ENVIRONMENTAL ANALYSIS RECORD
PROPOSED LAND EXCHANGE BETWEEN
U. S. BUREAU OF LAND MANAGEMENT AND
THE J. R. SIMPLOT COMPANY
POCATELLO, IDAHO

DAMES & MOORE

EARTH SCIENCES

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POCATELLO, IDAHO

Dames & Moore Job No. 4048-024-06

December, 1975

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1.0 INTRODUCTION

This document presents an Environmental Analysis Record for a proposed land exchange between the Burley, Idaho District Office of the U. S. Bureau of Land Management (BLM), and the J. R. Simplot Company, Minerals and Chemical Division, Pocatello, Idaho. The selected lands are located adjacent to the J. R. Simplot Company phosphate fertilizer manufacturing plant near Pocatello and it is proposed that this land be utilized, following exchange, for expansion of an existing gypsum storage area, the gypsum being a waste by-product of the phosphate fertilizer manufacturing process. The exchanged lands are not considered in this document.

The original proposal by the Simplot Company requested the exchange of a 500 acre tract of selected lands. A more recent proposal, however, has requested exchange of only a 220 acre portion of this total designated in this document as the "Priority A" selected lands and treated here as an alternative.

This Environmental Analysis Record has been prepared for the BLM for consideration in its decision to approve, modify, or deny the proposed land exchange. It follows the format of BLM Manual 1791, Release 1-913 dated June 17, 1974. In general, information is presented which is related to a description of the proposed action and alternatives, a description of the existing environment, and an analysis of the environmental impacts of the proposed action together with measures which may mitigate the impacts.

2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

2.1 PROPOSED ACTION

The proposed action consists of the transfer of ownership of certain federally owned National Resource Lands administred by the Burley, Idaho, District Office of the U. S. Bureau of Land Management (BLM), Department of the Interior, to the J. R. Simplot Company of Pocatello, Idaho. Ownership of this land (the "selected lands") would be exchanged for ownership of land of equal dollar value located elsewhere (the "exchanged lands") which the J. R. Simplot Company currently owns or has options to purchase.

The selected lands are adjacent to the south boundary of the J. R. Simplot Company phosphate fertilizer manufacturing plant property approximately four miles northwest of Pocatello, Idaho at the Don siding, in Bannock and Power Counties. The map in Plate 2.1-1 shows the general location of the property and the map in Plate 2.1-2 shows the property in detail. The aerial view of the selected lands and surrounding area in Plate 2.1-3 provides an additional perspective.

The selected lands consist of 12-1/2 quarter-sections of land which are contiguous in one parcel. However, the parcel has been divided into two categories, "Priority A" and "Priority B", reflecting the J. R. Simplot Company's requirements for acquisition. The legal description of these lands is as follows:

Priority A Selected Lands:
Power County:
Township 6 South, Range 34 East:
Section 18:

NE¼ SE¼	40 acres
SE¼ SE¼	40 acres
SW¼ SE¼	40 acres
SE¼ SW¼	40 acres

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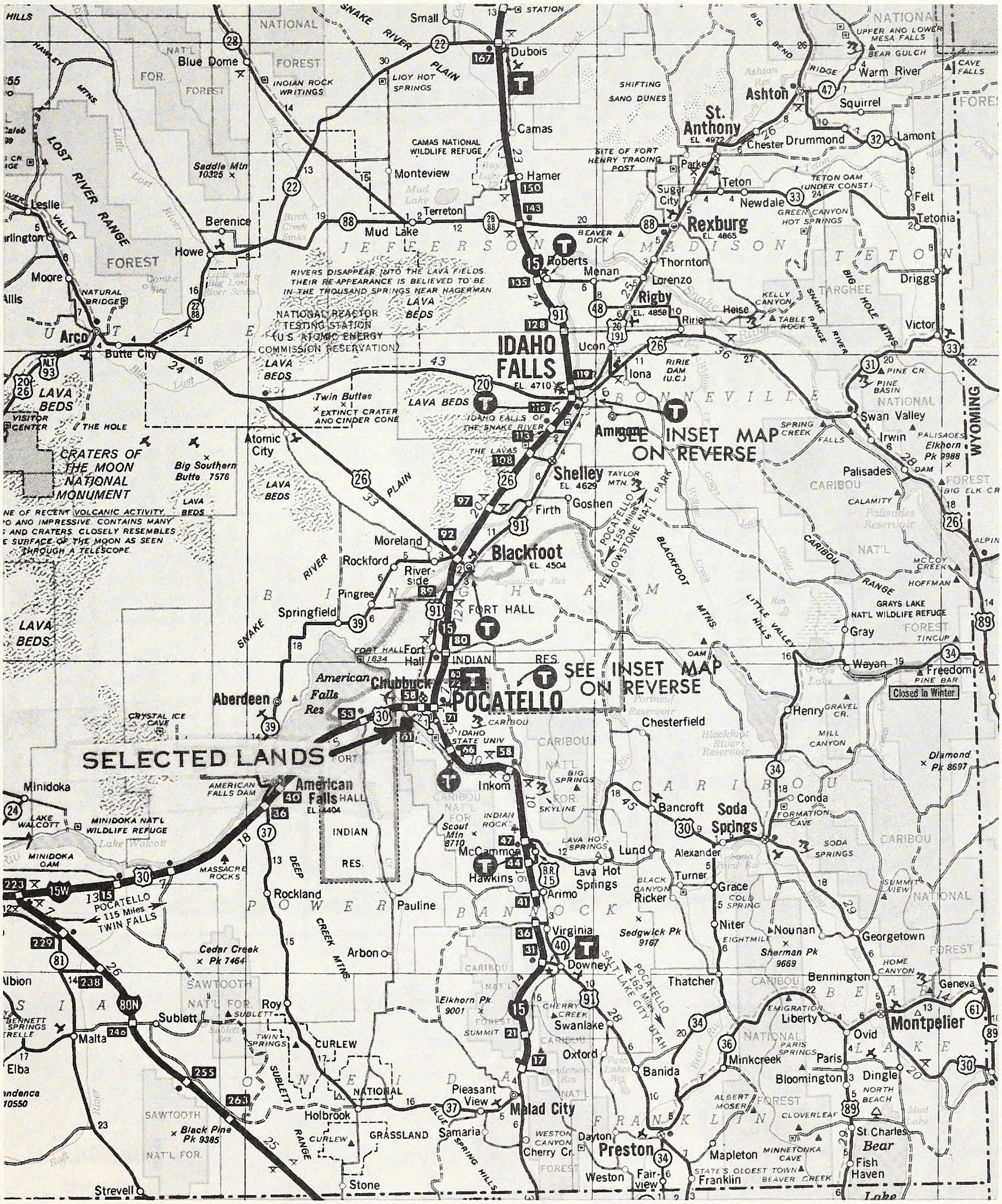
The selected lands are adjacent to the south boundary of the J. R. Simplot Company phosphate fertilizer manufacturing plant property about three miles southwest of Pocatello, Idaho at the [illegible] of Bannock and Power Counties. The map in Plate 2.1-1 shows the general location of the property and the map in Plate 2.1-2 shows the property in detail. An aerial view of the selected lands and surrounding area in Plate 2.1-3 provides an additional perspective.

The selected lands consist of 1,120 acres of land which are contiguous in one parcel. However, the parcel has been divided into two categories, "Priority A" and "Priority B", reflecting the J. R. Simplot Company's requirements for acquisition. The legal description of these lands is as follows:

Priority A Selected Lands:
Power County:
Township 6 South, Range 34 East,
Section 14:

NE¼ SW¼	40 acres
SE¼ NW¼	40 acres
SW¼ NE¼	40 acres
NE¼ SE¼	40 acres



REFERENCE

ROAD MAP OF IDAHO
TEXACO TRAVEL SERVICE
1975 EDITION

VICINITY MAP

SCALE OF MILES
0 5 10 20 30 40
ONE INCH EQUALS APPROXIMATELY 21.3 MILES

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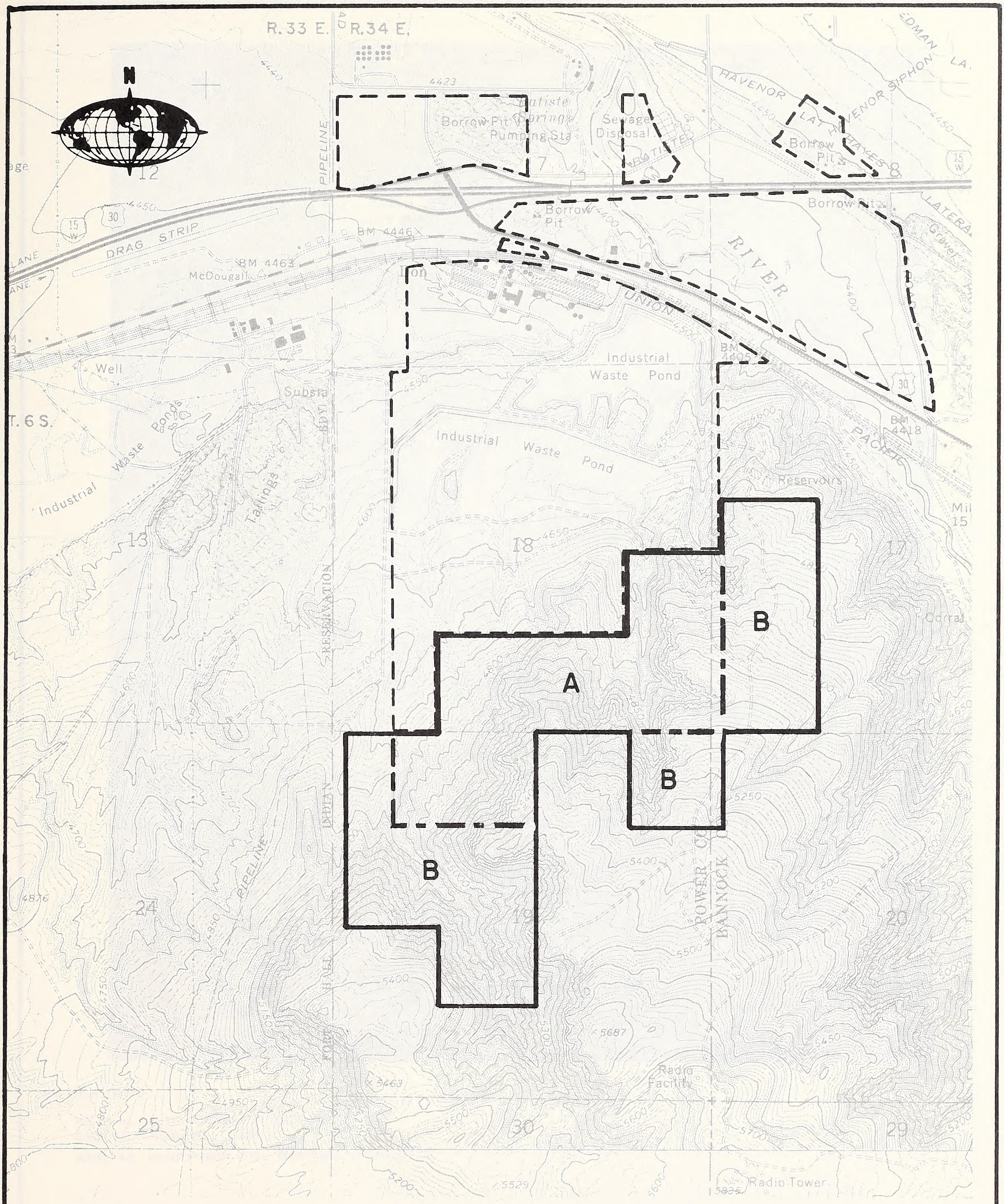
PLATE 2.1-1



REFERENCE

TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

SITE MAP

KEY

- ——— BOUNDARY OF SELECTED LANDS
- — - — BOUNDARY BETWEEN PRIORITY "A" AND PRIORITY "B" SELECTED LANDS
- - - - - BOUNDARY OF J.R. SIMPLOT CO. LAND

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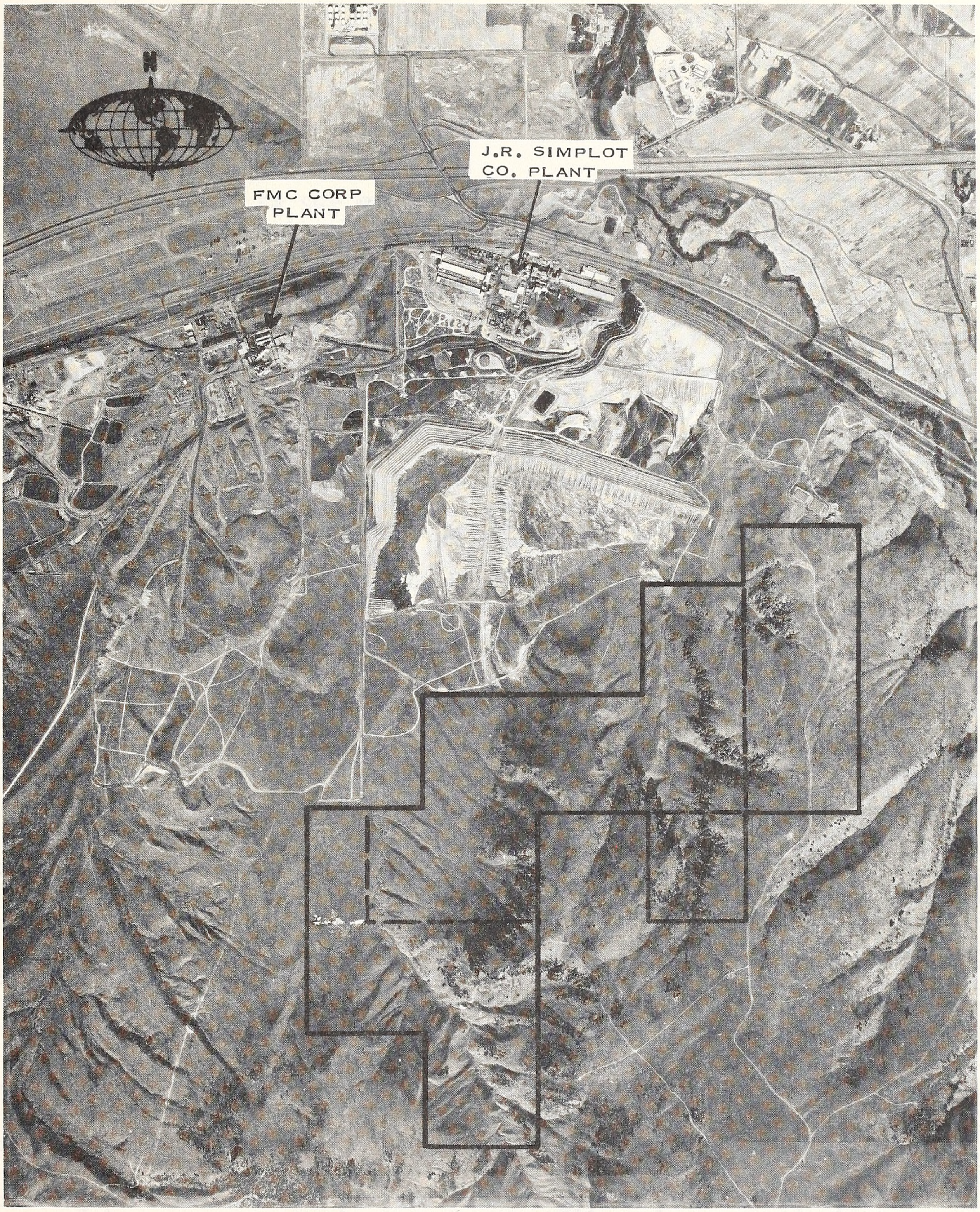
PLATE 2.1–2



REFERENCE

AERIAL PHOTOGRAPH 1516 H2 5
SEPTEMBER 27, 1974,
AERIAL MAPPING CO. BOISE, IDAHO

AERIAL VIEW OF SELECTED AND SURROUNDING LANDS

APPROX. SCALE

0 1/2 1

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PLATE 2.1-3

Section 19:

E½ SW¼ NW¼	20 acres
NE¼ NW¼	40 acres

Total Priority A Selected Lands 220 acres

Priority B Selected Lands:

Power County:

Township 6 South, Range 34 East:

Section 19:

NE¼ NE¼	40 acres
SE¼ NW¼	40 acres
SW¼ NW¼	40 acres
NE¼ SW¼	40 acres
W½ NW¼ NW¼	20 acres

Bannock County:

Township 6 South, Range 34 East

Section 17:

NW¼ SW¼	40 acres
SW¼ SW¼	40 acres
S½ SW¼ NW¼	20 acres

Total Priority B Selected Lands 280 acres

Total Priority A and B Selected Lands 500 acres

2.2 NEED FOR PROPOSED ACTION

The J. R. Simplot Company utilizes the land it owns immediately adjacent to the north boundary of the selected lands as a permanent storage area for the gypsum produced as a by-product in its phosphate fertilizer manufacturing process. At the present rate of gypsum production, approximately 1.25 million tons annually, the existing storage area can accommodate continued storage of gypsum for only one and one-half to two years without resorting to back-diking. The storage pile, at its present elevation of 4,650 feet, has nearly reached the J. R. Simplot Company property boundary in at least one location; back-diking would only temporarily resolve the problem of storage area.

The proposed land exchange would provide sufficient area to accommodate projected gypsum storage requirements for an additional 60 to 80 years.

Precedent for the land exchange of private lands for federal lands is well established and many such exchanges have been made in Idaho and other states.

Alternate methods and sites for gypsum disposal have been evaluated and are discussed in Section 2.4 of this report. Acquisition of the selected lands, however, appears to be the most feasible solution to the problem of gypsum storage considering environmental impact, land use and conservation, energy constraints and economic factors.

2.3 PROPOSED USE OF SELECTED LANDS

2.3.1 Summary of Phosphate Fertilizer Manufacturing Process

During the early 1940's the Defense Plant Corporation built facilities to blend fertilizer at the site of the present J. R. Simplot Company plant. The Company obtained these facilities and began operations in 1945. Over the years, operations have expanded so that the Simplot Company's Pocatello facility is now one of the two largest producers of phosphate fertilizers west of the Mississippi River and is one of three plants in the Intermountain West producing phosphoric acid by the so-called "wet process."

Phosphate ore is shipped by rail to the facility from the Conda Mine, located 7 miles north of Soda Springs, on a year-around basis and from the Gay Mine, located 30 miles northeast of Pocatello on the Fort Hall Indian Reservation, during the summer months. The ore is stockpiled at the Simplot facility and a continuous processing operation is maintained.

The ore is conveyed from the stockpile to the calciners where it is heated to about 1,500° F to burn out organic material. This process upgrades the phosphate content by 2 to 3 percent to approximately 32 to 34 percent phosphorus pentoxide. The calcined ore is then ground to a fine powder. In the phosphoric acid plants, the ground ore is reacted with sulfuric acid to produce phosphoric acid and, as a waste by-product, hydrated calcium sulfate or gypsum. The phosphoric acid is then used to make various grades and kinds of fertilizers. The Simplot facility makes five grades of solid fertilizers (three ammonium phosphate fertilizers, ammonium sulfate and triple superphosphate) and five grades of liquid fertilizer, which vary in nitrogen and phosphorus content. The sulfuric acid and ammonia employed during these processes are produced at separate plants within the facility.

The gypsum by-product of phosphoric acid production is insoluble and is mechanically separated from the phosphoric acid in pan filters, rinsed with weak acid and contaminated water, discharged to a slurry tank, thickened so that an approximate 30 percent suspension is formed, and pumped through pipes as a slurry to the gymsum storage area. Approximately five tons of gypsum is produced for each ton of P_2O_5 produced.

2.3.2 Gypsum Storage

2.3.2.1 Physical and Engineering Aspects of Gypsum Storage

The original gypsum storage area employed by the J. R. Simplot Company plant lies southeast of the plant and has a surface area of about 30 acres. It is bounded by the Union Pacific main line on the north and by the plant facilities on the west. This area was started

in 1953. After filling with gypsum, subsequent raising of the disposal area was accomplished by construction of perimeter dikes from the natural silty soils found on the hillsides to the south. By 1962 the embankment had reached a height of approximately 40 feet above the adjacent Union Pacific tracks. Various problems with this storage area including slides resulting from embankment instability caused abandonment of this site and a shift in 1965 to the presently operating storage area located to the south and west. With considerable rehabilitation the old storage area could possibly be re-used for gypsum disposal.

The operating gypsum storage area was constructed in 1964 commencing at elevations between 4,564 and 4,574 feet. The lowest tier of dikes was formed from native soils. At a given level, the storage area is divided by a cross dike which allows filling by hydraulic discharge of a portion of the storage area at one time. When the gypsum in the portion being filled has accumulated to a level near crest elevation of the confining dikes, the gypsum slurry discharge is directed to the other portion of the storage area. The gypsum is then allowed to settle and dry and new confining dikes are constructed from the dry gypsum within the area. After dike construction has been completed, discharge can be resumed until the area once again becomes filled with gypsum. Continuous discharge is thus permitted by cycling the gypsum slurry back and forth between the two operating areas.

The height of successive tiers of the dikes is ten feet and each dike is set-back 19.5 feet from the preceding one. Individual dikes are constructed at a slope of 1.5:1 and an overall slope of the final storage area of 3.75:1 is maintained.

