

LEVEL I WATER-QUALITY INVENTORY,
WHITE SANDS NATIONAL MONUMENT, NEW MEXICO

U.S. GEOLOGICAL SURVEY

Prepared for the

NATIONAL PARK SERVICE

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OTHER FILES ON DISK

1. WQDATA.XLS
2. PARAMETER.DOC
3. STATIONS.XLS
4. README.DOC

CONVERSION FACTORS AND VERTICAL DATUM

	Multiply	By	To obtain
	mile	1.609	kilometer
	acre	0.4047	hectare

Temperature in degrees Celsius (°C) can be converted to degrees Fahrenheit (°F) as follows:

$$^{\circ}\text{F} = 1.8 (^{\circ}\text{C}) + 32$$

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ABSTRACT

This data transfer presents the values and concentrations of field properties, common inorganic ions, perchlorate, volatile organic compounds, and semivolatile organic compounds in ground- and surface-water samples from White Sands National Monument, New Mexico. The data presented are based on samples collected between April 1999 and May 2000 as part of a level I water-quality inventory of White Sands National Monument.

INTRODUCTION

White Sands National Monument (WSNM) covers about 145,000 acres in southern New Mexico (fig. 1). About half of WSNM is covered with a mixture of active and stabilized dunes composed of sand-sized gypsum. The remainder of WSNM consists of playa lake, alkali flat, and bush flat environments. No naturally occurring permanent surface-water bodies exist within WSNM. Ephemeral surface-water bodies include Lake Lucero, a large playa lake near the western boundary of WSNM, and Lost River, an ephemeral stream that enters WSNM along its northern boundary (fig. 1).

Before entering WSNM, Lost River flows through an area of Holloman Air Force Base (HAFB) containing ground water and soils potentially contaminated by volatile organic compounds (VOC's) and semivolatile organic compounds (SVOC's). Rocket sled testing activities on HAFB that use ammonium perchlorate as a component of solid rocket fuel may introduce perchlorate into the watershed of Lost River. Lost River is ephemeral between WSNM and Red Playa (fig. 1). After entering WSNM, any discharge present in Lost River decreases to zero in approximately one-quarter mile by evaporation and infiltration into the gypsum dunes. Thus, Lost River has the potential to contribute perchlorate, VOC's, and SVOC's to ground water in WSNM.

Purpose and Scope

This data transfer presents the results of analysis of ground- and surface-water samples collected between April 1999 and May 2000 as part of a level I water-quality inventory of WSNM. Data include values and concentrations of field properties, common inorganic ions, perchlorate, VOC's, and SVOC's in surface- and ground-water samples from WSNM. Level I water-quality inventories include water-quality information on "those waters that are essential to the central cultural, historical, or natural resources management themes of the park or provide habitats to threatened or endangered plants or animals" (Gary Rosenlieb, National Park Service, written commun., 1998).

