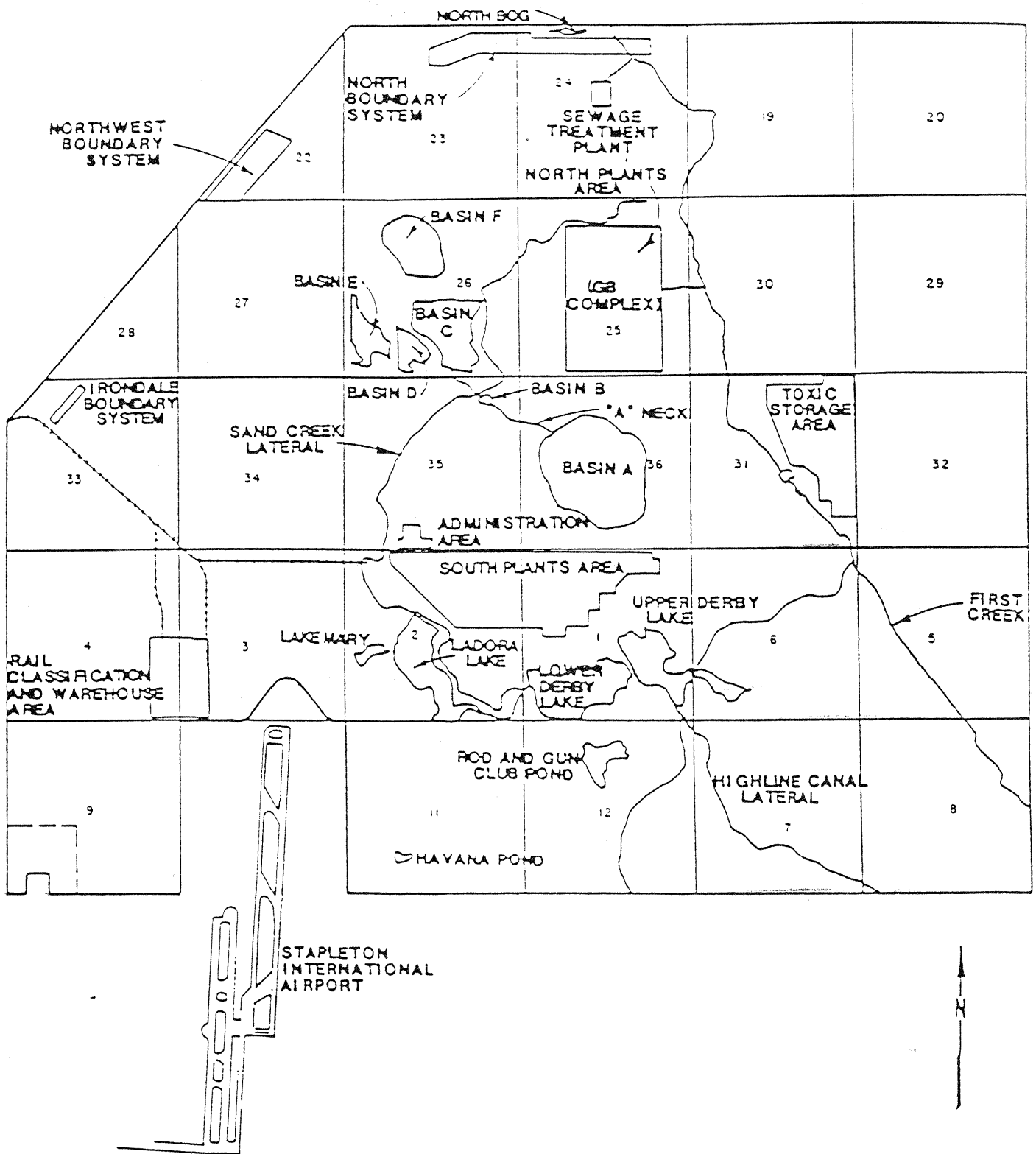


Figure 2. Rocky Mountain Arsenal Map

Source: Morrison-Knudsen Engineers, Inc.

population around RMA or to individuals working at RMA. A study of the impact of volatile organic emissions from Basin F was conducted by the U.S. Army Environmental Hygiene Agency in 1982 (USAEHA, 1982). This report concluded that any volatile emissions from Basin F did not pose a health threat to the general public or to the workers at RMA.

A number of studies have identified contaminants in the underlying groundwater in the vicinity of Basin F (RMA, 1977; RMA, 1978; Stollar and Van der Leeden, 1981; ESE, 1986b). The results of these studies suggested that Basin F might have contributed to the contaminant plumes of diisopropylmethyl phosphonate, dicyclopentadiene, chloride, and dibromochloropropane. Groundwater beneath RMA flows from southeast to northwest. Figure 3 represents generalized alluvial groundwater flow across RMA. Nevertheless, the continuing insufficiency of pertinent data currently precludes any definitive determination of whether Basin F is a major source of groundwater contamination at RMA (ESE, 1986a).

Adverse impacts have been documented for species exposed to Basin F liquids and sediments (Crane, 1965; Hiddeman, et al., 1965; Manthei, et al., 1981), with waterfowl mortality being the primary problem. Studies conducted in 1965 established the toxicity of pesticide-contaminated sediments in Basin F and F-1 to migratory waterfowl and small mammals (Crane, 1965; Hiddeman, et al., 1965). These studies also determined that the fluids of Basin F and F-1 contained no constituents toxic to wildlife (Hiddeman, et al., 1965). The phenomenon of various species of waterfowl in contact with Basin fluids experiencing a rapid wetting of their feathers that resulted in their losing body heat and the ability to float or to fly was initially attributed to the presence in Basin fluids of unknown degreasing or wetting agents (Hiddeman, et al., 1965). Detergents present in the Basin have been identified as one cause of this wetting action. Scare devices were installed in Basin F in 1975 to keep wildlife away. These devices will remain in operation until the liquids, solids and sludges have been isolated.

A source control study carried out by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA, 1983) was conducted over a three year period that resulted in the submission of a final report in September 1983. This report identified several remedial actions to facilitate the restoration of RMA. One of the remedial actions specified was a Groundwater Intercept and Treatment System North of Basin F.

On February 1, 1988, a proposed Consent Decree was lodged in the U.S. v. Shell Oil Company with the U.S. District Court in Denver, Colorado. The Army and Shell Oil Company agreed to share costs of the cleanup that was to be developed and performed under the oversight of the U.S. Environmental Protection Agency, with numerous opportunities for comment by the State of Colorado and the public. The long term cleanup is a complex task that will take several years to complete. To facilitate more immediate remediation activities, the proposed Consent Decree specifies a number of "interim" actions to alleviate the most urgent problems. One of these interim actions is the Groundwater Intercept and Treatment System North of Basin F.