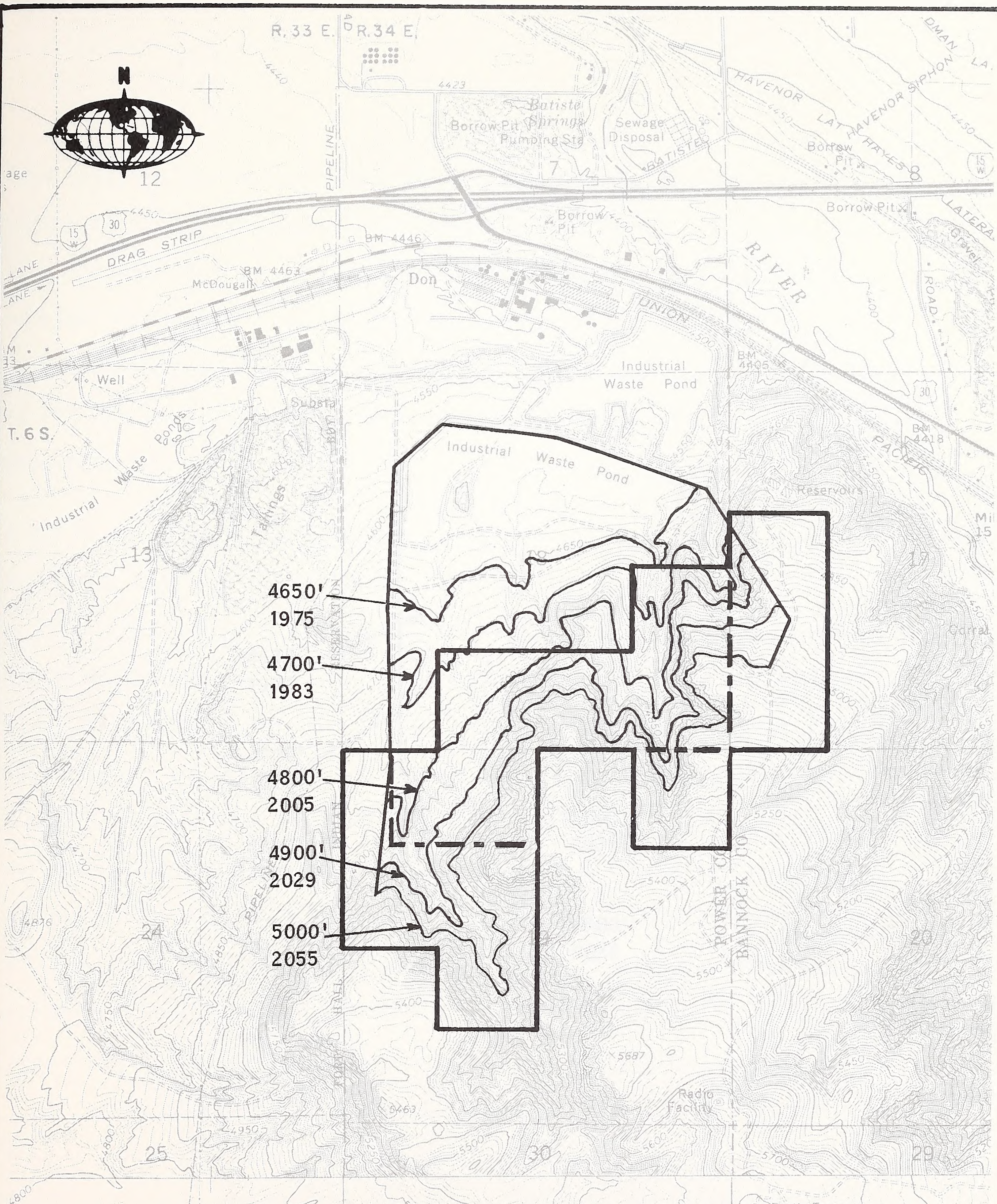
Prior to pumping the gypsum slurry to a new level, a water decant system is installed. This consists of laying three lines of 18 in. diameter

perforated concrete pipe on the soil surface to connect with pipe laid at preceding levels. These lines are covered with graded coarse gravel to form a filtration system. A portion of the water percolating through the gypsum enters the decant lines where it flows to the decant reservoir. From here it is pumped on a demand basis to the reclaim water plant and used in plant processes.

The operating gypsum storage area, at its present elevation of nearly 4,650 feet, contains approximately 8 million tons or about 10 million cubic yards of gypsum. The present and projected annual rate of gypsum production is 1.25 million tons or 1.5 million cubic yards.

It is proposed that the selected lands be utilized to allow continued use of the present operating gypsum storage area. This would be accomplished by expanding the storage area basically in the same manner as it has been in the last few years unless modifications are dictated by engineering considerations. A basic configuration of the proposed storage area is shown in Plate 2.3-1. This shows the area which would be covered by gypsum when the elevation reaches certain levels and the approximate year at which these levels are estimated to be reached. This configuration provides an additional 119 million cubic yards of storage by raising the level of the gypsum storage area to an ultimate elevation of 5,000 feet. This will be sufficient to accommodate the projected gypsum production of the J. R. Simplot Company facility for approximately 80 years. The process of elevation of the surface of the storage area will be gradual, averaging 4.4 feet per year. This configuration utilizes both Priority A and Priority B selected lands.

An alternative configuration is shown in Plate 2.3-2. This design, which also would ultimately raise the elevation of the storage area to 5,000



PROPOSED CONFIGURATION OF GYPSUM STORAGE AREA

REFERENCE

TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

KEY

—— BOUNDARY OF AREA COVERED BY GYPSUM AT SELECTED STORAGE LEVEL ELEVATIONS AND YEAR REACHED.

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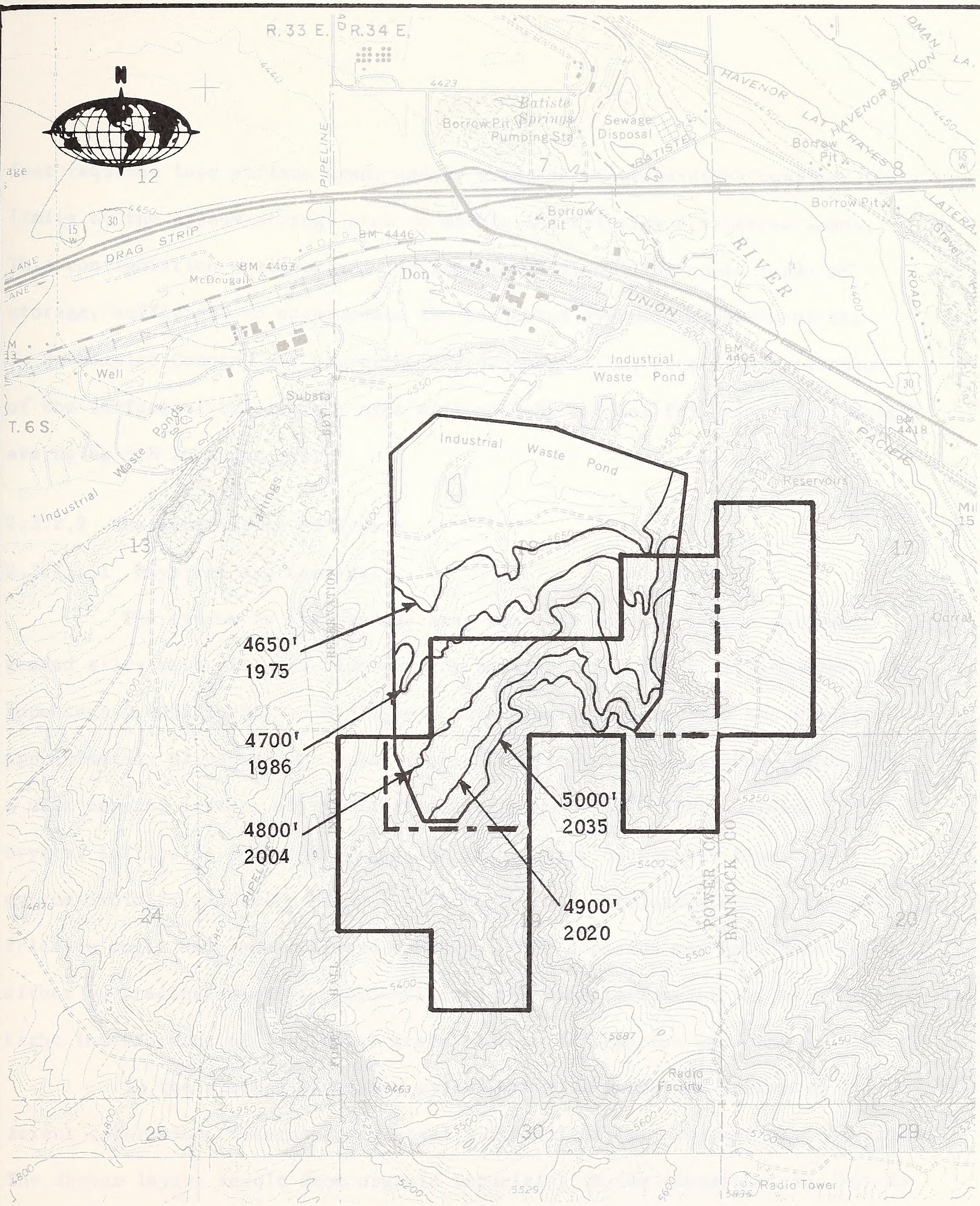
PLATE 2.3-1



REFERENCE

TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

KEY

—— BOUNDARY OF AREA COVERED BY GYPSUM AT SELECTED STORAGE ELEVATIONS AND YEAR REACHED

ALTERNATE CONFIGURATION OF GYPSUM STORAGE AREA

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PLATE 2.3-2

feet requires less surface area, and by a series of cross-dikes confines the limits of the gypsum storage area to within the Priority A selected lands. This configuration would provide an additional 93 million cubic yards of storage, sufficient to accommodate the projected gypsum production of the J. R. Simplot Company for approximately 60 years. The process of elevation of the surface of the storage area will also be gradual following this design averaging 5.8 feet per year.

2.3.2.2 Characteristics of Gypsum

2.3.2.2.1 Physical and Chemical

The gypsum in the storage area consists of non-plastic uniformly graded silts with virtually 100 percent passing a No. 200 U. S. Standard Sieve (openings 0.0029 inches or 0.075 mm). Dry density is variable but averages approximately 62 pounds per cubic foot. Impurities in the gypsum results in a weak crystal lattice of the individual gypsum grains. The weakness of the crystal lattice is responsible for the high degree of plastic flow. The gypsum exhibits generally favorable strength characteristics with a moderate friction angle and some measured cohesion. The cohesion may have been produced either by precipitation of compounds from the contained water, or by a very tight interlocking of individual grains due to deformation and plastic flow.

In the storage pile, the gypsum exhibits bands and layers of different coloration, alternating generally from light gray to dark gray or brown. The darker layers result from organic impurities in the phosphate ore, but do not produce any measurable difference in the engineering properties of the gypsum. This layered structure results in a highly anisotropic permeability;

that is, the permeability in the horizontal direction is many times greater than that in the vertical direction.

Chemically, the gypsum tailings are composed of calcium sulfate ($CaSO_4 \cdot 2H_2O$) with various impurities. A character sample of the gypsum slurry was obtained from the discharge to the storage area on July 8, 1975. Three one-gallon samples were obtained over an eight-hour period and composited. Solids were allowed to settle and were separated from the liquid. Both the solid and the liquid fraction were sent to an independent commercial laboratory (Ford Chemical Laboratory, Salt Lake City, Utah) for separate chemical analyses. The constituents which were assayed for were selected on the basis of those which were known or suspected to be present as well as those trace elements which have had recent environmental interest. The results of these analyses are shown in Table 2.3-1. It should be emphasized that the results of this analysis, based on one sample, are typical but should not be interpreted as representative of the entire gypsum storage area. The composition of the gypsum does vary with a number of factors including the particular phosphate ore being processed and variations in the processing operations.

A qualitative spectrographic analysis performed on the same samples revealed the presence of trace amounts of barium and titanium in the solids fraction and trace amounts of barium, titanium and rubidium in the liquid fraction.

Previous testing by the J. R. Simplot Company has shown that the water which is present on the surface of the gypsum storage area is acidic (pH approximately 2.0), is high in total dissolved solids (approximately 18,000 ppm), and is quite clear (turbidity of 15 to 35 Jackson Turbidity Units).

TABLE 2.3-1

TYPICAL CHEMICAL CHARACTERISTICS OF SOLID AND LIQUID FRACTIONS OF GYPSUM SLURRY

(Composite sample taken July 8, 1975 from influent to operating gypsum storage area at J. R. Simplot Company plant)

Constituent	Solids (%)	Liquid (mg/l)
Sulfate as SO_4	53.500	3020.0
Calcium as Ca	20.350	320.0
Silicon Dioxide	7.150	133.30
Phosphoric acid as P_2O_5	1.450	4800.0
Aluminum as Al	0.985	175.70
Sodium as Na	0.745	27.63
Fluoride as F	0.560	3200.0
Strontium as Sr	0.025	ND
Iron as Fe	0.025	6.898
Magnesium as Mg	0.015	360.0
Zinc as Zn	0.006	15.0
Chromium as Cr	0.004	0.703
Manganese as Mn	0.004	4.943
Vanadium as V	0.003	17.231
Copper as Cu	0.002	3.862
Cadmium as Cd	0.001	1.585
Lead as Pb	0.001	0.174
Uranium as U	$<$0.001	1.350
Molybdenum as Mo	0.000	0.328
Antimony as Sb	0.000	0.30
Selenium as Se	0.000	0.260
Silver as Ag	0.000	0.029
Arsenic as As	0.000	0.013
Mercury as Hg	0.000	0.005
Cyanide as Cn	0.000	$<$0.01
Water of Hydration	18.170	-
Total	102.996	12089.311

2.3.2.2.2 Radiological

Uranium is an accessory element in phosphate ore. Uranium concentrations vary directly with the phosphate concentration of the ore and usually are in the range of 0.1 to 0.4 pounds per ton (or 0.005 to 0.020 percent) (EPA, 1974). This uranium was deposited with the phosphate rock and is incorporated in the grain structure.

Since natural uranium contains approximately 99.28 percent uranium-238 and 0.71 percent uranium-235, the decay chain of uranium-238, known as the uranium-radium family, is of primary importance (EPA, 1974). This decay chain includes, among others, the alpha emitters uranium-238, thorium-230, polonium-210, radium-226 and radon-222, and the beta emitters thorium-234 and lead-210. From the standpoint of potential hazard, the radioisotope radium-226 is of primary concern. This isotope has a half-life of 1,620 years and decays by alpha emission into radon-222, a radioactive gas with a half-life of 3.8 days.

It may be expected, therefore, that some small amount of radiation accompanies the phosphate in the process stream. Samples of phosphate ore from the Conda Mine and from the Gay Mine taken in April, 1975, by the Simplot Company and analyzed by AccLabs Research Inc., showed 0.011 and 0.0081 percent U_3O_8 or 93 and 69 ppm total uranium, respectively. Available data indicates that there is a partitioning of uranium and its decay products during the acidulation step in phosphate rock processing with virtually all the uranium remaining with the fertilizer while a major portion of the radium and subsequent decay products are removed in the gypsum slurry (EPA, 1974).

A number of samples have been taken by the Simplot Company, the State of Idaho, and the Environmental Protection Agency to determine the level of radium-226 activity in various segments of the Simplot facility phosphate processing stream and the immediate environment. The results of these radiometric analyses are shown in Table 2.3-2. Included are the activity levels detected in ore samples, the liquid and solids fractions of the gypsum slurry, the decant water returning from the operating gypsum storage area, wells at the Simplot facility, Batiste Springs and the Portneuf River.

Evaluation of the radiation levels observed can only be made by comparison with existing regulations and recommendations. The EPA (1974) on August 5, 1974 recommended as an interim guideline, a maximum level for radium-226 of 9 pico-curies per liter (pCi/l) in liquid effluent to public waters from sources engaged in the phosphate fertilizer manufacturing industry. This guideline, however, is designed to protect downstream users and users of ground water which might be affected, i.e., to safeguard against indirect effects, and is not applicable to the gypsum storage area itself, from which, at the Simplot facility, there is no effluent.

Other existing regulations and recommendations also do not directly apply to the gypsum storage area. The Safe Drinking Water Act of 1974 proposes a limit of 5 pCi/l for radium-226. This will replace the 3 pCi/l limit set forth in the 1962 Public Health Service drinking water standards. In 10 CFR 20 (1960), limits for an effluent to an unrestricted area for soluble radium-226 in water are set at 30 pCi/l above natural background; these regulations, however, apply only to licensees of the former Atomic Energy

A number of samples were taken by the Division of [illegible] the State of Idaho and the Environmental Protection Agency to determine the level of radium-226 activity in various segments of the [illegible] phosphate processing stream and the immediate environment. The results of these radioactivity analyses are shown in Table [illegible]. [illegible] indicates that the activity levels detected in the samples, [illegible] [illegible] River.

Evaluation of the [illegible] levels [illegible] can only be made in comparison with [illegible]. The [illegible] on August [illegible], 19[illegible] [illegible] radium-226 of [illegible] pCi/l [illegible] waters from [illegible] this [illegible], however, [illegible] which might be affected [illegible] effects, and is not applicable to the gypsum [illegible] at the Simplot facility, [illegible] effluent.

Other existing regulations and recommendations that do not directly apply to the gypsum storage areas. [illegible] drinking water [illegible] sets a limit of 5 pCi/l for radium-226. This will replace the 3 pCi/l limit set forth in the 1962 Public Health Service drinking water standards. [illegible] CFR 20 (1960) limits [illegible] to an effluent [illegible] radium-226 in water [illegible] 60 pCi/l [illegible] however, [illegible]

TABLE 2.3-2

RADIOASSAY OF ENVIRONMENTAL SAMPLES FOR RADIUM-226

Sample	Reference*	Radioactivity
Ore Samples		
Conda Mine-low grade	1	32 ± 1.0 pCi/g
Conda Mine-low grade	2	37.2 ± 0.2 pCi/g
Conda Mine-main bed	1	28 ± 0.97 pCi/g
Gay Mine-high grade	1	28 ± 0.96 pCi/g
Gay Mine-main bed	2	16.4 ± 0.1 pCi/g
Simplot Stockpile	3	33 pCi/g
Gypsum Slurry Solids Fraction		
	1	23 ± 0.87 pCi/l
	3	16 pCi/l
	4	12.2 ± 0.1 pCi/l
	5	3.3 to 20 pCi/l
Gypsum Slurry Liquid Fraction		
	1	61 ± 2.9 pCi/l
	2	66.6 ± 0.4 pCi/l
	4	26.6 ± 0.4 pCi/l
Decant Water		
	1	40 ± 2.3 pCi/l
Wells and Springs		
Simplot #4 Well	2	0.23 ± 0.05 pCi/l
Simplot #5 Well	2	0.13 ± 0.06 pCi/l
Simplot #5 Well	1	0.7 ± 0.36 pCi/l
Swanson Well	2	0.20 ± 0.05 pCi/l
Batiste Spring	2	0.36 ± 0.06 pCi/l
Portneuf River		
Upstream	1	0.7 ± 0.35 pCi/l
Upstream	2	0.19 ± 0.06 pCi/l
Downstream	1	0.54 ± 0.33 pCi/l

*1 EPA Preliminary Report Event PHOS 6, NERC, Las Vegas, Nevada, September 9, 1975 (Samples taken April, 1975).

2 Sampled by J.R. Simplot Co., April, 1975, analyzed by Eberline Instrument Corp., Albuquerque, New Mexico.

3 EPA, 1974, Report on Radiological Pollution from Phosphate Rock Mining and Milling, National Field Investigation Center, December, 1973, Revised May, 1974 (Samples taken March, 1973).

4 Sampled by Dames & Moore, July, 1975, analyzed by Eberline Instrument Corp., Albuquerque, New Mexico, see Section 2.3.2.2.1 for details of sampling.

5 Samples reported by Idaho Dept. of Health & Welfare (personal communication, July 3, 1975, from Gary F. Booth, Radiation Control Section).

Commission (AEC). The National Bureau of Standards Handbook 69 indicates a recommended maximum permissible concentration of radium-226 in water of 100 pCi/l for continuous occupational exposure in a controlled area. The General Water Quality Standards for the State of Idaho (Idaho Dept. of Environmental and Community Services, 1973) specify that waters of the State, including both surface and underground, shall not contain radium-226 in excess of 10 pCi/l.

Since Idaho is an AEC (now Nuclear Regulatory Commission) "Agreement State," the State has jurisdiction over radiation matters and handles regulation and licensing. These rules and regulations are contained in "Idaho Radiation Control Regulations," dated May 9, 1973, and apply only to State licensees. The J. R. Simplot Company phosphate fertilizer manufacturing facility is not required to be licensed by the State and therefore is not subject to the provisions contained in these regulations (Gary F. Booth, personal communication, June 26, 1975).

The only applicable regulations and recommendations, therefore, pertain to radium-226 levels in water which may be utilized for culinary purposes and these set a limit of 5 pCi/l. The radium-226 levels detected in such sources listed under the wells and springs and the Portneuf River in Table 2.3-2, are from 7 to 38 times below this 5 pCi/l level. If significant leaching of radium-226 from the gypsum storage area to ground water sources were occurring or had occurred over the 20 years of operation of the storage areas, it would undoubtedly be detectable in elevated levels in these wells and springs. Such is not the case. It is believed that the concentration of radium-226 has been reduced by ion-exchange absorption on soil

particles underlying the gypsum storage area. This is indicated by the fact that samples of ground water from wells and from nearby surface waters have levels of concentration an order of magnitude below the proposed drinking water standards.

The gypsum storage area is a source of low-level concentrations of radon-222 gas and its daughters. The Environmental Protection Agency is currently pursuing an investigation to determine whether or not the levels of these decay products of radium-226 at the Simplot facility are of significance. Only one measurement of radon-222 concentration on the gypsum storage area resulting from this study is currently available. A four-hour air sample taken May 1, 1975 downwind of the operating gypsum storage area at a sampler located on the dike showed a radon-222 level of 0.31 $\pm$ 0.049 pCi/1. The National Bureau of Standards Handbook 69 recommends a radon concentration limit in unrestricted areas of 3 pCi/1 above natural background concentration; Dr. Keith Schiager (personal communication) indicates that a level of 1 pCi/1 above natural background concentration is currently generally accepted as the limit for continuous exposure of the public. The measured concentration on the gypsum storage area is 3-10 times lower than these recommended limits.