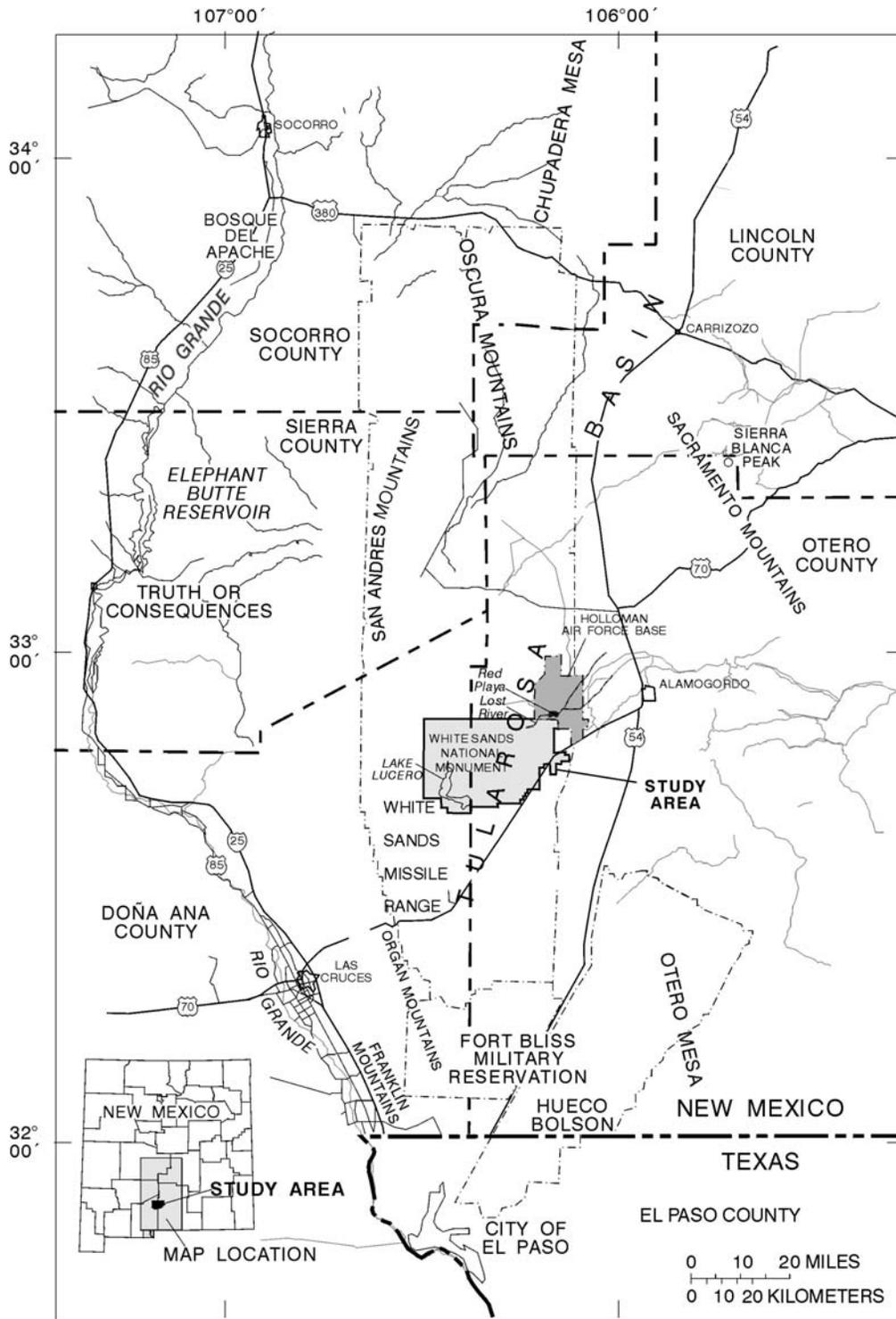


Figure 1.--Location of the study area.

Study Area

The study area includes WSNM and Lost River between WSNM and Red Playa (fig. 1). Water-quality samples were collected from Lake Lucero, Lost River, and WSNM monitoring well numbers 1, 4, 5, and 6 (fig. 2).

Previous Studies

Water-quality data, including analyses for selected inorganic and metal analytes, are available for Lake Lucero from 1970, 1977, and 1993 sampling events (National Park Service, 1997). Water-quality data for Lost River near WSNM are limited to selected metals from one sampling event in 1985 (National Park Service, 1997) and one sampling event for VOC's by the U.S. Geological Survey (USGS) in 1998. The 1998 USGS sample was not collected as part of the level I study.

DATA COLLECTED

Level I data collected during this study and tabulated include field properties and common inorganic ions in water samples from Lake Lucero; field properties, common inorganic ions, perchlorate, VOC's, and SVOC's from WSNM monitoring wells 1, 4, 5, and 6; and field properties, common inorganic ions, perchlorate, and VOC's from Lost River. Dissolved-oxygen and discharge measurements were attempted during sampling of Lost River, but discharge was insufficient to measure either.

Sampling Protocols

Ground-water samples were collected using a submersible positive displacement pump. The field properties pH, specific conductance, and temperature were monitored during pumping. Ground-water samples were collected after these measured properties showed stable values and at least three well volumes of water had been purged. Dissolved oxygen was measured using a flow-through chamber system. Dissolved-oxygen concentrations were noted at the time of sample collection. For VOC analysis, surface water was collected as dip samples, and for all other chemical analyses was collected with a peristaltic pump. Discharge measurements on Lost River were attempted with a modified Parshall flume using the method described in Buchanan and Somers (1969). The minimum discharge that can be measured with this method, however, is 0.01 cubic foot per second.

All pumps and associated hosing used in sampling were cleaned before each use. The cleaning procedure involved circulating a mild detergent solution through the pump and associated hosing, followed by flushing with tap water, then flushing with deionized water. Once clean, the pumps and associated hosing were stored in clean plastic bags until used.