Additional perspective into radon-222 concentrations may be gained by realization that the Nuclear Regulatory Commission considers that its criteria for dose exposures from uranium tailings piles are adequate. These criteria indicate acceptability of radiation released into the air from the radium-226 concentrations of from 150 to 1000 pCi/g typically found in uranium tailings piles. Such radium-226 concentrations are from one to two orders of magnitude above those contained in the gypsum storage area.

2.4 ALTERNATIVES

2.4.1 Introduction

The J. R. Simplot Company has considered several alternatives to the proposed action of acquiring the use of the selected lands for gypsum disposal. The feasibility of these alternatives will be discussed in this section.

The basic problem is to find a long-term, economically feasible and environmentally acceptable method of disposing of large quantities of a solid waste by-product of the phosphate fertilizer manufacturing process. The alternatives considered fall into two categories. The first, discussed in Section 2.4.2, includes constructive uses of the waste gypsum for industrial or agricultural purposes. The second category includes those alternatives in which gypsum is considered a waste product for which disposal is required. These alternatives, discussed in Section 2.4.3 through 2.4.6 include utilizing only a portion of the selected lands, existing gypsum disposal areas, other local sites, or distant sites for disposal of the gypsum.

2.4.2 Find Constructive, Marketable Uses for Gypsum

Gypsum is a useful material with more than 20 million tons used in the United States during 1973. Almost the entire total, however, came from natural gypsum deposits which are mined cheaply across the United States. By-product phospho-gypsum, such as that produced by the J. R. Simplot Company, is also in large supply with fertilizer plants in Florida producing more than 20 million tons of this material annually. Marketable uses for phospho-gypsum thus face serious supply competition from both natural deposits and other industrial waste stockpiles.

A primary demand for natural gypsum is in the production of wallboard. A basic problem in utilizing phospho-gypsum for this purpose is the removal of the many impurities in the material. This requires special processing methods and machinery which raise the cost of processing to $10 to $12 per ton. As a result, United States wallboard manufacturers do not consider it economically feasible to use phospho-gypsum in their processes.

The impurities in the phospho-gypsum and the high cost of their removal also make it economically infeasible to use the material in the manufacture of Portland cement and building blocks.

By-product phospho-gypsum may be used as a soil conditioner and supplementary fertilizer source of calcium and sulfur. For such use the gypsum would have to be partially processed by drying. The market demand for this material is small and distantly located involving prohibitive transportation costs.

In summary, high processing costs and competition from cheap natural raw materials make phospho-gypsum economically unattractive for industrial use and a distant and small market for its use for agricultural purposes make these infeasible alternatives for the J. R. Simplot Company's gypsum disposal problem. Although research is continuing toward development of useful, marketable products from waste gypsum, such use is not in the foreseeable future.

2.4.3 Utilize Priority A Lands Only for Gypsum Disposal

A reduction in the acreage of the selected lands from 500 to 220 acres to include only the Priority A lands, is a feasible alternative. As

noted in Section 2.3.2.1 of this report, a configuration has been devised which would allow gypsum storage utilizing only these lands. This design provides storage capacity to accommodate approximately 60 years of gypsum production in contrast to the 80 years of production which would be accommodated if all the selected lands were available. The ultimate gypsum storage area elevation of 5,000 feet would be the same whichever configuration were utilized but the rise in elevation would be somewhat less gradual, averaging 5.8 vs. 4.4 feet per year, utilizing only the Priority A lands.

The environmental impacts of this alternative are similar to those of the basic proposed action although generally on a reduced scale, and have been assessed throughout this report. Where there are basic differences between the impacts of utilizing only the Priority A lands and the total selected lands, these have been noted.

2.4.4 Utilize Existing Gypsum Disposal Areas

There is sufficient storage capacity in the currently operating gypsum storage area to accommodate the production which will accrue in the next one and one-half to two years. Raising the storage area elevation to accommodate additional production would result in the gypsum encroaching upon BLM lands along the north border of the NE¼ SE¼ Section 18.

A contingency plan has been developed by the J. R. Simplot Company which would allow continued short-term utilization of the currently operating storage area (Dames & Moore, 1974). This would require the construction of two earthfill dikes with one located near the south boundary of the SE¼ NE¼ Section 18 and the other near the southwest corner of NE¼ SW¼ Section 18. These dikes would allow gypsum accumulation to an elevation of 4,700 feet before

encroachment upon BLM land. Total storage capacity provided by this configuration above the 4,650 feet elevation is approximately 11 million cubic yards. This would extend the maximum life of the operating storage area by about 7 years.

A second short-term contingency plan has been developed by the Company which requires the extensive rehabilitation of the old storage area immediately to the north of the operating storage area (Dames & Moore, 1975). The ultimate elevation of this area would be 4,580 feet, some 70 feet above its present elevation. However, total storage capacity would be only 2.7 million cubic yards, sufficient to accommodate the gypsum production of less than two years.

In summary, use of existing gypsum storage areas, even with extensive rehabilitation, can provide only a limited, short-term solution to the problem of gypsum disposal.

2.4.5 Utilize Other Local Sites for Gypsum Disposal

Another alternative is to establish a gypsum disposal area on lands in the vicinity which may or may not be currently in J. R. Simplot Company ownership. The sites considered here are those which are close enough so that the gypsum could be piped as a slurry to the site. Disposal at more distant sites which would require transport by railroad will be considered in Section 2.4.6.

A basic consideration is the size of the disposal area which would be required. A recent study by the J. R. Simplot Company indicated that to accommodate the gypsum produced for 80 years would require approximately 480 acres of relatively flat land and that the ultimate height of the storage area would approach 500 feet.

The land which might be available for such a storage area is generally to the north and west of the plant site at less than 4,500 feet elevation. On such land one generally encounters alluvial soils which are much more permeable than the silt loess soils of the selected lands. Seepage from a storage area and contamination of wells and/or the Portneuf River would probably be much more of a possibility at these sites. The J. R. Simplot Company owns approximately 200 acres of land between U. S. Highway 30 and Highway I-15W (see Plate 2.1-2), which might be considered a potential site for a gypsum storage area. This site, however, is dissected by the Portneuf River and the soils are known to be highly permeable. In addition, a gypsum storage area at this site would have very high visibility and would eliminate its function as a "buffer strip" between the plant and residential areas.

There are a number of other constraints associated with utilizing nearby lands other than the selected lands for a gypsum disposal are including those of land acquisition, acquisition of rights-of-way, zoning, aesthetics, etc. Most of the candidate land would have higher use priority than for a disposal area. Finally, if an accident such as a broken slurry pipeline were to occur, the spill might threaten adjacent land under other ownership or could contaminate water supplies or watercourses such as the Portneuf River.

In addition to the environmental problems associated with the use of other local disposal areas, there are economic considerations which make their use unattractive. A study was recently conducted by the J. R. Simplot Company to evaluate the costs involved in establishing such a site on land in the Michaud Flats area approximately one mile north and one and one-half miles west of the plant site. This study showed that the costs,

excluding the costs for land acquisition, dike construction and maintenance, and pumping, approximated $1.4 million or about 4.6 times greater than the equivalent costs to extend the presently operating gypsum storage area to the 5,000 feet elevation on the selected lands.

To summarize, the basic considerations which make the establishment of a new gypsum storage area on nearby lands infeasible are largely the difficulty of finding land of sufficient acreage which is not suited for a higher land use, and environmental considerations associated with seepage, accidental spills and aesthetics (visibility).

2.4.6 Utilize Distant Sites for Gypsum Storage

Sites which are too distant to pipe the gypsum to as a slurry could be utilized as a disposal area. Use of such an area would necessitate transport of the material by rail. There would undoubtedly be a great number of problems associated with locating an area which was accessible by rail and which would be acceptable as a disposal site from the viewpoint of environmental constraints.

Assuming an acceptable site could be located, the gypsum would still have to be pumped to existing storage areas for drying in much the same manner as it presently is. Costs associated with this pumping operation are estimated at $0.72 per ton. Upon drying, it would then have to be loaded into freight cars ($0.10 per ton), transported to the site, then unloaded and emplaced ($0.92 per ton). Based on a rail haul of 20 miles, shipping costs are estimated at $0.80 per ton. The total of these rehandling and shipping costs amounts to $1.82 per ton in comparison with $0.72 per ton for disposal as a pumped slurry to the existing storage area. Based on an

annual production of 1.25 million tons of gypsum, disposal by rail transport to a distant site would result in annual costs $2.275 million over and above the costs to dispose of the gypsum as it currently is practiced, a factor increase of 3.5 times. Over the proposed 60 or 80 year life of the presently operating disposal area these excess costs would amount to $136 and $182 million.

In theory, the gypsum could be returned to the mines from which its parent phosphate ore originated. Logistical problems at the mines and freezing gypsum in ore cars in winter would present some problems, but energy costs, in terms of diesel fuel required for rail transport, make this plan environmentally unacceptable. Both mines, the Gay and the Conda, are at higher elevations than the J. R. Simplot Company plant (approximately 1,200 feet and 1,800 feet, respectively), and it would require a great deal of energy to return the gypsum. The 37 mile haul to the Gay Mine would involve 46 million freight ton miles annually and the 79 mile haul to the Conda Mine would involve 99 million freight ton miles annually.

From both an environmental and an economic viewpoint, this alternative does not appear feasible.

3.0 DESCRIPTION OF EXISTING ENVIRONMENT

3.1 CLIMATOLOGY

3.1.1 Regional Climatology

Eastern Idaho is characterized by great topographic relief which creates significant climatological variations within short horizontal distances. All of Idaho is west of the Continental Divide, and despite being approximately 500 miles from the Pacific Ocean, is influenced primarily by maritime air masses. Having a more continental climate than western and northern areas of Idaho, the eastern region is characterized by a wider range between summer and winter temperatures, and the precipitation pattern is marked by wet winters and dry summers.

Elevation plays a much more important role in determining temperatures than does latitudinal position. Warmer temperatures are generally found at lowest elevations and colder temperatures are found at highest elevations, the possible exception occurring in winter when pockets of very cold drainage air are likely to collect in the valleys. In general, summer temperatures range from mean minima of 40-52°F to mean maxima of 76-80°F; winter temperatures range from mean minima of 0-12°F to mean maxima of 22-36°F. Records for the State of Idaho prior to 1971 indicated that the lowest recorded temperature was -60°F at Island Park Dam on January 18, 1943, and the highest recorded temperature was 118°F at Orofino on July 28, 1934.

The primary source of winter moisture is the Pacific Ocean. This precipitation is most often associated with low pressure systems and cold fronts moving into the northwestern United States from the Gulf of Alaska and falls mainly as snow. Snowfall is generally light in the valleys and

heavy in the mountains. A State record of 484.5 inches of snow was recorded at Roland, in Shoshone County, in 1948. Summer precipitation is usually in the form of thundershowers, which can be locally heavy at times. There is some question as to whether the source of summer moisture is the Gulf of Mexico or the Pacific Ocean off the coast of Mexico. Mean annual total precipitation in eastern Idaho ranges from less than 10 inches in the Snake River Valley to about 40 inches in a few isolated mountain areas. Record precipitation figures for the State through 1970 include an annual maximum of 81.05 inches at Roland in 1933 and a one day maximum of 7.17 inches at Rattlesnake Creek, in Elmore County, on November 23, 1909.

The annual average percentage of possible sunshine is about 70. About 40 percent of possible sunshine is experienced in winter and about 80 percent is experienced in summer.

3.1.2 Site Climatology

3.1.2.1 Data Sources

Meteorological data from the Pocatello Municipal Airport were used extensively in this report. The airport meteorological tower is located approximately three miles west-northwest of the selected lands and meteorological conditions have been assumed to be virtually identical at both sites. Hereafter, all references to meteorological data from or conditions at Pocatello will be understood to mean data from or conditions at the Pocatello Municipal Airport. Evaporation data from the Aberdeen Experimental Station, located about 15 miles west-northwest of the selected lands, have also been included in the report. Lengths of data records vary according to parameter and are provided in the sections covering the individual parameters.

3.1.2.2 Total Precipitation

Pocatello receives an average of 10.8 inches of precipitation annually. Approximately three-fourths of the annual average is fairly evenly distributed according to monthly average totals from November through June. During this period percipitation amounting to 0.01 inch, or more, will fall on an average of nearly one day in three. Late spring and summer precipitation normally comes in the form of scattered thundershowers which can vary greatly in extent and rainfall and which may occasionally be accompanied by hail and strong winds. From July through October precipitation amounting to at least 0.01 inch can be expected on an average of about one day per week. In fall thundershower activity occurs less frequently and general rain or snow systems of Pacific origin become the dominant storm feature (U. S. Department of Commerce, 1975).

Table 3.1-1 shows mean, maximum, and minimum total precipitation amounts as recorded at Pocatello. Extremes that exceed the figures shown that have been recorded in the vicinity of Pocatello include a maximum monthly precipitation total of 4.34 inches in March, 1907, and a maximum 24-hour total of 2.60 inches in September, 1926 (U. S. Department of Commerce, 1975).

Extreme 24-hour precipitation events and their return periods were obtained from Miller et al (1973). The 2, 5, 10, 25, 50, and 100-year return period 24-hour precipitation events are, respectively, 1.0, 1.4, 1.7, 2.1, 2.3 and 2.5 in. This means, for example, that a storm yielding 2.5 in. of precipitation within a 24-hour period would be expected to occur on an average of once every 100 years.

TABLE 3.1-1

MEAN, MINIMUM AND MAXIMUM TOTAL PRECIPITATION AND SNOWFALL, POCATELLO, IDAHO - MUNICIPAL AIRPORT

(From U. S. Department of Commerce, 1975)

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
Total Precipitation													
Normal^Δ	1.05	0.80	0.94	1.06	1.29	1.28	0.36	0.62	0.61	0.75	1.05	0.99	10.80
Maximum Monthly*	2.92	1.46	1.90	3.30	3.11	3.30	1.84	3.98	2.29	2.56	1.87	2.95	3.98
Minimum Monthly*	0.24	0.12	0.10	0.19	0.19	0.02	T	T	T	0.00	0.02	0.38	0.00
Maximum Daily*	0.97	0.59	0.70	1.14	1.67	1.08	0.98	1.16	1.05	1.30	0.85	0.84	1.67
Snowfall													
Mean†	10.0	5.3	5.1	4.4	0.2	T	0.0	0.0	0.1	1.4	3.2	7.7	37.4
Maximum Monthly*	28.1	16.3	15.4	13.9	1.5	T	0.0	0.0	2.0	12.6	11.1	19.9	28.1
Maximum Daily*	10.1	6.1	7.3	9.0	1.5	T	0.0	0.0	2.0	7.0	6.8	8.2	10.1

T - trace; an amount too small to measure
Δ - normals for the period 1941 - 1970
* - From 25 years of records prior to and including 1974
† - From 21 years of records prior to and including 1970

3.1.2.3 Snowfall

An annual average of approximately 37.4 inches of snow was recorded at Pocatello during the 21 years prior to and including 1970. Storm systems pass frequently through the area during winter and spring, and accumulations on the ground of a foot or more are common. At Pocatello snowfall amounting to one inch or more can be expected on an average of 13 days per year with a maximum average monthly occurrence of three days in both December and January.

Table 3.1-1 shows extreme snowfall amounts as recorded at Pocatello in the 25 years prior to and including 1974. This table indicates that the maximum 24-hour snowfall was 10.1 inches and the maximum monthly snowfall was 28.1 inches. A maximum 24-hour snowfall of 14.6 inches was recorded in March, 1916, at another location in the vicinity of Pocatello. The maximum seasonal snowfall recorded at Pocatello since the winter of 1935-36 was 61.7 inches during the winter and spring of 1961-62. The minimum annual snowfall recorded at Pocatello during the period 1935-74 was 18.2 inches in the winter and spring of 1940-41 (U. S. Department of Commerce, 1975).

3.1.2.4 Evaporation

Evaporation data from the Aberdeen Experimental Station are presented in Table 3.1-2. These data, based on up to 25 years of records through 1960, indicate that an average of about 46.5 total inches of evaporation can be expected during the months of April through October with monthly averages during this period ranging from 3.41 to 9.25 inches. Evaporation data are obtained from exposed pans of water, and, therefore, data are

difficult or impossible to obtain from November through March because of frequent periods of below-freezing weather.

TABLE 3.1-2

MEAN MONTHLY EVAPORATION (INCHES)
ABERDEEN EXPERIMENTAL STATION, IDAHO
(From U. S. Department of Commerce, 1964)

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Mean Evaporation	-	-	-	4.92	7.07	7.94	9.25	8.37	5.60	3.41	-	-
Number of Years of Record	-	-	-	8	23	25	25	24	24	15	-	-

Mean annual Class A pan evaporation and mean annual lake evaporation are estimated to be 52 and 37 inches, respectively, by the Environmental Data Service (1968). May-October evaporation is estimated to be 81 percent of the annual evaporation.

3.1.2.5 Sky Cover

Sky cover data from Pocatello (U. S. Department of Commerce, 1975) show that cloudy days are most likely to occur in winter, whereas clear to partly cloudy days are most common in summer and early fall. Twenty-five years of data prior to and including 1974, indicate that, on an annual basis, 30 percent of the days are clear from sunrise to sunset, 27 percent are partly cloudy, and 43 percent are classed as cloudy.

3.1.2.6 Fog

Heavy fog that reduces visibility to 1/4 mile or less occurs an average of 15 days per year in Pocatello with such conditions largely confined

to the period from November through March (U. S. Department of Commerce, 1975). These months average about three days each of heavy fog.

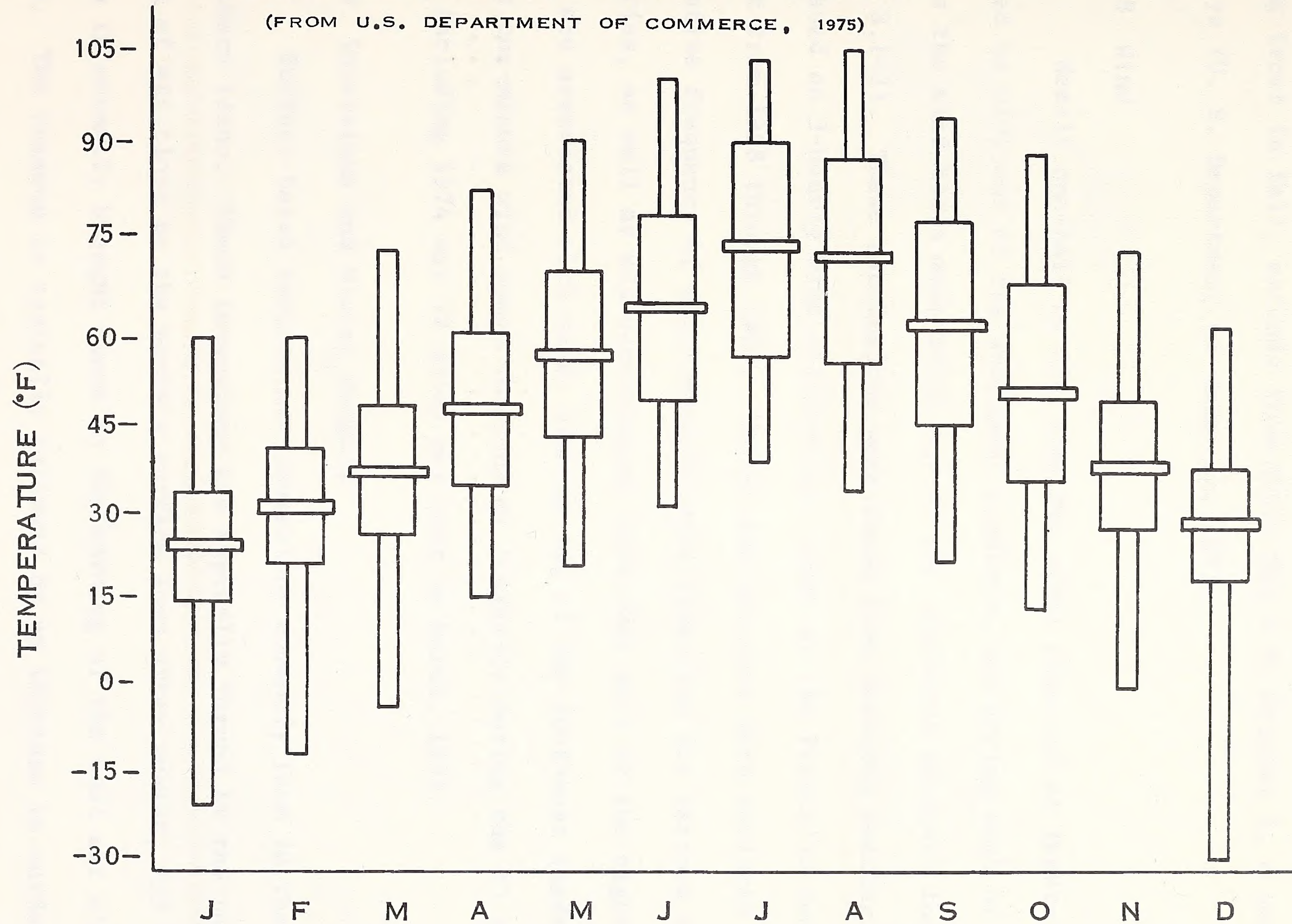
3.1.2.7 Temperature

Temperature data from Pocatello are presented in Plate 3.1-1, diagrammed to show the normal, normal daily maximum and minimum, and extreme high and low temperatures for each month. The normal figures are based on data collected during the period 1941-70; extremes are based on 11 years of data recorded prior to and including 1974. This diagram shows that temperatures at Pocatello have ranged, during the respective period of record, from as low as -28°F in December, 1972, to as high as 104°F in August, 1969. However, other extremes that have been recorded at other locations in the vicinity of Pocatello were -31°F in January, 1949, and 105°F in July, 1931. July and August are typically the warmest months with averages of 16 and 13 days per month, respectively, when the temperature reaches or exceeds 90°F. December and January are normally the coldest months during which the daily minimum temperature falls to 0°F, or less, on an average of four and five days, respectively. Based on 11 years of records prior to and including 1974, the daily maximum temperature can be expected to reach or exceed 90°F on an average of 34 days per year and fail to rise above 32°F on an average of 38 days per year. Based on data from the same period of record, daily minimum temperatures can be expected to drop to 32°F or less on an average of 173 days per year and to 0°F or below on an average of 11 days per year (U. S. Department of Commerce, 1975). The average growing season, which is defined as the period of time between the last killing frost in spring and the first

MONTHLY MEANS AND EXTREMES IN TEMPERATURE

POCATELLO, IDAHO — MUNICIPAL AIRPORT

(FROM U.S. DEPARTMENT OF COMMERCE, 1975)



	J	F	M	A	M	J	J	A	S	O	N	D
MAX.△	57	57	71	81	89	99	102	104	93	87	71	59
NORM. MAX.*	32.4	38.6	45.8	57.7	68.1	76.5	88.8	86.4	75.7	63.0	45.9	35.5
NORM.*	23.2	29.4	35.4	45.3	54.4	61.8	71.5	69.5	59.4	48.4	35.7	26.9
NORM. MIN.*	14.0	20.1	24.9	32.8	40.7	47.1	54.1	52.5	43.1	33.8	25.5	18.3
MIN.△	-19	-11	-3	15	20	30	37	32	21	10	0	-28

△ BASED ON RECORDS FOR 11 YEARS PRIOR TO AND INCLUDING 1974

* BASED ON RECORDS FOR THE 1941 -- 1970 PERIOD

killing frost in fall, extends from about May 4 to October 5, a period of 154 days (U. S. Department of Commerce, 1975).

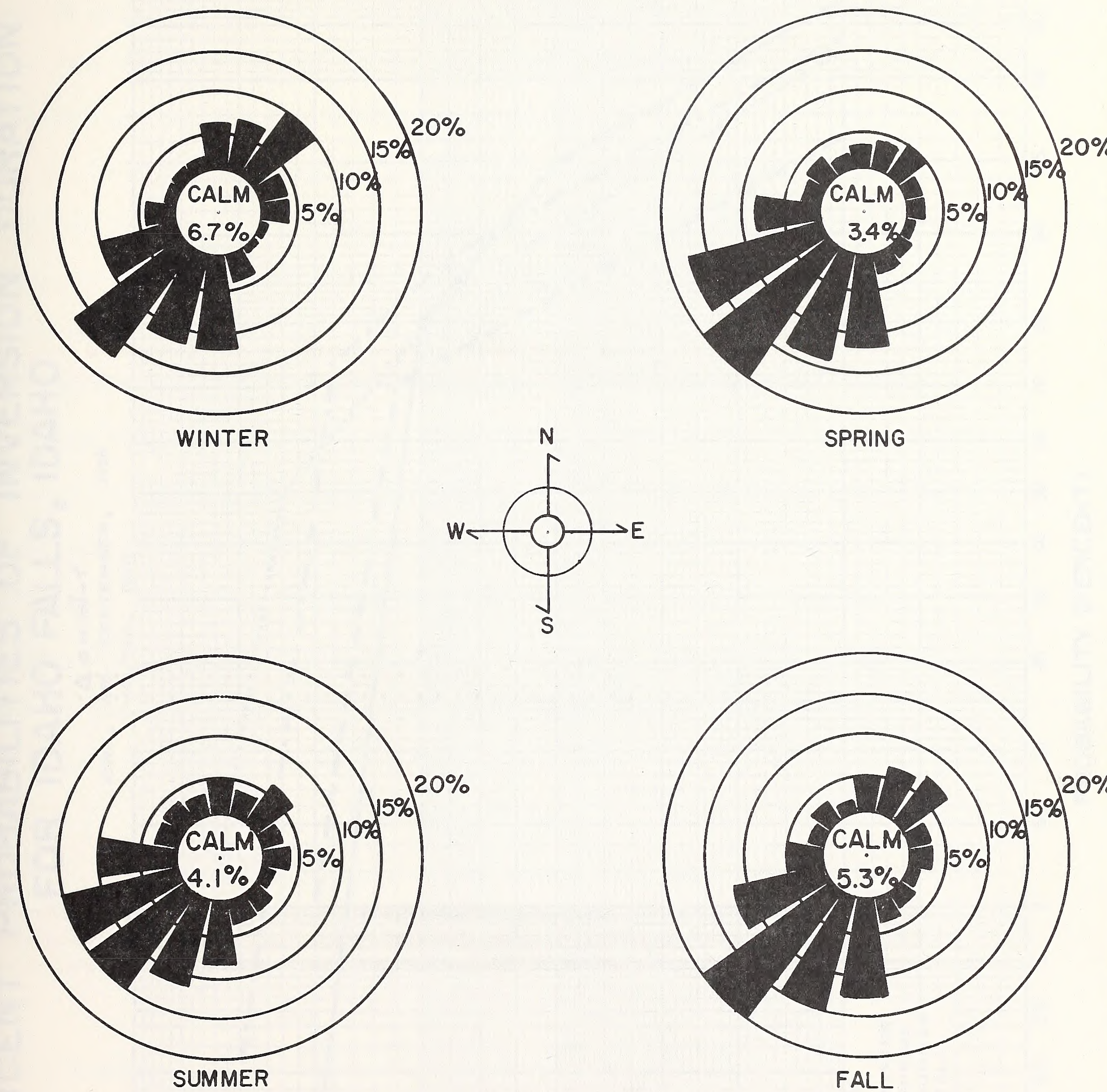
3.1.2.8 Wind

Nearly one-half of the time the winds observed at Pocatello can be expected to blow out of the southwest quadrant, and during each of the four seasons the wind blows more often out of the southwest quadrant than any other (Plate 3.1-2). These conclusions were drawn from National Weather Service data based on 3-hourly wind observations taken at the Pocatello Municipal Airport from 1958 through 1962. Annual and seasonal data analyzed according to relative frequency of occurrence, by wind direction for various wind speed categories, as well as all occurrences, show that most of the highest wind speeds are associated with winds blowing out of the southwest quadrant. The fastest one-minute wind speed observed at Pocatello during the 25 years prior to and including 1974 was 72 miles per hour in March, 1955.

3.1.2.9 Inversions and Mixing Heights

Surface-based temperature inversions commonly form in the valleys of southern Idaho. These inversions are typically formed by the rapid cooling of air close to the earth's surface soon after sunset, and their breakup is normally brought about by the warming of the cool air after sunrise. The breakup is typically followed by an increase in surface wind speeds. Low-level inversions occur approximately 50-55 percent of the time in fall and winter and approximately 35-40 percent of the time in spring and summer in the Snake River Valley in southeastern Idaho (Hosler, 1961).

Percent probabilities of inversion duration have been determined for Idaho Falls, Idaho, as shown in Plate 3.1-3. These probabilities are



SEASONAL PERCENT FREQUENCY OF SURFACE WIND DIRECTION ALL STABILITY CLASSES

POCATELLO, IDAHO, MUNICIPAL AIRPORT
1958 – 1962

(FROM NATIONAL WEATHER SERVICE DATA)

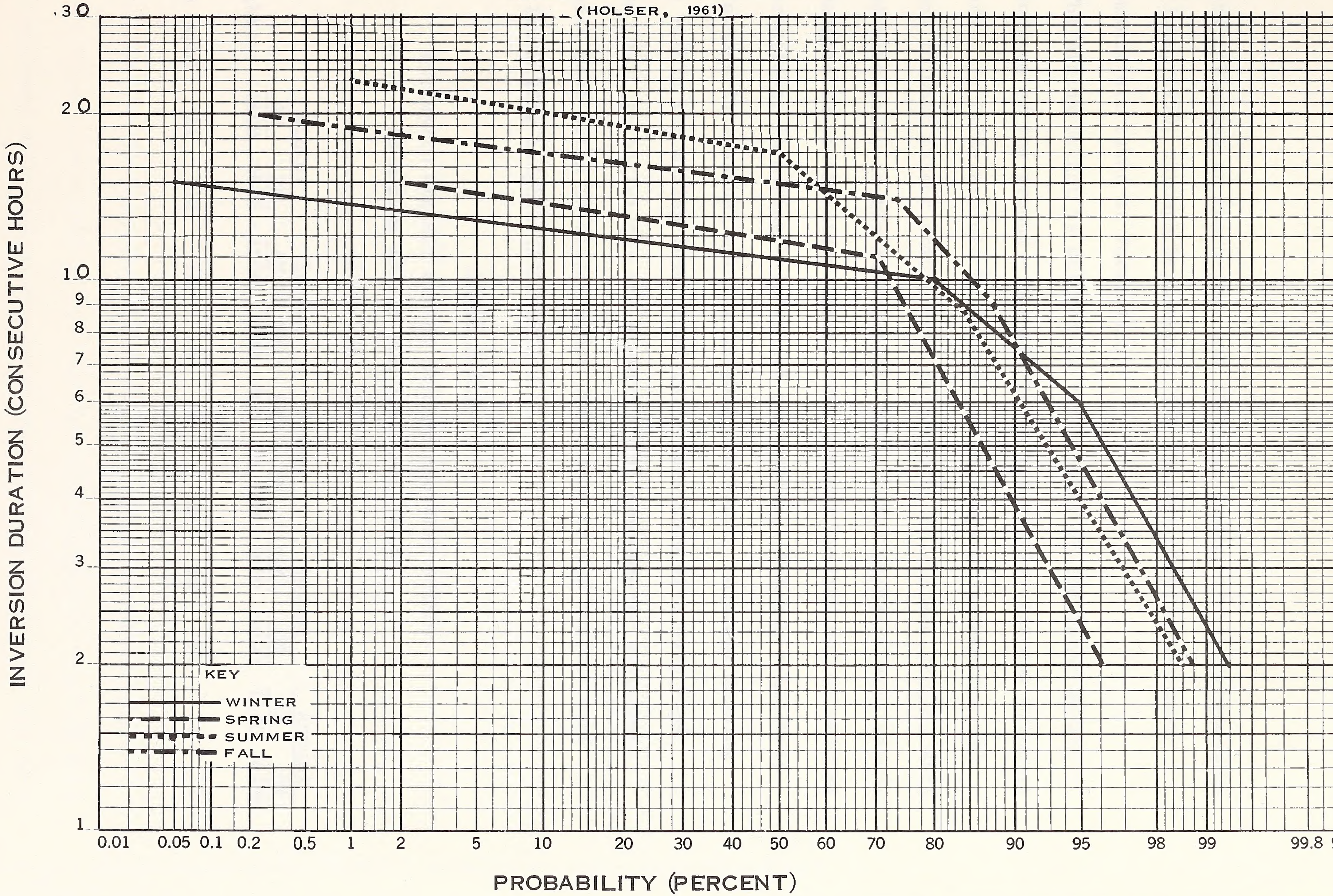
DAMES & MOORE

PERCENT PROBABILITIES OF INVERSION DURATION FOR IDAHO FALLS, IDAHO

$\Delta z = 250' - 5'$

JUNE, 1950 SEPTEMBER, 1958

(HOLSER, 1961)



DAMES & MOORE

PLATE 3.1-3

based on data collected at the 5-foot and 250-foot levels of an instrumented tower from June, 1950, through September, 1958 (Hosler, 1961). No upper air measurements are taken at Pocatello.

The mixing height is defined as the heights of the layer of air - above the surface of the ground - through which relatively vigorous vertical mixing occurs. It is determined by various meteorological parameters and it determines to what extent atmospheric pollutants, of surface origin, will be dispersed vertically in the atmosphere. Table 3.1-3 presents data related to mixing heights in southeastern Idaho. The diurnal variations, as well as seasonal variations, in mixing heights are pronounced, although relatively slight variations in seasonal morning heights are noted. Average morning wind speeds within the mixing layer tend to be less than afternoon wind speeds. The least potential for the dispersion of atmospheric pollutants tends to exist most often in winter under conditions of low surface wind speeds and low mixing heights (EPA, 1972).

TABLE 3.1-3

ESTIMATED AVERAGE MIXING HEIGHTS AND WIND SPEEDS IN MIXING LAYERS FOR SOUTHEAST IDAHO

(From EPA, 1972)

	Winter		Spring		Summer		Autumn		Annual	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
Mixing Heights (ft.)	1100	2600	1500	7900	800	10,500	1000	5600	1100	6700
Wind Speeds (mph)	11	12	12	16	9	15	10	14	11	14

3.1.2.10 Atmospheric Stability

The National Climatic Center, Asheville, North Carolina has computer-processed and reformatted surface wind data from Pocatello for January, 1958, through December, 1962, into seasonal and annual summaries of frequency and relative frequency distributions by direction and Pasquill stability class. Analysis of surface wind data according to atmospheric stability was based upon the parameters of sky condition, wind speed, season, time of day, net radiation, and insolation. The Pasquill stability classes are coded as follows:

A - Extremely unstable

B - Moderately unstable

C - Slightly unstable

D - Neutral

E - Slightly stable

F - Moderately stable.

Unstable conditions (stability classes A, B, and C) occur when air layers close to the ground undergo warming with associated low wind speeds. Stable conditions (classes E and F) occur when the air layers close to the ground undergo cooling with associated low wind speeds. Drainage winds occur under E and F stability conditions. Neutral conditions (class D) occur with cloudy and/or high wind speeds.

Table 3.1-4 lists the number of occurrences of the particular stability classes and the percentage of the total number of observations represented by those occurrences as well as the most frequently observed wind directions associated with each stability class. Neutral conditions are seen

to have prevailed about 56 percent of the time, unstable conditions a total of about 17 percent of the time, and stable conditions a total of about 27 percent of the time. All of these data are based on 3-hourly observations made at the Pocatello Municipal Airport from January, 1958, through December, 1962 (U. S. Department of Commerce, 1972).

TABLE 3.1-4

STABILITY CLASS OCCURRENCES AND PERCENT FREQUENCY OF OCCURRENCE POCATELLO, IDAHO, MUNICIPAL AIRPORT

(From National Climatic Center Data)

Stability Class	Number of Occurrences (Including Calms)	% of Total Number Of Observations (Including Calms)	Most Frequent Wind Directions (In Decreasing Frequency)
A	269	1	W, N, NE, NW
B	2,214	5	NE, NNE, N
C	4,652	11	WSW, W, NE, NNE
D	24,505	56	SW, WSW, SSW, S
E	5,818	13	SSW, SW, S
F	6,340	14	SSW, SW, S, NE
All	43,798	100	

Annual average wind speeds associated with stability classes are as follows:

Class A: 2.6 mph
Class B: 4.7 mph
Class C: 7.7 mph
Class D: 12.9 mph
Class E: 7.2 mph
Class F: 3.5 mph
All: 9.7 mph

3.1.2.11 Severe Weather

The incidence of tornados in Idaho is very small. Sufficiently few tornados have been reported in the vicinity of Pocatello to consider the probability of such an occurrence to be virtually zero (Thom, 1963).

Damaging windstorms are not uncommon in Idaho. From October through June such winds are most generally associated with cyclonic storms and cold fronts of Pacific origin. Although trees are sometimes damaged and power and communications are disrupted at times, seldom does any structural damage occur. Extreme winds in July, August, and September are most often created by local thunderstorm activity.

Floods are most likely to occur in Idaho during the spring as the heavy snowpack at higher elevations begins to melt. The Snake River is particularly susceptible to flooding each year, but mainly upstream from Idaho Falls. In recent years the creation of reservoirs and other flood control facilities have considerably lessened the threat of flooding along the State's rivers.

Occasionally, in the warm part of the year, the local flash-flooding of normally dry washes may be the result of locally heavy thundershowers. The area between Pocatello and Downey (40 miles south-southeast of Pocatello) is an area where flash-flooding is common.

Hail is most commonly observed in Idaho in spring and summer. Hail in spring tends most often to be small and soft, resulting in little, if any, damage. Summer hail is seldom larger than 1/2 inch in diameter, but mature crops at this time of year are more susceptible to damage. Nevertheless, hailstorms are typically widely scattered and of a very localized nature.

.11 Severe [illegible]

The incidence [illegible]

[illegible] have been [illegible]

[illegible]ility of [illegible]

[illegible]

[illegible]uch winds are most generally [illegible]

[illegible] of [illegible]

[illegible]ications [illegible]

[illegible] winds [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Occasionally, in the [illegible] part of the [illegible]

[illegible]ually dry [illegible] may be the result of [illegible]

[illegible] between [illegible]

[illegible]ared [illegible]

Hail is most commonly reported in [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

3.2 AIR QUALITY

3.2.1 Air Quality Standards and Regulations

Ambient air quality standards have been established by the Idaho Department of Health and Welfare (1975) and are set forth in "Rules and Regulations for the Control of Air Pollution in Idaho." Pertinent standards relating to sulfur oxides, particulates and fluorides are summarized below:

SULFUR OXIDES (SULFUR DIOXIDE)

A. Primary air quality standards are:

1. 80 micrograms per cubic meter (0.03 ppm) - annual arithmetic mean.

2. 365 micrograms per cubic meter (0.14 ppm) - maximum 24-hour concentration not to be exceeded more than once per year.

B. Secondary air quality standards are:

1. 1,300 micrograms per cubic meter (0.50 ppm) - maximum 3-hour concentration not to be exceeded more than once per year.

C. When more than one standard is applicable, the interpretation that results in the most stringent standard shall apply.

PARTICULATE MATTER

A. Primary air quality standards are:

1. 75 micrograms per cubic meter - annual geometric mean.

2. 260 micrograms per cubic meter - maximum 24-hour concentration not to be exceeded more than once per year.

B. Secondary air quality standards are:

1. 60 micrograms per cubic meter - annual geometric mean.

2. 150 micrograms per cubic meter - maximum 24-hour concentration not to be exceeded more than once per year.

FLUORIDES

A. Primary and secondary air quality standards are those concentrations in the ambient air which result in a total fluoride content in vegetation used for feed and forage of no more than:

   1. 40 parts per million, dry basis - annual arithmetic mean.

   2. 60 parts per million, dry basis - monthly concentration for two consecutive months.

   3. 80 parts per million, dry basis - monthly concentration never to be exceeded.

3.2.2 Sources of Data

Air quality parameters for which measurements are available in the vicinity of the selected lands include sulfur dioxide, particulates, and indirectly, fluorides. Sulfur dioxide measurements are taken at a station operated by the Environmental Division, Idaho State Department of Health and Welfare located at the Pocatello Sewage Plant, 3640 feet downwind (N 58° E) from the J. R. Simplot Company 200-foot tall No. 3 sulfuric acid plant stack. This station (designated "P2") started operations in late November, 1974. The sampling unit, a Philips Coulometric Sulfur Dioxide Analyzer, is run continuously. Prior to the establishment of the State station, the J. R. Simplot Company conducted its own sulfur dioxide measurements using the same type of analyzer at a station located 3,020 feet downwind (N 64° E) from the No. 3 stack from September 1972 through December 1973 and also during May 1974. From June 1974 through May 1975 this station was inoperative due to mechanical difficulties with the sampling unit. Sampling was resumed in June 1975.

Particulate sampling by the Idaho State Department of Health and Welfare in and around Pocatello began in 1971 at several loctions, but it

has been sporadic and several stations have been dropped from the network. The station nearest the selected lands (designated "Bannock 004") is at the Sewage Treatment Plant at the same site as the "P2" sulfur dioxide sampler noted above. Another nearby station (designated "Pocatello 006") is located at the Chubbuck School 2.8 miles NE of the J. R. Simplot Plant. High-volume samplers are utilized at these sites and one 24-hour sample is taken once every three to six days.

Samples of alfalfa and native grasses in the vicinity of the selected lands have been collected and analyzed for fluorine content annually since 1955. These studies are conducted by the Department of Bacteriology and Biochemistry, University of Idaho, for the Idaho State Department of Health and Welfare. Samples are taken at varying distances and directions from the selected lands and at different times during the growing season.

In addition to the ambient air quality standards there are a number of other State and Federal regulations which safeguard air quality by controlling emissions from new and established sources but are not applicable to the operations of the proposed gypsum storage area. The associated, but separate, processes which are a part of the J. R. Simplot Company's fertilizer manufacturing process, are considered a source of air contamination and as such are subject to the various State and Federal rules and regulations. Emissions from these processes are monitored and controlled by Compliance Orders issued by the Idaho Department of Health and Welfare to the J. R. Simplot Company. Such orders, issued in October 1973, April 1974 and

September 1975, are legally enforceable documents, which specifically detail requirements and time schedules the J. R. Simplot Company facility must comply with in regard to controlling emissions of particulates, fluorides and sulfur dioxide.

Data in the following sections regarding air quality are presented as part of a description of the existing environment and should not be employed to determine compliance with existing air quality regulations if, for no other reason, than because the data is summarized and could be misleading from a regulatory viewpoint.

3.2.3 Sulfur Dioxide

The mean monthly concentrations of sulfur dioxide for 26 months from September 1972 through July 1975 are shown in Table 3.2-1. Included are both J. R. Simplot Company and State values. The sampling stations are approximately one-half mile NE of the Simplot Plant as described in Section 3.2.2. Individual monthly means have ranged from a low of 0.0009 ppm sulfur dioxide to a high of 0.067 ppm. Mean annual concentrations for the two most complete 12-month periods were 0.031 and 0.024 ppm.

3.2.4 Particulate Matter

The results of high volume particulate sampling near the selected lands at sites described in Section 3.2.2 are shown in Table 3.2-2. Figures are available for 1971-1974 for the Bannock 004 Station and the Pocatello 006 Station. The monthly mean figures shown are the averages of several 24-hour samples taken during each month. At the Bannock Station mean monthly concentrations of particulates have ranged from 64.6 to 244.0 micrograms

TABLE 3.2-1

MEAN MONTHLY CONCENTRATIONS OF SULFUR DIOXIDE
NEAR SELECTED LANDS

(Data from measurements by J.R. Simplot Co.*and Idaho Dept. of Health & Welfare)**

	Hours Monitored	% Time Monitored	Mean Concentration (ppm)
September 1972	564	78	.062
October	737	99	.012
November	677	94	.042
December	630	85	.019
January 1973	444	60	.013
February	606	90	.004
March	569	76	.014
April	623	86	.059
May	611	82	.046
June	717	99	.052
July	351	47	.028
August	416	56	.010
September 1972 - August 1973	6945	79	.031
September	499	69	.017
October	732	98	.026
November	662	92	.004
December	696	94	.0009
January 1973 - December 1973	6926	79	.024
May 1974	646	87	.026
December	504	68	.02
January 1975	624	84	.0393
February	269	40	.0104
March	553	74	.0194
April	NA	NA	.0250
May	NA	NA	.077
June	NA	NA	.0474
July	NA	NA	.0264

*September 1972 to May 1974.