Field treatment and preservation of collected samples included: (1) common inorganic ions--filtered using a 0.45-micrometer flow-through filter, acidified with nitric acid to a pH less than 2 in samples for cation analysis, and shipped to the laboratory within 1 week of sample collection; (2) VOC's--acidified with hydrochloric acid to a pH less than 2, chilled to 4 degrees Celsius, and shipped to the laboratory on the day of collection; and (3) SVOC's--chilled to 4

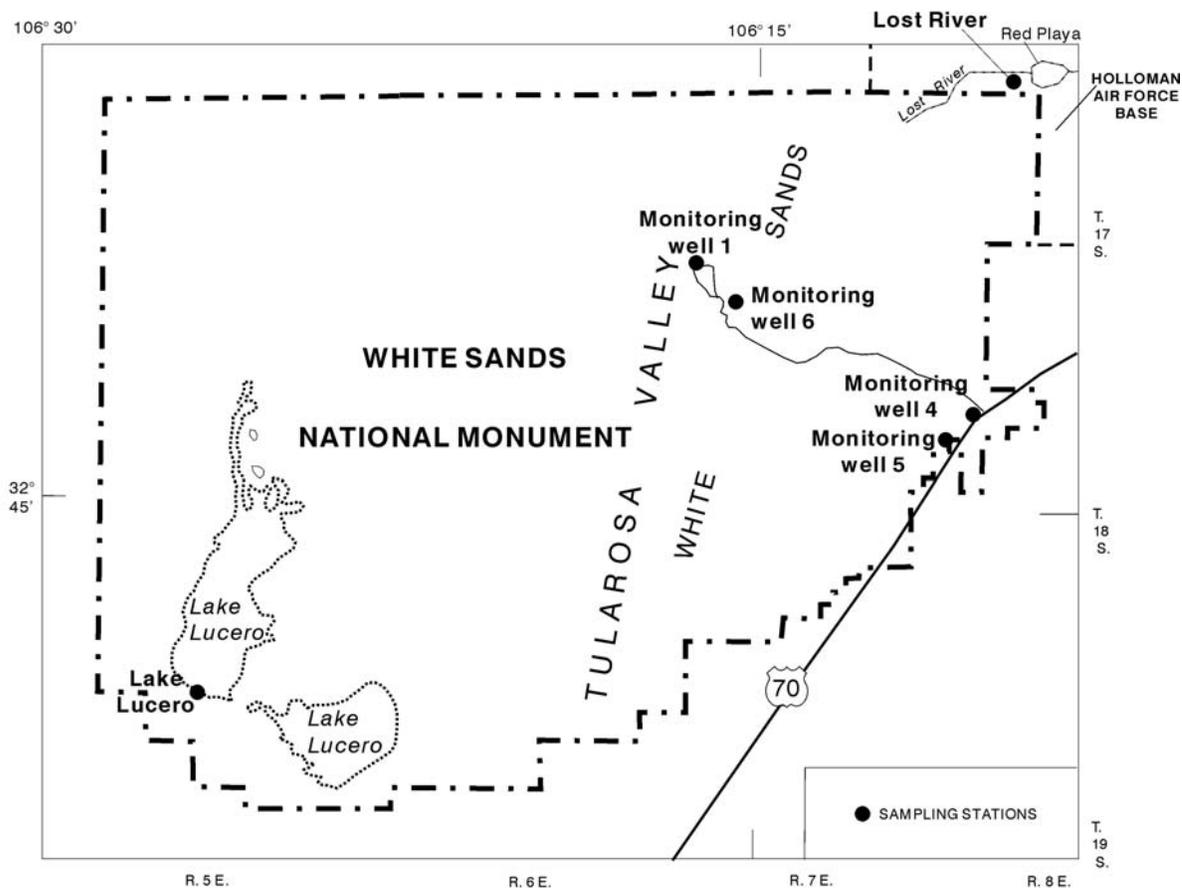


Figure 2. Location of the sampling stations.

degrees Celsius and shipped to the laboratory on the day of collection. Alkalinity titrations were performed on the day of sample collection.

Analytical Protocols

Field properties were determined using procedures described in Wilde and Radtke (1998). The USGS National Water Quality Laboratory (NWQL) conducted all laboratory analyses with the exception of perchlorate, which was determined by a U.S. Air Force laboratory. NWQL methods used to determine inorganic ions are described in Fishman and Friedman (1989) and Fishman (1993). Perchlorate concentrations were determined using the AS-11 method described by Chaudhuri and others (1999). Methods of NWQL determination for VOC's are described in Connor and others (1998) and for SVOC's are described in Fishman (1993). Pritt and Raese (1995) described NWQL quality assurance and quality control procedures.

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