**December 1974 to July 1975.

TABLE 3.2-2

MEAN MONTHLY CONCENTRATIONS OF PARTICULATE MATTER (IN PPM) NEAR SELECTED LANDS
(Data from high-volume particulate sampling conducted by Idaho Dept.of Health and Welfare)

	1971		1972		1973		1974	
	Bannock 004	Pocatello 006	Bannock 004	Pocatello 006	Bannock 004	Pocatello 006	Bannock 004 *	Pocatello 006
January	149.2	NA	NA	NA	191.8	70.2	155.3	39.0
February	146.7	NA	NA	NA	77.0	54.4	167.6	80.6
March	171.3	80.8	132.3	NA	85.4	45.3	111.7	44.9
April	110.5	87.8	136.3	59.9	170.2	329.9	162.1	132.8
May	244.0	97.4	131.3	95.0	NA	NA	NA	NA
June	128.7	70.8	137.1	114.5	124.5	63.4	127.3	105.7
July	141.3	92.1	112.6	77.6	122.4	106.8	201.1	108.5
August	127.1	89.6	102.9	83.4	121.0	172.5	186.7	74.5
September	126.0	91.7	NA	NA	97.1	72.3	195.8	106.1
October	99.4	84.8	73.6	46.7	NA	106.8	84.1	52.6
November	134.6	49.3	134.1	85.1	64.6	47.9	160.1	65.0
December	164.7	25.6	87.6	43.8	120.2	109.1	NA	100.8
Average	143.48	83.19	118.85	78.22	109.91	86.07	162.42	82.32
Geometric Mean	123.83	72.35	103.87	70.66	99.56	71.48	144.69	70.75

*Construction activities took place in immediate vicinity during 1974.

per cubic meter while at the Pocatello Stations these values have ranged from 43.8 to 329.9. Annual geometric mean values are higher at the Bannock Station with these values being 123.83, 103.87, 99.56 and 144.69 micrograms per cubic meter during the same years the Pocatello Station values were 72.35, 70.66, 71.48 and 70.75 micrograms per cubic meter, respectively. A downward trend in annual particulate concentrations at the Bannock Station is evident from 1971 through 1973. The large increase in 1974 is due to nearby construction activities at the Pocatello sewage treatment plant.

3.2.5 Fluorides

Although the concentration of fluorides in air is not measured directly in the Pocatello area, an indication of their concentration may be gained through examination of data which analyzes the fluoride content of vegetation. While a large percentage of the fluoride found in plants is due to uptake through the leaves of fluoride associated with particulates in the atmosphere, it should be noted that native soils in the region often contain up to 1000-1500 ppm fluoride and that plants will accumulate it from this soil source up to 10-15 ppm (A. C. Wiese, personal communication, October 24, 1975).

Samples of grass and alfalfa from the area have been analyzed for fluoride content since 1955. The results of the 1974 and 1975 samplings are presented in Table 3.2-3 based on data in Wiese et al (1974) and Wiese (personal communication, 1975). Caution should be observed in evaluation of these fluoride concentrations in terms of potential animal toxicity since the analytical methods employed do not discriminate between types of fluorides, i.e., gaseous vs. particulate

and soluble vs. insoluble, and all forms of fluorides are not equally toxic to livestock (Hobbs and Merriman, 1962).

In Table 3.2-3, the mean and range of fluoride concentrations observed during each sampling period in 1974 and 1975 are given, as are the number and percentage of those samples which showed fluoride concentrations of 40 ppm or greater. The results are separated by type of sample, i.e., whether range grass or alfalfa, and by distance from a reference point established at the FMC plant. All range grass samples were taken from one to three miles southeast and southwest of the reference point and the same sites were sampled in both years. Alfalfa samples were taken from one to six miles northeast of the reference but the samples were not from the same sites each year.

The fluoride levels reported for the vegetation samples to a large extent reflect the time period which the vegetation was exposed to atmospheric fluoride. Thus, range grass and alfalfa samples are not exactly comparable since the alfalfa is cut and harvested for hay several times per year while the range grass is not. In addition, the fluoride levels detected are influenced by the amount of rainfall which occurred prior to sampling. Rain washes accumulated particulates and therefore fluorides from the surface of the vegetation. Since the samples are not washed prior to fluoride analysis in an effort to more closely simulate levels which grazing animals might ingest, the fluoride levels will reflect the general and specific weather conditions of the season.

Comparing samples taken at the same time and at about the same distance from the reference point, range grasses not unexpectedly exhibited fluoride concentrations from 1.5 to 3 times greater than alfalfa during 1974 and 1975. For comparable vegetation types, sampling times [illegible] insoluble, and all [illegible]

[illegible]

In Table [illegible], the [illegible]

[illegible]ed during each sampling period in 1973 and 1974 [illegible]

[illegible]mber and percentage of [illegible]

of 40 ppm or greater. [illegible]

whether range grass [illegible]

[illegible]lished at [illegible]

[illegible] miles northeast and southwest [illegible]

were sampled in both [illegible]

[illegible]les northeast [illegible]

each year.

The fluoride sample [illegible]

extent reflects the time [illegible]

[illegible]heric fluoride. [illegible]

[illegible] concentrations [illegible]

[illegible] when the range grass [illegible]

detected are influenced by the amount of [illegible]

[illegible] sampling. When washed [illegible]

[illegible] from the surface of the vegetation. [illegible] the samples are not

[illegible] prior to fluoride analysis [illegible]

which grazing animals might ingest, the fluoride [illegible]

the general and specific weather conditions [illegible]

Comparing samples taken at the same time [illegible]

[illegible] from the reference point, range grasses [illegible]

[illegible]ed fluoride concentrations from [illegible] greater than [illegible]

1973 and 1974. [illegible]

TABLE 3.2-3

FLUORIDE CONCENTRATIONS IN VEGETATION SAMPLES COLLECTED DURING 1974 AND 1975 NEAR SELECTED LANDS

(Data from Wiese et al, 1974 and Wiese, 1975 personal communication)

Vegetation Type, Distance From Reference Point Established at FMC Plant, and Date of Collection	No. of Samples	Fluoride Concentration (ppm dry weight) Range	Mean	No. > 39 ppm	% > 39 ppm
Range Grass 0-3 Miles					
June 1974	21	9- 63	20.4	2	9.5
July 1974	20	26-115	63.6	17	85.0
Sept 1974	20	53-224	125.4	21	100.0
May 1975	19	50-172	105.0	19	100.0
June 1975	21	11- 92	42.3	10	47.6
July 1975	21	28-122	65.7	18	85.7
Sept 1975	21	50-161	92.5	21	100.0
Alfalfa 0-3 Miles					
June 1974	20	5- 87	31.1	6	30.0
July 1974	17	7- 78	27.4	2	11.8
Sept 1974	13	37-218	75.4	11	84.6
June 1975	17	4- 77	28.1	4	23.5
July 1975	10	15- 32	21.9	0	0.0
Aug 1975	6	9- 69	30.8	1	16.7
Sept 1975	10	11- 83	31.7	2	20.0
Alfalfa > 3 Miles					
June 1974	35	5- 52	21.8	5	14.3
July 1974	30	6- 30	14.8	0	0.0
Sept 1974	22	21- 59	33.3	4	18.2
June 1975	33	5- 53	20.2	2	6.1
July 1975	20	9- 21	13.6	0	0.0
Aug 1975	12	10- 38	19.9	0	0.0
Sept 1975	19	6- 22	13.8	0	0.0

and distances, fluoride levels detected during 1975 were generally lower than during 1974; this was most pronounced in comparing the September, 1975 samples with those taken a year previously following a very dry late summer. The high level noted in the May 1975 range grass sample decreased to less than half this value the following month. This was undoubtedly due to rainfall washing particulates from the plants. On the day following the May sampling, three inches of snow containing 0.41 in. of water fell and three other major rain storms producing 0.59, 0.18 and 0.24 in. of rain in 24-hour periods fell between this time and the time the June samples were taken (U. S. Weather Service, Pocatello, personal communication).

Alfalfa samples taken within 0-3 miles of the reference point generally showed fluoride levels from 1.3 to 2.3 times higher than those taken at the same times at distances of from 3-6 miles.

Table 3.2-4 summarizes by month of sampling for each year during the period 1967 through 1975 the percentage of total vegetation samples (range grass and alfalfa combined) which exhibited fluoride concentrations of 40 ppm or greater. The May 1975 sample is not included since this was the first time samples were taken this early in the year. Samples were not necessarily taken at the same sites each year and samples ranged in distance from less than one to six miles from the reference point. Although there have been variations in specific years, due to timing of sampling in relation to rainfall and alfalfa cutting, the percentage of range grass samples included and other factors, the overall data shows a trend toward increasing concentration with progression of the vegetation growing season.

TABLE 3.2-4

PERCENTAGE OF VEGETATION SAMPLES COLLECTED NEAR SELECTED LANDS WITH FLUORIDE CONCENTRATIONS OF 40 PPM OR GREATER, 1967-1975

(Data from Wiese et al 1974 and Wiese 1975, personal communication)

	June	July	Aug.	Sept.
1967	10.4	-	10.3	32.2
1968	23.4	28.0	29.8	-
1969	6.8	30.8	16.7	29.2
1970	12.7	15.2	36.8	43.5
1971	9.1	12.5	-	6.8
1972	14.1	1.7	13.6	20.5
1973	20.2	9.2	31.1	32.6
1974	17.9	30.4	-	64.9
1975	23.3	37.7	5.5	46.0
No. > 39 ppm/Total Sample	101/677	107/522	59/274	123/345
% > 39 ppm	14.9	20.5	21.5	35.6

3.2.6 Water Vapor

Visible atmospheric plumes noted at times in the vicinity of the selected lands are largely water vapor. A major source is the cooling towers of the J. R. Simplot Company which evaporate approximately 40,000 gallons of water per hour. The water vapor plumes are particularly noticeable from December through February under conditions of atmospheric stagnation when there is little wind to disperse the plume and it settles close to the ground surface.

3.3 LAND

3.3.1 Topography

The selected lands consist of foothills or bench topography grading to lower elevation mountain slopes and ridges of the Bannock Range. The land surface slopes generally in a northerly direction toward the Snake River Plain from 10 percent to near vertical in some areas. Elevations between 4,500 and 4,850 feet are mainly foothill-bench areas. The steeper lower mountain slopes are found generally between 4,850 and 5,350 feet elevation, while the lower mountain ranges maintain elevations above 5,350 feet. Within the limits of the selected lands, the mountainous topography is cut by two major canyons which channel drainage through the site. For purposes of description, the canyons will be referred to as the East Canyon and the West Canyon, with respect to their locations. The following paragraphs outline topographic features within each quarter-section. Reference to the Site Map (Plate 2.1-2) and the Aerial View of the Selected Lands (Plate 2.1-3) will aid in relating descriptions to locations.

In Section 19, the S½ NW¼ and the NE¼ SW¼ encompass a major portion of the West Canyon. This canyon trends approximately N 45° W for some 4,800 feet. The three quarter-sections cover the mouth of the canyon and approximately 3,000 feet of its length. The mountainous sidewall of the canyon slopes steeply from 40 percent to near-vertical.

Areas within the N½ NW¼ of Section 19 and the SE¼ SW¼ of Section 18 are primarily foothill topography and include areas of lower mountain slopes. The foothill-bench areas slope moderately at approximately a 10 percent grade from the steeper mountain slopes. The ground surface is fingered by

a series of washes and gullies which direct surface drainage in a northerly direction across the site.

The SW¼ SE¼ of Section 18 comprises the shoulder of a lower mountain slope. The area slopes in a northerly direction at approximately 30 percent. The eastern end of the quarter-section includes a portion of the western side of the East Canyon.

In Section 19, the NE¼ NE¼ together with the E½ SE¼ in Section 18 completely cover the East Canyon which trends some 3,800 feet due north. The eastern side of the canyon is steep with sideslopes ranging from 40 percent to vertical. Midway along this east side a smaller draw is present and trends approximately WNW. The west side of the canyon is somewhat shallower in slope near the mouth and slopes from 20 to 30 percent. As the west side trends toward the head of the canyon, sideslopes steepen and in some areas are near-vertical. Again, midway along the west side, a smaller draw trending north is incorporated into the configuration.

In Section 17, the W½ SW¼ and the S½ SW¼ encompass a lower mountain ridge. The land surface slopes in a northerly direction at approximately a 12 percent slope.

3.3.2 Geology and Seismicity

3.3.2.1 Regional Historical Geology

The following discussion has been summarized from an unpublished U. S. Geological Survey paper (Trimble, undated) which outlines the historical geology of the Pocatello area.

As early as the Precambrian Era (3 billion years ago), sedimentary rocks began forming in the Pocatello area as sediments deposited in a

slowly-sinking marine basin. Sediments continued to be deposited until the middle Cretaceous period (100 million years ago). During this time the rocks of the region were subjected to orogeny wherein compressive stresses pushed, folded and broke the sedimentary rocks. Structurally this resulted in the formation of a pattern of thrust faulting with the western plate overriding the eastern plate in the westernmost area of Wyoming. Later, changes of stress resulted in the relative displacement of rocks formed 100 miles to the west, into the Pocatello area.

During the middle and late Tertiary period (20-30 million years ago), the relaxation of the compressive stresses resulted in the formation of the basin and range structure in which large blocks sunk to form valleys between higher standing blocks which formed mountains or highlands. Slightly later, the Snake River Plain was formed by typical basin and range faulting that separated mountain blocks north and south by its massive down-dropped block.

In the later Tertiary period (10-20 million years ago), these faults and fractures in the earth's crust provided conduits for the upwelling of silicic volcanic rocks and volcanic eruptions established new drainage patterns, dammed streams and formed lakes.

During the last few million years, middle and late Pleistocene time saw the onset of a different type of volcanic activity. From deepseated faults along the Snake River Plain, black basalt lavas emerged as flows and nearly covered the eastern portion of the plain. An early extrusion dammed the ancestral Snake River, probably near the location of the present Raft River, about 40 miles WSW of the selected lands. A huge lake was formed and accumulated more than 200 feet of sediment. Finally the volcanics were breached by erosion and the lake was drained. Wind widely redeposited great quantities of silt from

the surface of the old lakebed. These deposits of silt are called loess and cover most of the higher elevations south of the selected lands.

A rejuvenation of the volcanic flows again dammed the ancestral Snake River and formed a Pleistocene lake in the general area of the American Falls Reservoir. The youngest of the accumulated 80 feet of sediment is estimated to be less than 50,000 years old.

The last major geological event is evidenced by scouring and deposition of alluvial conglomerates in the Pocatello area, indicating that a catastrophic flood occurred about 30,000 years ago when glacial Lake Bonneville overflowed at Red Rock Pass south of Downey, Idaho. Large quantities of water poured down Marsh Creek Valley from the south into Portneuf Valley and discharged into the Snake River Plain at Pocatello, engulfing the Pleistocene American Falls Lake. This resulted in the deposition of considerable Quaternary alluvium.

3.3.2.2 Site Bedrock Geology

3.3.2.2.1 General

The selected lands are located geomorphologically between the Snake River Plain section of the Columbia Plateau Physiographic Province and the Great Basin Physiographic Province. The dominant geological forces were orogenesis (mountain building), typical basin and range faulting and subsequent volcanic activity.

The selected lands and surrounding areas have been mapped by the U. S. Geological Survey and the map is in preparation. A site geology map has been adapted from an open file (data U.S. Geological Survey, in press) and is shown on Plate 3.3-1. Much of the following discussion is based on this material and from material in Carr and Trimble (1963).

face of the [illegible] lands.

[illegible] of the [illegible] lands [illegible]

A [illegible] the [illegible]

[illegible] and [illegible]

[illegible] reservoir. The [illegible]

to be [illegible]

The [illegible]

alluvial [illegible]

[illegible]

[illegible]

[illegible]

into the [illegible]

Falls [illegible]

[illegible].

Site [illegible] Geology

[illegible] General

The selected lands are [illegible] geomorphologically [illegible]

[illegible] section of the Columbia Plateau [illegible]

[illegible] physiographic features. The [illegible] geologic [illegible]

[illegible] (mountain building), regional basin and range [illegible]

activity.

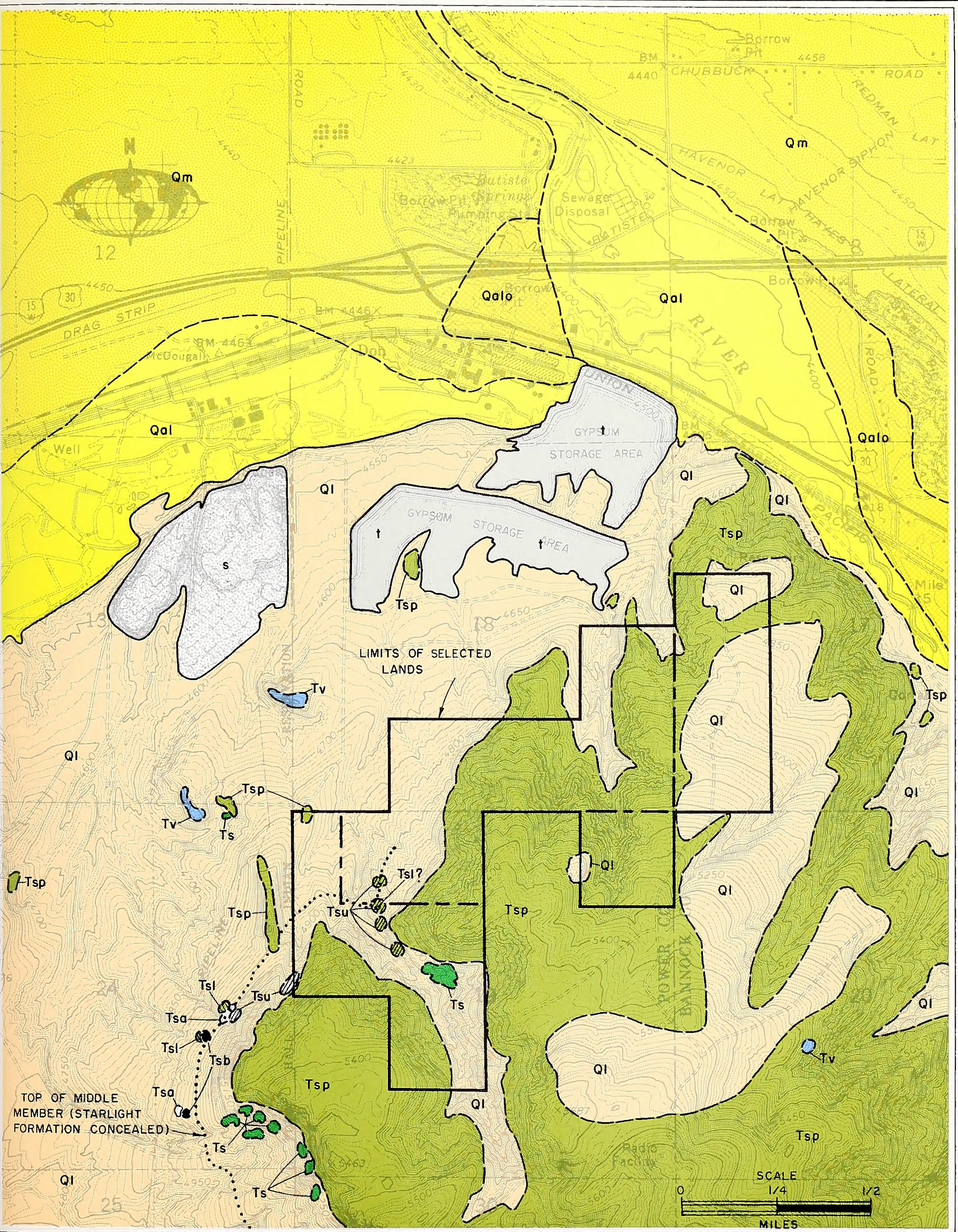
The selected lands and surrounding areas [illegible]

[illegible] and the map [illegible]

adapted from [illegible]

on Plate 2.5-1. Much of the [illegible]

and from material in [illegible]



EXPLANATION

RECENT

- t — TAILINGS
- s — SLAG WASTE

QUATERNARY

- Qal — YOUNGER ALLUVIUM
- Qalo — OLDER ALLUVIUM
- Qm — MICHAUD GRAVEL

QUATERNARY CON'T.

- Ql — SILT LOESS

TERTIARY (PLIOCENE)

- Ts — STARLIGHT FORMATION, UNDIFFERENTIATED
- Tv — VITROPHYRE, DARK PORPHYRITIC GLASS
- Tsp — PORPHYRITIC TRACHYANDESITE (LATITE)
- Tsu — UPPER MEMBER RHYOLITIC FRIABLE TUFF & MINOR TUFF-BRECCIA

TERTIARY (PLIOCENE) CON'T

MIDDLE MEMBER

- Tsa — TUFF OF ARBON VALLEY
- Tsl — LOWER MEMBER, BEDDED RHYOLITIC FRIABLE TUFF, & MANY INTERSTRATIFIED BASALT FLOWS & MINOR BASALTIC TUFF & BRECCIA
- Tsb — BASALT

CONTACT, DASHED WHERE INFERRED, DOTTED WHERE CONCEALED

GRAVEL PIT

REFERENCES: 1. TOPOGRAPHIC BASE MAP, U.S.G.S. QUADRANGLE MAP TITLED "MICHAUD, IDAHO – 1971. 2. GEOLOGIC MAPPING, U.S.G.S. OPEN FILE REPORT TITLED "GEOLOGY OF MICHAUD & POCATELLO QUADRANGLES, BANNOCK COUNTY, IDAHO.

THIS ILLUSTRATION IS PRELIMINARY & HAS NOT BEEN EDITED OR REVIEWED FOR CONFORMITY WITH U.S.G.S. SURVEY STANDARDS OR NOMENCLATURE.

SITE GEOLOGY MAP

DAMES & MOORE

PLATE 3.3-1

The rock formations at the site are Tertiary (Pliocene) volcanics of the Starlight Formation. The Starlight Formation is a newly named formation previously included within rocks, formerly mapped as the Salt Lake Formation. The Starlight Formation is subdivided into upper and lower members separated by a vitric-crystal middle tuff member. The formation includes rhyolitic friable bedded tuff, subordinate amounts of marl, sandstone and conglomerate and locally much basalt and basaltic tuff, and porphyritic trachyandesite flows with related intrusive rocks.

3.3.2.2.2 Stratigraphy

The upper member of the Starlight Formation comprises bedded rhyolitic tuff, a locally overlying trachyandesite flow, and related intrusive rocks.

The main portion of this member is a white to gray bedded rhyolitic tuff, with minor amounts of tuff-breccia and white marl. It outcrops in areas near the mouth of the West Canyon in the NW¼ of Section 19, and also near section corner 19-24-25-30. This portion of the upper member is at least 200 feet thick.

A porphyritic trachyandesite overlies the bedded tuff locally, and outcrops extensively in the selected lands and is considered part of the upper member. The porphyritic trachyandesite is commonly a bluish-gray or grayish to purplish-brown dense devitrified glassy rock with as much as 25 percent phenocrysts. The rock is commonly iron-stained and appears to be a single thick flow. The flow is probably between 500 and 600 feet thick at its crest in the NW¼ NW¼ of Section 29. The preserved thickness elsewhere is probably much less.

In the surrounding area a related intrusive vitrophyre is occasionally present, that is also considered part of the upper Starlight member. Near the west wall of a canyon cut in the trachyandesite flow in the center of Section 20, a black, red and gray-banded, perlitic vitrophyre and vitrophyre breccia is exposed and suggests a plug-like intrusion. The vitrophyre also outcrops near the SE¼ of Section 13 with a plug structure.

The middle member, sometimes known as the vitric-crystal tuff, is believed to be consistent through the Starlight formation and is considered a marker bed when exposed. The middle member is a light-colored partly welded rhyolitic tuff and is as much as 77 feet thick in some areas. In the site area, the middle member is only exposed in one location near the center of the E½ of Section 24. The approximate location of the concealed top of the middle member is shown on Plate 3.3-1.

The lower member of the Starlight Formation is probably more than 500 feet thick and consists of white to gray bedded rhyolitic friable tuff with many interstratified basalt flows. The basalts crop out extensively but the rhyolitic tuff beds are mostly concealed by loess or talus. Near the site, the lower member is exposed in a few locations in the SE¼ of Section 24.

3.3.2.2.3 Structure

The structure within the area is relatively simple. The dominant structural feature of the Starlight Formation is a moderate dip between 10° and 35° northwest toward the Snake River Plain. Locally, the strike of the Starlight Formation varies from east to N 45° W. The vitric-crystal tuff middle member, considered a marker bed, gives an indication of the local dip and strike.

3.3.2.3 Economic Geology

The only known natural earth materials of economic importance within the area surrounding the selected lands are sand, gravel and crushed rock. Gravel beds are exploited to a small extent.

3.3.2.4 Seismicity

The selected lands lie within a Zone 3 seismic area, as determined by the United States ESSA/Coast and Geodetic Survey. A Zone 3 area is one in which major earthquake damage may occur.

The area within approximately 50 miles of Pocatello appears to be generally quiescent from the standpoint of seismic activity. No earthquakes in excess of about Richter Magnitude 3.0 have occured in this area within the last 100 years. In addition, discussions with U. S. Geological Survey personnel indicate that there are no known active faults within 30 miles of Pocatello which show signs of activity within the last 50,000 years.

However, Pocatello is surrounded by three major areas of seismic activity: (1) in the southeastern corner of Idaho and northern Utah some 85 miles southeast of the site; (2) in southwestern Montana (Hebgen Lake area), about 120-150 miles to the northeast; and (3) in the Stanley-Challis, Idaho area, some 160 miles to the northwest. Of these areas, it is likely that only areas (1) and (2) could produce significant damaging effects at the site.

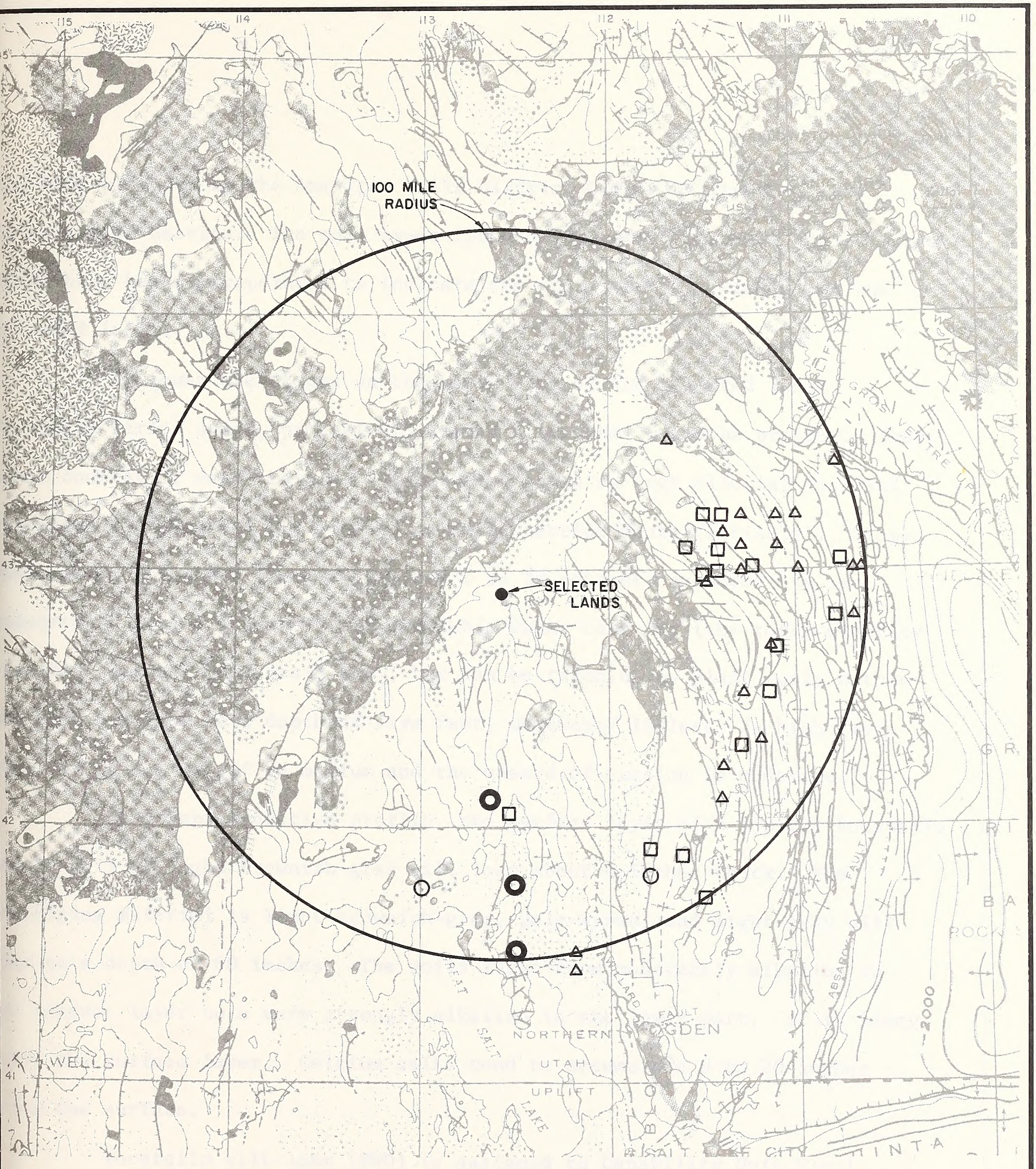
Epicenters of historic earthquakes within a 100-mile radius of the site are plotted on Plate 3.3-2. (National Geophysical and Solar-Terrestrial Data Center, 1975). These epicenters represent primarily

seismic events in Area (1) and the southern extremes of Area (2). As shown by these data, the maximum Richter Magnitude of historic earthquakes within a 100-mile radius of the site is in the range of 6.0 to 6.9.

3.3.3 Soils

The general soil cover on the selected lands may be described as a calcareous silt. This soil, having been deposited by wind, is commonly characterized as loess or silt loess and is found at elevations above 4,500 feet. Near the northern portion of the selected lands, the loess ranges in depth from a few feet to in excess of 60 feet as determined by previous field investigations (Dames & Moore, 1974).

The U. S. Soil Conservation Service has not mapped the soils on the selected lands. However, they have been recently mapped and characterized in Power County to the eastern boundary of the Fort Hall Indian Reservation, i.e., to the west border of the selected lands. This unpublished information



REGIONAL SEISMIC MAP

KEY:

RICHTER MAGNITUDES

- ● 6.0 – 6.9
- ○ 5.0 – 5.9
- □ 4.0 – 4.9
- △ 3.0 – 3.9

NORMAL FAULT

THRUST FAULT

UNCLASSIFIED FAULT

REFERENCE: TECTONIC MAP; COHEE (1961) SEISMIC DATA; NATIONAL GEOPHYSICAL AND SOLAR-TERRESTIAL DATA CENTER (1975)

MILES

10 5 0 10 20 30 40 50

N

DAMES & MOORE

PLATE 3.3-2

has been provided by the American Falls District Office of the Soil Conservation Service. The soil types found on the west border of the selected lands have been extrapolated to indicate the soils probably present on the selected lands.

At lower elevations on the north side of the selected lands, Pocatello series soils, probably Pocatello silt loam, would be present. These soils consist of well-drained, loess-formed soils on high alluvial fans and dissected plateaus and are classed as xeric torriorthents (entisols). Slopes where these soils are found range from 0 to 30 percent, permeability is moderate (0.8 to 2.5 in/hr), and available water capacity (the total quantity of water that will not drain away, but can be taken up by plant roots within the root zone, or to a depth of five feet, whichever is less) is high (more than 7.5 in.). Runoff is medium and the hazard of erosion is moderate.

In a representative profile, the surface layer of a typical Pocatello series soil is light brownish-gray silt loam about 4 inches thick. The underlying material is light brownish-gray, pale-brown, and light-gray silt loam to a depth of 60 inches. The soils range from moderately alkaline in the surface layer to a very strongly alkaline in the lower part. It is limey below the surface layer. Calcium salts tend to accumulate 9 to 20 inches below the surface.

Pocatello silt loam (PWD) is assigned to Capability Unit VIe-1 indicating that this soil has severe limitations, primarily risk of erosion and slope, which makes it unsuited to cultivation and restricts its use to range or wildlife food and cover.

At slightly higher elevations, soils of the Wheeler series would be found, probably Wheeler silt loam. The Wheeler series consists of

well-drained, loess-formed soils on dissected alluvial fans and low plateaus and are classed as xeric torriorthents (entisols). Slopes where these soils are found range from 8 to 75 percent, permeability is moderate (0.8 to 2.5 in/hr), available water capacity is high (more than 7.5 in.), runoff is very rapid and erosion hazard for these soils is very high.

Wheeler soils may be silt loams to 60 inches or more deep but with little development of topsoil. Little organic matter is present. In representative profile the surface layer is light brownish-gray silt loam about 3 inches thick. The underlying material is light brownish-gray and very pale brown silt loam to a depth of 60 inches. The soil is moderately alkaline and is limey throughout.

Wheeler silt loam (WLE) is assigned to Capability Unit VIe-1, indicating the same limitations of use as described for the Pocatello series.

The final Soil Conservation Service soil type which occurs on the selected lands is the Rock land category. This miscellaneous land type is in steep mountainous terrain. Rock outcrops are common and there is little development of topsoil. Runoff is very rapid and the hazard of erosion is very high. Such land is in Capability Unit VIIIs-1, indicating the existence of limitations, primarily shallow, droughty or stony soils and slope, which preclude their use for commercial plant production and restrict use to wildlife habitat, recreation and watershed.

Some additional information regarding soils on the selected lands is available in the report of a special investigation conducted for the J. R. Simplot Company by Wiese and Johnson (1974). Soil samples were taken during 1973 along the south fence line separating J. R. Simplot Company

property from the selected lands. Three samples were characterized and analyzed by 6 inch intervals to 5 feet for pH and fluorides.

The soil was probably of the Wheeler series and was described as a deep silt loam. It was moderately calcareous throughout as indicated by its pH which ranged from 8.10 in the upper 12 inches and increased to a maximum of 8.95 at 42 to 48 inches and then decreased to 8.50 in the 54 to 60 inch portion. Fluoride content was 425 ppm in the top 6 inches and varied from 400 to 613 ppm elsewhere in the profile with maximum content in the 18 to 30 inch portion; the deepest segment sampled, 54 to 60 inches, exhibited a fluoride concentration of 475 ppm.

3.3.4 Land Ownership and Use

3.3.4.1 Land Ownership

Since the selected lands lie in both Power County and Bannock County, land ownership and land use in both counties will be discussed to obtain an overall perspective. This information is summarized in Table 3.3-1.

Approximately two-thirds of the land in each county is privately owned. Public lands, managed by the BLM and the Forest Service, account for slightly less than 30 percent in each county, and state and county holdings account for 5 to 8 percent. The Fort Hall Indian Reservation includes nearly 400 square miles in northern Bannock and eastern Power County; this land is considered in private ownership whether owned collectively by the Indian Tribe, allotted to individuals within the Tribe, or if sold to non-Indian private interests.

TABLE 3.3-1

LAND OWNERSHIP AND LAND USE IN BANNOCK AND POWER COUNTIES, IDAHO

(Data from Soil Conservation Service and Southeast Idaho Council of Government, 1975)

	Bannock Cy		Power Cy	
Land Ownership	Acres	%	Acres	%
Total Acres	719,360		903,040	
Federal Lands	193,833	26.95	264,734	29.32
BLM	79,539	11.06	228,687	25.33
National Forest	114,294	15.89	36,047	3.99
State and County	55,814	7.76	50,841	5.63
Private	464,552	64.58	587,090	65.01
Other	5,161	0.72	375	0.04
Land Use				
Cropland	192,107	38.77	279,600	46.24
Irrigated	49,020	9.89	40,000	6.62
Non-Irrigated	143,087	28.88	239,600	39.63
Rangeland	212,100	42.80	283,600	46.91
Woodland	62,291	12.57	24,300	4.02
Pasture	15,000	3.03	4,000	0.66
Urban Land	14,000	2.82	13,100	2.17
Total Acres Categorized	495,498	(68.88%)	604,600	(66.95%)
Estimated Land Use Change*				
Cropland to Urban	5,800	36.5	1,776	5.8
Rangeland & Woodland to Urban	2,000	12.6	0	0
Rangeland & Woodland to Irrigated Cropland	0	0.0	2,960	9.7
Dry Cropland to Irrigated Cropland	8,000	50.3	25,340	83.1
All uses to Homesites & Recreation	100	0.6	400	1.3
Total	15,900		30,476	

*Per year 1975-1980.

Plate 3.3-3 shows the land ownership for 200 square miles centered on the selected lands and includes the City of Pocatello. Here, about 44 percent is in Indian ownership, 42 percent is privately owned, and about 14 percent is National Forest or Bureau of Land Management land.

The selected lands are bounded by land owned by J. R. Simplot Company, FMC Corporation, and the BLM to the north, Michaud Creek Ranches to the east, and FMC Corporation to the west.

3.3.4.2 Land Use

3.3.4.2.1 General

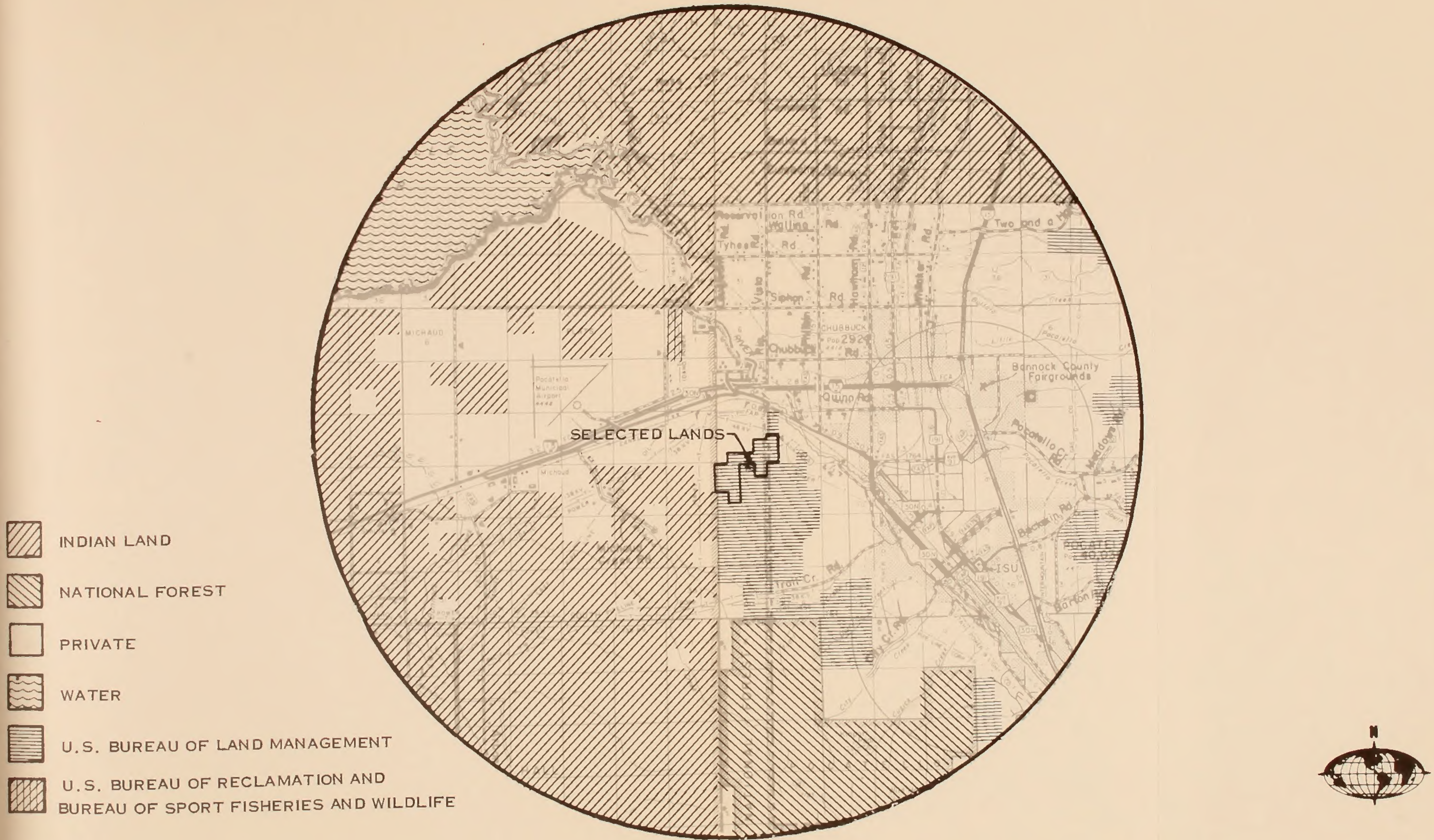
Approximately two-thirds of the total land area in each county has been classified by the U. S. Soil Conservation Service by its usage as of 1967. These classifications do not include federally-owned land. This data is shown in Table 3.3-1.

The dominant land use in both counties, accounting for 42 to 47 percent of the land classified, is as rangeland. In Power County, cropland amounts to about 46 percent of the total with only about 15 percent of the cropland irrigated. In Bannock County, cropland accounts for 39 percent of the classified land with 25 percent of the cropland irrigated. The major crops raised are winter wheat, barley, alfalfa hay, spring wheat, potatoes, sugar beets and mixed grains and hays. Lands used primarily for woodlands and pasture range from about 16 percent in Bannock County to less than 5 percent in Power County. Urban land constitutes less than 3 percent of the total in each county.

The U. S. Soil Conservation Service has estimated the acres of rapid land use changes in Idaho for each year from 1975 to 1980. This data for

LAND OWNERSHIP

U.S. SOIL CONSERVATION SERVICE, POCATELLO AND AMERICAN FALLS, IDAHO



REFERENCE

BASE MAP, BANNOCK AND
POWER COUNTY "BIG SKY MAPS,"
1971 K.D.B. ENTERPRISES INC.
NAMPA, IDAHO

DAMES & MOORE

PLATE 3.3-3

Bannock and Power Counties is summarized in Table 3.3-1. Approximately 2-3 percent of the total land area in each county is predicted to change land use each year during this period. The primary change is from dry cropland to irrigated cropland with this change amounting to 50 percent in Bannock and 83 percent of the total land use change in Power County. A significant proportion (36 percent) of the total land use change in Bannock County is estimated to convert cropland to urban land; this trend is much less pronounced in Power County.

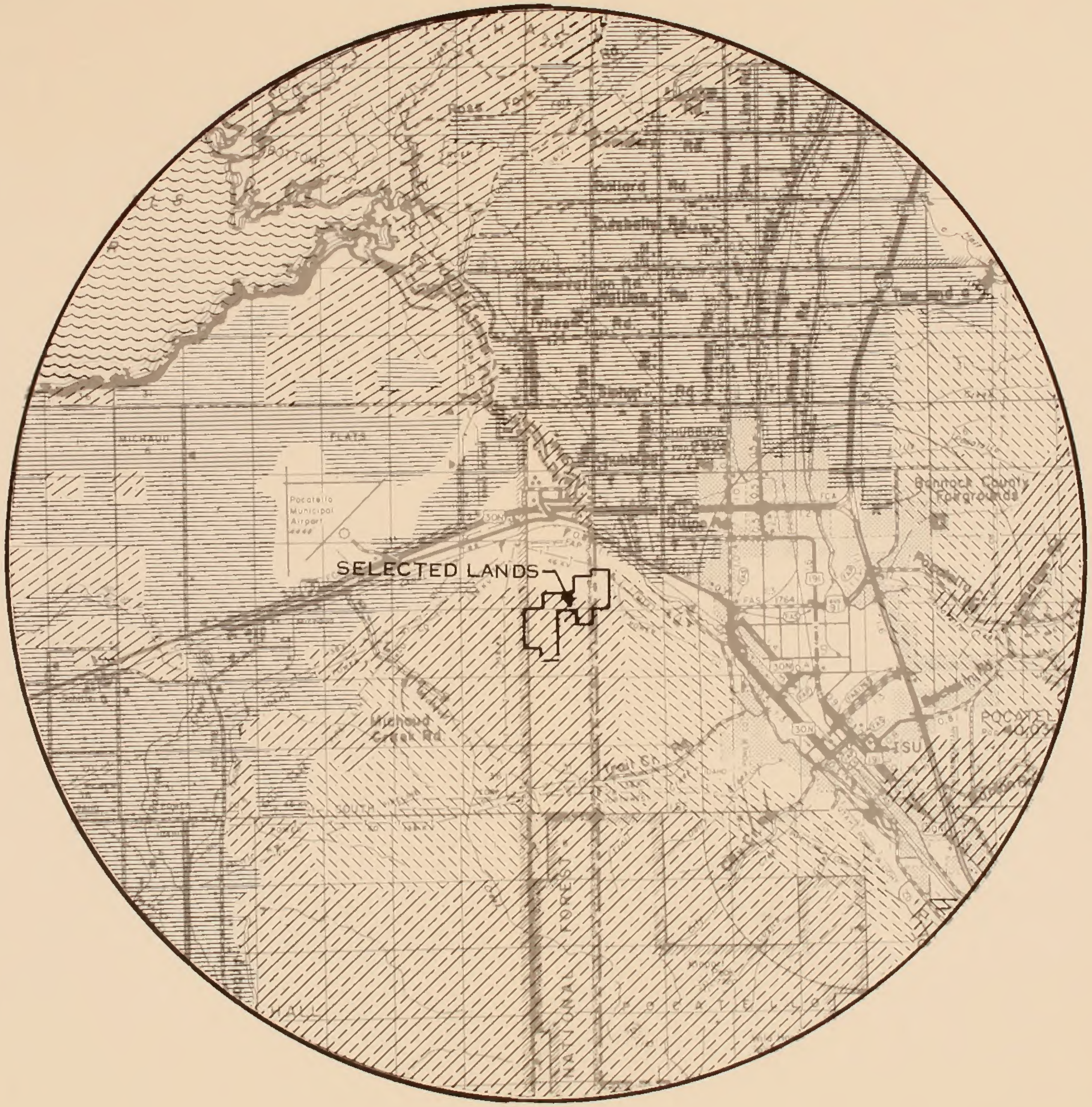
Land use for 200 square miles centered on the selected lands is shown in Plate 3.3-4. Approximately 50 percent of this area is classed as cropland with nearly three-quarters of the cropland under irrigation. About 34 percent of the land in this area is used for pasture and range and 16 percent is classed as urban and industrial. The high proportion of the latter category is, of course, due to inclusion of the City of Pocatello. The selected lands are classed as pasture and range and are surrounded by land of a similar classification on the east, south and west; to the north the land is classed as urban and industrial.

3.3.4.2.2 Site-Specific

An aerial photograph taken in 1941 viewed at the Pocatello office of the U. S. Soil Conservation Service shows little or no industrial development surrounding the selected lands. During the early 1940's the Defense Plant Corporation built facilities to blend fertilizer at the site of the present J. R. Simplot Company plant. The Simplot Company obtained these facilities and began operations in 1945. The other major industrial development near the selected lands, the FMC Corporation's elemental phosphorus plant, began operations in 1949.

LAND USE

U.S. SOIL CONSERVATION SERVICE, POCATELLO AND AMERICAN FALLS, IDAHO



NON-IRRIGATED CROPLAND

IRRIGATED CROPLAND

PASTURE AND RANGE

URBAN AND INDUSTRIAL

WATER

REFERENCE

BASE MAP, BANNOCK AND POWER COUNTY "BIG SKY MAPS," 1971 K.D.B. ENTERPRISES INC., NAMPA, IDAHO

1 0 1 2 MILES

DAMES & MOORE

PLATE 3.3-4

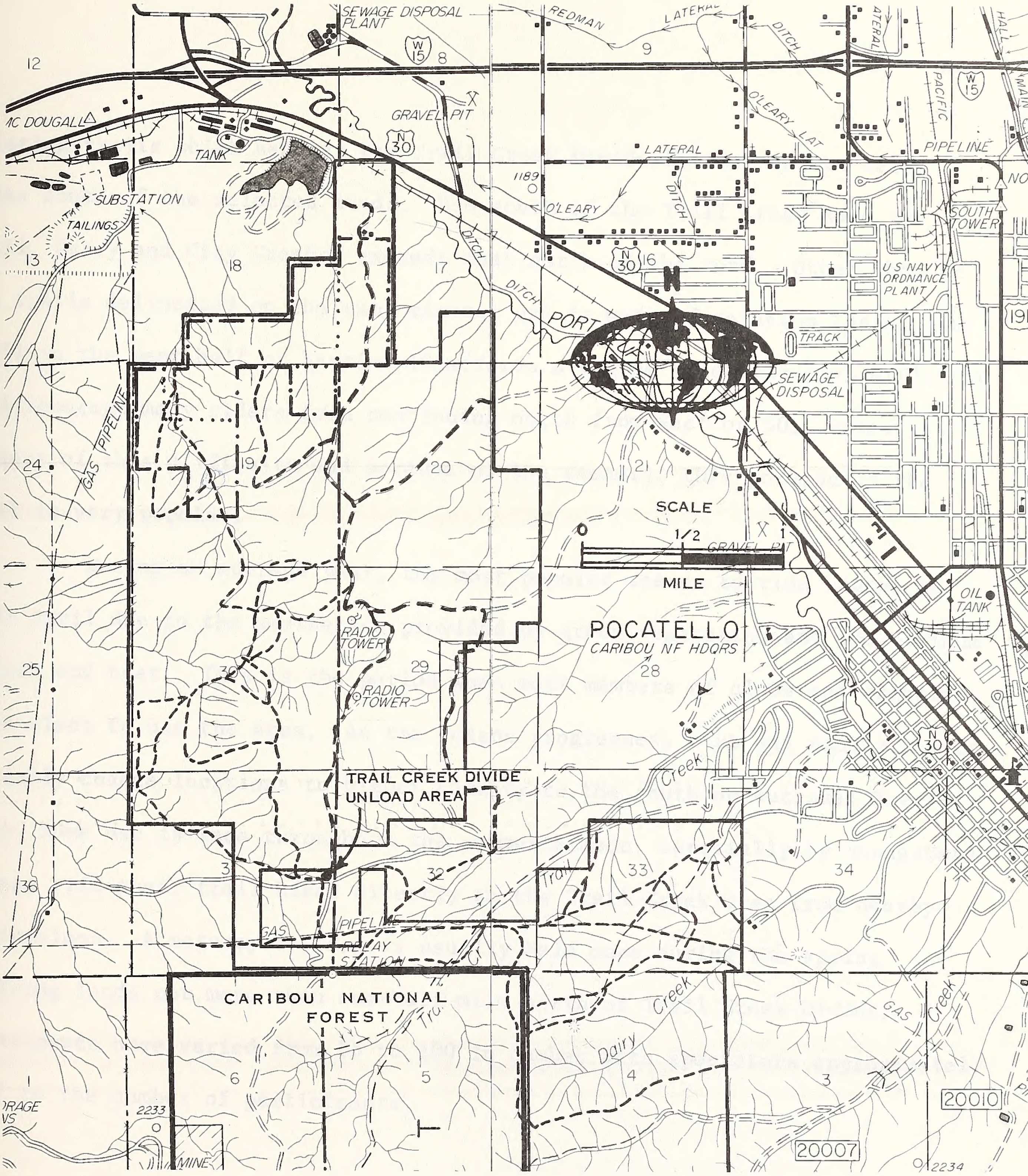
Historically, the selected lands have been used for cattle grazing. More detail regarding this use as well as uses for wildlife habitat and grazing will be found in Sections 3.5 and 3.6.

Due to the proximity of the selected lands to a major population center, a number of uses are made of these and surrounding lands not necessarily because of their uniqueness or special characteristics but more because of accessability. Such uses include educational/scientific uses, rock climbing and motorcycle riding. No quantitative data on the extent of usage for these purposes could be obtained but some qualitative information was obtained.

Class groups from Idaho State University and the public schools apparently visit the area on an infrequent basis for nature study and nature hikes. (Karl E. Holte, personal communication). Members of the Outdoor Program at the University have held rock-climbing seminars on the rocky canyon walls which are present in a portion of the selected lands. Although these uses have been minimal in the past, they may be expected to intensify in view of the projected rapid growth for Pocatello.

Motorcycle or trail-bike use of the selected lands and surrounding area is somewhat better documented than other recreational or educational uses. The BLM has provided observations regarding this use (Cozakos, 1975) and the following is derived from this communication.

The map in Plate 3.3-5 delineates trails in the vicinity of the selected lands used most by motorcycles. This high use is largely due to proximity of the city and the fact that this area provides access into adjacent Caribou National Forest lands. Predominant motorcycle activity occurs on



KEY

NATIONAL RESOURCE LAND (BLM)

SELECTED LANDS

MOTOR CYCLE TRAILS

REFERENCE

U.S.F.S. MAPS 1071 MICHAUD AND AND 1061 POCATELLO, REVISED DECEMBER 1971

MOTORCYCLE TRAILS ON SELECTED LANDS AND ADJACENT NATIONAL RESOURCE LANDS

DAMES & MOORE

PLATE 3.3-5

existing trails which head at the Trail Creek Divide located two to three miles south of the selected lands. Use south of the Trail Creek Road (on Trail, Dairy and City Creeks) exceeds that north of the road. Other than on the trails delineated on the map, minimal use is made of selected lands. The trail in the west half of Section 19 affords a degree of difficulty sufficient to discourage many riders from continuing north from Section 30. However, because of this difficulty and because of the scenery, this portion of the trail is very popular.

During an average year, the most popular season to ride begins in early April due to the aesthetics provided by green vegetation and the minimum of dust and heat. This is the period when most members of clubs and organizations elect to use the area. As the season progresses, club and family riders generally change locations to higher country to the south on National Forest lands. Some use is made throughout the summer season, especially by youngsters who can ride their trail bikes directly to the Trail Creek area from nearby subdivisions. A motorcycle race is usually held once during the spring involving lands not more than one-half mile north of Trail Creek Divide. Participants have varied from 25 to 100 in number with spectators approximately equal to the number of participants.

3.4 WATER

3.4.1 Surface Water Hydrology

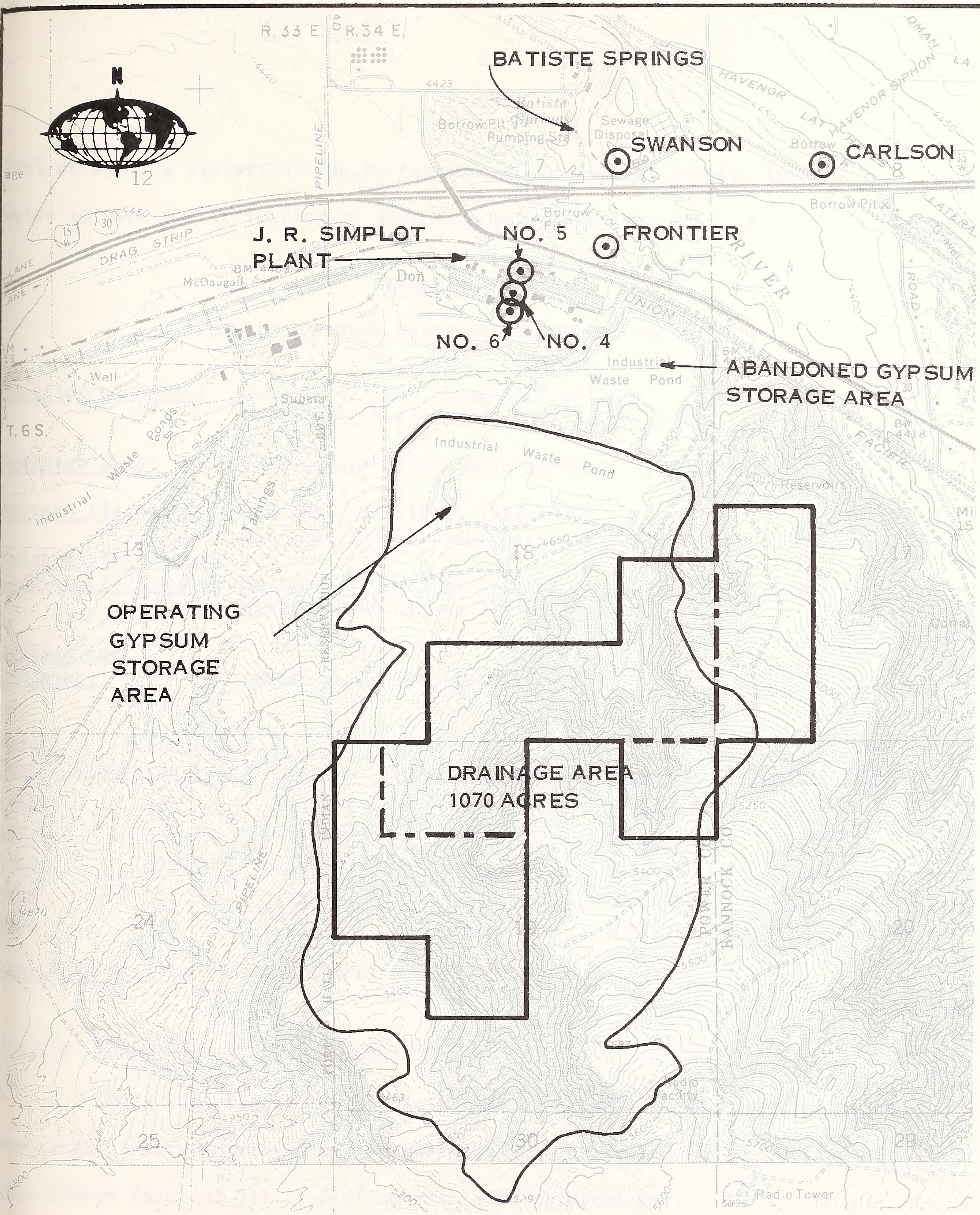
3.4.1.1 Drainage

There are no permanent bodies of water or perennial streams on the selected lands. With the exception of the "B" Priority land in Section 17 and a small portion of "A" Priority land in the E½ SE¼ of Section 18 which drains to the Portneuf River, the selected lands are drained by a series of ephemeral stream channels in a northly direction into the operating gypsum storage area owned by J. R. Simplot Co. (Plate 3.4-1). This watershed ranges in altitude from 4,600 to 5,700 feet and comprises an area of 1,070 acres including the tailings pond of 107 acres.

The Portneuf River, located within one-half mile of the selected lands, flows into American Falls Reservoir some eight miles to the northwest. The river is gauged two and one-half miles southeast of the selected lands at which point the drainage area of the river is 1,250 square miles.

Data regarding flow in the river are presented in Table 3.4-1. The average flow for 57 years of record is 252 cubic feet per second (cfs) with extremes of 0.4 cfs and 2,900 cfs. Water from the Portneuf River is diverted upstream and downstream from the selected land area for irrigation and flow is regulated by the Portneuf Reservoir (capacity 23,695 acre-feet) and the Chesterfield Reservoir (capacity 865 acre-feet).

American Falls Reservoir lies on the Snake River. Maximum contents for the period of record (1926-1970) was 1,748,000 acre-feet at surface elevation 4355.34 feet, which occurred on June 21, 1963. Minimum contents since full capacity was attained in 1927 was 2,000 acre-feet on September 9,



REFERENCE

TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

KEY

⊙ WELL LOCATION

VICINITY HYDROLOGIC MAP

FEET
2000 0 2000

DAMES & MOORE

PLATE 3.4-1

1961 at surface elevation 4296.26 feet (U. S. Geological Survey, 1974). Water is used for irrigation by diversion below the reservoir.

TABLE 3.4-1

FLOW IN PORTNEUF RIVER AT POCATELLO, IDAHO

Location of Gauge: Lat 42° 52' 20", Long 112° 28' 05" (SE¼, NW¼, Section 27, T. 6 S., R. 34 E).

Drainage Area: 1250 square miles, mean altitude 5,850 feet.

Average Discharge: 252 cfs (1912-1916, 1917-1970)
228 cfs (15-year base period 1952-1967)

Extremes for Period of Record (57) years: Maximum 2990 cfs on 2-14-62
Minimum 0.40 cfs on 7-3-61

Average and Extremes: (Water years 1966-1970)

Water Year	Average Discharge (cfs)	Maximum Date	Maximum Discharge (cfs)	Minimum Date	Minimum Discharge (cfs)
1966	209	4-1 & 2 1966	710	7-22-66	1.7
1967	238	6-16-67	639	10-23-66	1.8
1968	225	2-16-68	602	7-31-68	5.0
1969	331	4-25-69	1,130	10-12-68	1.7
1970	277	5-23-70	860	7-25-70	32.0

Source of Data: U. S. Geological Survey (1974).

3.4.1.2 Runoff and Flood Potential

Data regarding average precipitation, extreme 24-hour precipitation events and return intervals and evaporation were presented in the section of this report (Section 3.1.2) dealing with site climatology.

The drainage area encompassed by the operating gypsum storage area pond is 107 acres. Surface water runoff will accumulate in the pond following periods of heavy precipitation or snowmelt. Since the pond does not

have a spillway, sufficient freeboard must be maintained to retain potential storm runoff.

Calculations to determine storm runoff were performed using the following equation:

$$R = KPA$$

where: R = volume of runoff (acre-feet)

K = runoff coefficient

P = total precipitation (feet)

A = drainage area (acres)

The runoff coefficient for the type of ground surface on the selected lands is approximately 0.3 (Bigerstaff, 1974). Assuming a 100-year, 24-hour rainfall of 2.5 inches (Miller et al, 1973), a volume of 60 acre-feet of runoff would be discharged to the operating pond. Adding the full accumulation of precipitation over the 107 acre pond of 22 acre-feet, a total volume of 82 acre-feet would accumulate in the pond, thus raising the water surface 0.77 feet. The storage area is designed to accommodate such excess water flow.

3.4.1.3 Surface Water Quality

Concentrations of selected chemical constituents measured by the U. S. Environmental Protection Agency at intervals from 1969 through 1974 in the Portneuf River at Batiste Springs (located one-half mile north of the J. R. Simplot Co. plant) are presented in Table 3.4-2. The concentrations observed are extremely variable for most of the constituents.

An effluent averaging approximately 550 gallons per minute (gpm) is discharged into the Portneuf River from the J. R. Simplot Company plant. The effluent is primarily from cooling tower blowdown water, water from

TABLE 3.4-2

SELECTED CHEMICAL CONSTITUENTS, PORTNEUF RIVER AT BATISTE SPRINGS

Date	pH	Dissolved Solids (mg/1)	Ammonia Total As N (mg/1)	Chloride As Cl (mg/1)	Fluoride As F (mg/1)	Iron, Total As Fe (µg/1)	Manganese As Mn (µg/1)	Nitrate, Total As NO_3 (mg/1)	Orthophosphate as PO_4 (mg/1)	Sulfate, Total As SO_4 (mg/1)
69/07/08	7.80	550	0.900	4	1.65	380	260.0	5.5	0.60	70
69/11/03	8.20	562	1.190	80	0.85	110	80.0	7.8	1.13	51
69/12/17	8.00	646	0.770	72	0.69	60	170.0	4.0	0.29	53
70/03/03	8.10	545	*26.750	50	1.25	*8580	*1910.0	21.0	1.85	100
70/09/22		512	0.900	59	1.04	140	270.0	3.2	1.06	56
70/12/21	7.90	512	*50.000	2	0.60	180	300.0	5.2	6.40	50
71/03/15	8.10	332	0.900	31	0.01	*1190	*840.0	1.7	1.04	24
71/06/14	7.30	332	0.200	30	0.78	120	210.0	2.7	0.70	20
71/09/02	8.10	480	0.500	52	0.44	250	200.0	3.6	1.00	45
71/12/07	8.10	460	0.500	34	1.33	150	10.0	5.0	4.00	24
72/03/06		428	0.600	40	0.51	80	12.0	4.7	0.76	86
72/06/06		548		32		380	210.0	2.1	0.84	19
72/07/17				36		480		1.5	1.08	
72/11/28				40		330	220.0	4.4	0.77	
72/12/26	7.20			42		80	20.0	3.6	0.24	
73/01/30				34		0.3	0.01	4.7	0.14	
73/02/26				24		0.2	0.01	6.1	0.54	
73/03/19	8.40			20		0.02	0.01	8.0	7.20	
73/04/24	8.40			30		2	0.1	4.0	0.56	
73/05/29	8.20			8		450	70.0	2.3	0.43	
73/08/07	8.10			2		380	10.0	3.0	2.17	
73/09/05	8.10			6	0.47	70	10.0	3.5	0.46	
73/12/17	8.30			3				2.9	0.40	44
74/05/17				23	0.38	350	10.0	2.5	0.20	22
74/06/17	8.40			13	0.27	0.01	0.01	1.2	0.23	38

Source: U. S. Environmental Protection Agency (1975).

*Validity of these measurements suspect.

bearing coolers, water softeners, sinks, showers and storm sewers. No water from the gypsum storage area or process water is discharged except by accident or during emergency and the last such incident occurred in 1972. The effluent is discharged in accordance with standards set forth in National Pollutant Discharge Elimination System Discharge Permit No. ID-000067-1 administered by the U. S. Environmental Protection Agency and Water Quality Standards and Wastewater Treatment Requirements of the Idaho Department of Environmental and Community Services. The effluent is monitored for various physical and chemical properties by the Environmental Protection Agency, the State of Idaho and the J. R. Simplot Company.

3.4.2 Ground Water Hydrology

3.4.2.1 Wells and Springs

Data regarding water wells located within three miles of the selected lands are presented in Table 3.4-3. Three wells (reference numbers 52, 53, and 54 in Table 3.4-3) are indicated to be present on or near the selected lands. However, the incorrect township, range or section number have apparently been reported since no wells are known to exist at these sites.

Ground water in the area is used for culinary, industrial, commercial, irrigation and stock watering purposes. Most of the wells listed are used for domestic water supply.

Yields of up to 4,000 gpm with only a three foot drawdown have been reported. Most yields are considerably smaller and drawdowns are generally small, usually less than ten feet. Most of the wells have been completed in sands and gravels at depths of less than 200 feet on Michaud Flats and Gibson Terrace located to the north of Highway I-15W. Some of the wells also penetrate volcanic flow rock and cinders.

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WATER WELLS WITHIN THREE MILES OF SELECTED LANDS

Ref. No.	Owner or Name	Location	Depth (Ft)	Aquifer[1/]	Depth To Water (Ft)	Date Measured	Yield: Rate (GPM)	Yield: Drawdown (Ft)	Use[2/]
		Township 6S, Range 34E							
1	Perry	SE¼, SE¼, Section 4	114	G	50	9-71	20	2	D
2	Wilford	NE¼, SE¼, Section 4	114	S, G	50	12-71	20	2	D
3	Carlyle	SE¼, SE¼, Section 4	92	S, G	55	4-57	30	0	D
4	Reese	NW¼, SW¼, Section 5	197	V	62	5-71	20	0	D
5	Lambert	NW¼, SW¼, Section 5	185	V	62	5-71	20	0	D
6	Taylor	SW¼, SW¼, Section 5	188	V	57	6-71	-	-	D
7	Smith	NW¼, SW¼, Section 5	217	V	70	11-67	70	-	D
8	Reisner	SE¼, SW¼, Section 5	111	G	57	7-72	-	-	D
9	Bright	SE¼, SW¼, Section 5	114	G	54	8-72	-	-	D
10	Rockford #5	SW¼, SW¼, Section 5	114	G	55	8-72	-	-	D
11	Rockford #6	SW¼, SW¼, Section 5	115	S, G	54	8-72	-	-	D
12	Rockford #1	SE¼, SW¼, Section 5	116	S, G	63	11-72	-	-	D
13	Rockford #2	SE¼, SW¼, Section 5	84	G, S	42	1-72	-	-	D
14	Rockford #4	SW¼, SW¼, Section 5	123	S, G	47	2-73	-	-	D
15	Rockford #3	SE¼, SW¼, Section 5	86	G, S	43	1-73	-	-	D
16	Nelsen	SE¼, NE¼, Section 5	121	G	98	10-73	20	0	D
17	Leslie #2	N ½, NE¼, Section 5	84	S, G	52	6-73	32	-	D
18	Leslie #3	N ½, NE¼, Section 5	115	S, G	50	7-73	95	-	D
19	Leslie #1	N ½, NE¼, Section 5	122	S	58	5-73	50	-	D
20	Orchard	NE¼, NE¼, Section 5	120	G	67	6-73	-	-	D
21	Liezinger	NE¼, NE¼, Section 5	100	S, G	34	3-74	35	-	D
22	Jackson	NE¼, NE¼, Section 6	130	G	68	5-67	35	12	D
23	Jackson	SE¼, NE¼, Section 6	85	G	63	11-73	20	-	D
24	Rowland's Inc.	NW¼, NE¼, Section 7	174	V	24	4-64	-	-	D,C
25	Simplot #4	SE¼, SW¼, Section 7	229	G, B, S, V	57	12-54	2400	68	I

Ref. No.	Owner or Name	Location	Depth (Ft)	Aquifer[1/]	Depth To Water (Ft)	Date Measured	Yield Rate (GPM)	Yield Drawdown (Ft)	Use[2/]
26	Simplot #5	SE¼, SW¼, Section 7	250	S, G, B	58	4-65	4000	3	I
27	Simplot #6	SE¼, SW¼, Section 7	235	V, S, G	57	8-64	2500	69	I
28	Swanson	SE¼, NE¼, Section 7	-	-	-	-	-	-	D
29	Trout Farm	NE¼, NE¼, Section 7	50	G	Flowing		75	-	C
30	Frontier	NW¼, SE¼, Section 7	-	-	-	-	-	-	D
31	Allen	NE¼, NW¼, Section 8	126	S, G	48	9-69	12	16	D
32	Sortor	NW¼, NE¼, Section 8	111	S, G	70	2-64	20	2	D
33	Carlson	SE¼, NW¼, Section 8	-	-	-	-	-	-	D
34	Parris	NW¼, NE¼, Section 8	110	S, G	50	1-64	20	2	D
35	Artinger	NW¼, NE¼, Section 8	120	G	60	7-63	15	2	D
36	Linton	SE¼, SE¼, Section 8	156	S, G	35	7-63	120	10	C
37	Artinger	NE¼, NW¼, Section 8	122	S, G	50	9-65	25	5	D
38	Lohr	NE¼, NE¼, Section 8	120	S, G	50	11-62	20	-	D
39	Nasiska	SE¼, NE¼, Section 9	85	-	65	4-55	-	-	D
40	Wohieton #1	NE¼, SE¼, Section 9	99	S	63	5-60	-	-	D
41	Wohieton #2	NE¼, SE¼, Section 9	102	S, G	61	9-60	-	-	D
42	Clinkscales	NE¼, --- Section 9	100	S, G	56	4-73	50	-	D
43	Ward	SW¼, SE¼, Section 9	150	V, S	43	11-74	-	-	F
44	Fowler	SW¼, SW¼, Section 10	97	S, G	64	5-64	30	2	D
45	Stratton	SW¼, SW¼, Section 10	120	G, B	58	8-72	20	4	D
46	Ward	NW¼, NE¼, Section 16	152	S, G	-	12-66	-	-	D
47	Livestock Exchange	NE¼, SW¼, Section 16	78	G	38	2-55	100	4	S
48	Crane	- - Section 16	78	G	30	4-62	15	5	D
49	Price	NE¼, NW¼, Section 16	90	G	45	3-73	50	-	D
50	Ecol-West	SW¼, SW¼, Section 16	68	G	34	2-74	100	8	I
51	Bengal Const.	SW¼, SW¼, Section 16	63	G	42	9-74	30	-	D
52	Anderson	SW¼, SW¼, Section 18[3/]	282	S	230	4-72	30	-	D
53	Christensen	NE¼, NE¼, Section 19[3/]	102	G	63	6-72	15	0	D

Ref. No.	Owner or Name	Location	Depth (Ft)	Aquifer[1/]	Depth To Water (Ft)	Date Measured	Yield: Rate (GPM)	Yield: Drawdown (Ft)	Use[2/]
54	Howell	NE, NW, Section 19 [3/]	260	G	140	9-72	35	-	D
55	McCarty #1	SW¼, NW¼, Section 21	300	-	-	2-69	-	-	-
56	McCarty #2	SE¼, SW¼, Section 21	60	-	-	3-69	-	-	-
57	McCarty #3	SE¼, SW¼, Section 21	245	S	206	5-69	5	50	D
58	Sant	SW¼, NE¼, Section 21	370	V	32	9-68	Not Enough To Warrent		D
59	Pack	NW¼, SE¼, Section 21	135	S	52	11-59	-	-	D
60	Zwergart	SW¼, NE¼, Section 21	200	G	33	1-72	400	100	I
61	McCarty #4	SE¼, SW¼, Section 21	300	Q	120	8-74	10	-	D
62	Lynch	SE¼, SW¼, Section 21	380	Q	300	8-74	5	-	D
63	Delles	SE¼, SW¼, Section 21	400	R, C	275	8-74	5	-	D
64	Flaherty Mfg Co.	NE¼, NW¼, Section 22	100	S, G	35	1-55	-	-	D, I
65	Pease	NW¼, NW¼, Section 22	80	G	40	9-74	20	-	D
66	Wronsach	SW¼, SW¼, Section 29	121	S, G	38	6-70	-	-	D
		Township 6S, Range 33E							
67	Rowland Brothers	SW¼, - Section 1	265	V	52	1-54	1800	0	F
68	Meader	NE¼, NW¼, Section 1	75	S, G	Flowing	9-63	150	Flow	D
69	Douglas	NE¼, SE¼, Section 1	240	V	24	2-54	3040	0	F
70	Lindley	Cntr NE¼, Section 11	309	S, G	40	10-54	1800	9	F
71	Westvaco	SE¼, SE¼, Section 12	120	G	96	8-55	-	-	-
72	Old Airport	NE¼, SE¼, Section 12	113	S, G	65	7-52	-	-	-
73	Lindley	SW¼, NW¼, Section 12	213	S, G	50	10-73	-	-	F
74	FMC	NW¼, NE¼, Section 14	220	V	6	2-69	3600	9	I
75	Idaho Power	NW¼, SE¼, Section 14	234	V	168	6-73	-	-	I

1/ Aquifer: B, boulders; C, clay; G, gravel; Q, quartzite; R, rock; S, sand; V, volcanic flow or cinders.

2/ Use: C, commercial; D, domestic; F, irrigation; I, industrial; S, stock watering.

3/ Incorrect location reported on log-actual location unknown.

Source: Idaho Department of Water Resources (1975).

The J. R. Simplot Company utilizes three wells located in the vicinity of the plant (reference numbers 25, 26 and 27 in Table 3.4-3) for process water supplies. The wells vary from 229 to 259 feet in depth and are each capable of producing in excess of 2,400 gpm.

Although no springs are located on the selected lands, a number of springs issue along the flood plain of the Portneuf River north of the J. R. Simplot Company plant. Batiste Springs, the closest, was measured at 50 cfs on September 14, 1925 while Fish Hatchery Spring, one and one-half miles northwest of Batiste Springs, was measured to flow at 75 cfs on the same date (Stearns et al, 1938). The source of the spring water is probably primarily from underflow from the Portneuf River Basin augmented to a lesser degree by infiltration of irrigation water and precipitation on Michaud Flats. Water from Batiste Springs is pumped to the two storage reservoirs, owned by the Union Pacific Railroad, located in the NW¼ of Section 17, immediately north of the northern boundary of the Priority B selected lands. The water from these reservoirs then flows by gravity to Pocatello where it is utilized for culinary and industrial purposes by the Union Pacific Railroad and other industrial users.

3.4.2.2 Aquifers

The depth to ground water on the selected lands is unknown. Six borings were drilled during September and October, 1974, on J. R. Simplot Company property close to the boundary of the selected lands in the SW¼ SW¼ of Section 18 and the NW¼ SE¼ of the same section. These borings were at surface elevations ranging from 4,650 to 4,718 feet and varied from 43 to 62 feet in depth (Dames & Moore, 1974). All were above the area which was being utilized at the time for gypsum storage. Ground water was not encountered in any of these borings.

The selected lands are underlain by the Starlight Formation and a veneer of windblown silt and fine sand (loess). The loess deposits vary up

to greater than 60 feet in thickness and generally lie above the ground water table. The Starlight Formation, described in Section 3.3.2 of this report, is of an unknown but presumably considerable thickness. Because of the relief of the selected lands, the Starlight Formation is well drained and the water table likely lies at moderate depth. The formation may be capable of small to high yields of ground water.

Lake bed deposits and alluvium which underlie Michaud Flats and Gibson Terrace are an important aquifer. Interbedded gravel and fine-grained sediments were probably deposited on an irregular surface of basalt and silicic volcanic rock. Many wells on Michaud Flats have been drilled through alluvium and reportedly penetrate volcanic rock at depths less than 225 feet. Water in these rocks is mostly unconfined, but may be locally confined. Depths to water on Michaud Flats range from a few to about 100 feet and a number of wells yield large amounts of water with little drawdown. The magnitude of annual water-level fluctuation is small, generally being about two feet or less (West, 1963). Wells on Gibson Terrace mostly tap sands and gravels and are usually less than 150 feet in depth.

Pre-Tertiary strata consisting of limestone, quartzite, sandstone, dolomite, and shale are exposed south of the selected lands. These consolidated rocks normally have relatively poor yields and because they are exposed in areas of high relief, water levels are farther below the surface than in adjacent valley areas.

Water bearing characteristics of rocks exposed in the vicinity of the selected lands are summarized in Table 3.4-4.

3.4.2.3 Recharge and Discharge

As moisture, either in the form of rainfall or melting snow, impinges upon the ground surface, some of the water restores soil moisture, some runs

TABLE 3.4-4

WATER-BEARING CHARACTERISTICS OF STRATA EXPOSED IN VICINITY OF SELECTED LANDS

Age	Stratigraphic Unit	Thickness (Ft)	Lithology	Water-Bearing Characteristics
Quaternary	Loess	0 - 60+	Windblown, well sorted fine sand and silt forming a veneer over older deposits	Generally thin and above the zone of saturation
Quaternary	Alluvium	0 - 250	Clay, silt, sand and gravel; poor to excellent sorting; bedding irregular to lenticular	Sand and gravel yield moderate to large quantities. Unconfined and locally confined ground water conditions
Quaternary	Lake Bed Deposits		Clay and sand with some gravel in lower part; contains one or more basalt flow	Important source of artesian water in Michaud Flats area. Moderate to large yields
Tertiary	Starlight Formation	Unknown	Tuff, marl, sandstone, conglomerate and basalt	Joints and fault zones in flows and tuffs and beds of coarse-grained material may yield small to moderate quantities. Zone of saturation at moderate depth on property
Pre-Tertiary	Undifferentiated	Unknown	Limestone, quartzite, sandstone, dolomite, and shale	These consolidated rocks are relatively poor aquifers in area

off and some percolates to the water table and moves down-gradient as underflow. Recharge to the ground water table on the selected lands is due principally to percolation of rainfall and snowmelt despite the steep slopes which are present.

The mountainous area of which the selected lands are a part is probably a recharge area to adjacent valleys although the actual quantity of recharge from this source is small in relation to other recharge sources. Recharge to the ground water table in the lower elevations of the surrounding areas where most of the wells are located is primarily from underflow from upland areas to the south, underflow from perennial streams, such as the Portneuf River and Bannock Creek, and to a much lesser extent, from direct precipitation.

Ground water moves from places of recharge to places of discharge down the hydraulic gradient at right angles to contours on the water table or piezometric surface. The general direction of ground water movement in the mountainous area, of which the selected lands are a part, is probably in the same direction as surface drainage. The water table in Michaud Flats slopes northwesterly except adjacent to the Portneuf River flood plain where it steepens slightly and parallels the river. The water table slopes westerly in the Gibson Terrace area but steepens and parallels the Portneuf River near the river's flood plain. Ground water discharges from springs near the lower reaches of the Portneuf River into water wells and into American Falls Reservoir.

3.4.2.4 Seepage From Gypsum Storage Area

Gypsum tailings are composed of interbedded layers of silt, silty fine sand and "clean" fine sands. The horizontal permeability of the gypsum is controlled by the permeability of the "clean" fine sands and varies up to 8,000 feet or more per year. Vertical permeability is controlled by the fine-grained materials and typically ranges from 20 to 500 feet per year. Three perforated collector drains underlie the gypsum storage area and return a portion of the water percolating through the gypsum to the J. R. Simplot plant for reuse.

The gypsum storage area is underlain principally by silt soils of moderately low to low permeability. To determine the rate of percolation of water through the in-place soils, 12 constant-head permeameter tests were performed in the laboratory on undisturbed soil samples taken near the ground surface under the presently operating gypsum storage area prior to its construction (Dames & Moore, 1966). These tests indicated that permeability of the silt ranged from 6 to 320 feet per year and averaged 166 feet per year. These permeability values are for saturated flow; actual flow through unsaturated soils is much slower than under saturated conditions.

Inspection of the gypsum storage area revealed that the physical characteristics of the in-situ natural silt loess soils are significantly changed when contacted by the gypsum slurry. The silt soil tends to become cemented and indurated by exposure to the effluent. Although the physical and chemical changes which produce this cemented layer and their reaction rates are unknown, they apparently occur quite rapidly since the layer was observed in hand-dug excavations in the operating gypsum storage area at sites where the gypsum was only a few inches in depth. It was also found in a layer

approximately a foot in thickness about 50 feet below the surface of the abandoned gypsum disposal area, where it was noted to perch ground water.

Air permeability tests were performed on four cores of the cemented material to gain initial insight into its permeability. Porosity ranged from 16.0 to 36.3 percent and the values derived for permeability to water were 1.5, 2.4, 22 and 93 feet per year.

In addition, a laboratory permeability test was performed on a typical sample of silt loess soil taken from the J. R. Simplot property above the point where the gypsum had encroached. In an attempt to duplicate the chemical reaction taking place in the field which produces the cemented layer, water from the gypsum storage area pond was percolated through a sample of the silt soil in a bench test for nine days. During this short period, the physical characteristics of the soil were not drastically changed to the extent of hardening or changing its calcareous nature. However, a reaction did occur which significantly reduced the permeability of the sample to less than 0.5 feet per year. The same tests performed previously on similar samples of silt loess soils from the J. R. Simplot Company property utilizing tap water indicated permeabilities on the order of 200 to 300 feet per year (Dames & Moore, 1974). Thus, it appears that the cementing phenomenon which takes place reduces permeability of the soil by a factor of more than 400 to 600.

Silty gravel and volcanic bedrock underlie the silt surface soils and crop out upslope from the operating gypsum storage area. These materials could contain zones of relatively high permeability. Should gypsum storage pond waters encounter such zones of high permeability, seepage could possibly escape to the ground water table.

Existing information is inadequate to determine present seepage losses. Should seepage occur, it would be expected to move generally downward through the underlying strata except where deflected laterally downdip within the more highly permeable strata. At the site of the gypsum storage area, seepage would be expected to move generally downward and northward in the unsaturated materials. Upon encountering the general water table, the seepage would mix with ground water and move downslope at right angles to the water table contours. Constituents in the seepage would be highly reduced in concentration along the travel path due to natural processes including various chemical reactions, filtration, dilution, absorption and biological degradation. Effects of seepage would be expected to be detected in the J. R. Simplot Company industrial wells, the Frontier Well or Batiste Springs.

3.4.2.5 Ground Water Quality

In general, ground waters of the area are of the calcium bicarbonate type with the main constituents being calcium, sodium, magnesium, bicarbonate, sulfate and chloride. Table 3.4-5 shows the concentrations of some chemical constituents of ground water derived from wells and springs near the selected lands from 1930 to 1957.

Chemical analyses of the water in the Simplot Company industrial wells and Batiste Springs have been conducted over a period of several years by the Simplot Company, the State of Idaho, and the Environmental Protection Agency. Review of this data revealed various shortcomings, including non-uniformity of constituents tested for, different methodologies employed, many questionable values, etc., which suggested that little reliability

TABLE 3.4-5

CONCENTRATIONS OF CHEMICAL CONSTITUENTS IN GROUND WATER IN THE VICINITY OF THE SELECTED LANDS

Location	Sec. 7 T6S, R34E (Batiste Springs)		Sec. 15 T6S, R34E (Well)	Sec. 23 T6S, R34E (Well)	Sec. 27 T6S, R34E (Well)
Date of Sample:	5-19-30*	7-23-57**	7-14-47*	8-7-52**	8-7-52**
Total Dissolved Solids***	271	452	423	564	506
Silica (SiO_2)	30	44	24	25	23
Iron (Fe)	0.06	0.01	0.05	0	0.54
Calcium (Ca)	47	74	75	86	77
Magnesium (Mg)	16	18	27	30	32
Sodium (Na)	23	44	36		
Potassium (K)	3.6	7.2			
Bicarbonate (HCO_3)	188	217		286	308
Sulfate (SO_4)	42	110	38	50	55
Chloride (Cl)	28	41	45	70	57
Nitrate (NO_3)	2.3	5.2		3.6	0.2
Total Hardness as $CaCO_3$	183	258	298	336	328
Fluoride (F)		1.3		0.0	0.0
Phosphate (PO_4)		1.2		0.1	0.2

* Source: Stearns et al (1938)

** Source: West (1963)

***All concentrations in ppm.

could be attributed to the results. Therefore, during October of 1975 a sample was taken from each of five wells in close proximity to the J. R. Simplot Company plant and sent to an independent laboratory (Ford Chemical Laboratory, Salt Lake City, Utah) for analysis by approved standard methods. The five wells sampled are downgradient from the gypsum storage areas and would be expected to reflect any influence which the presence of the gypsum storage areas might have upon ground water quality.

The results of these analyses are presented in Table 3.4-6. The locations of the wells in relation to the gypsum storage areas may be seen by reference to Plate 3.4-1. The constituents assayed were the major ones which are present in the liquid or solids fraction of the gypsum slurry (refer to Table 2.3-1) and would therefore be the ones most likely to be indicators of leaching from the gypsum storage areas to the ground water. The 1962 Public Health Service drinking water standards are also included in the table for comparison.

For the 10 chemical constituents assayed which have drinking water standards, the concentrations detected in the five wells were below these limits in all cases with the exception of iron levels in two of the wells. Since iron exhibits a low level in the liquid and solid fractions of the gypsum slurry, it is probable that the excess for this element in these two wells above the recommended limits resulted from sources other than the gypsum storage areas.

For the other chemical constituents assayed for which there are no drinking water standards, the concentrations detected are relatively low and do not indicate contamination by the gypsum storage areas.

TABLE 3.4-6

CONCENTRATIONS IN MG/L OF CHEMICAL CONSTITUENTS IN WELLS NEAR THE J. R. SIMPLOT COMPANY PLANT

(Samples Taken in October 1975 and Analyzed by Ford Chemical Laboratory)

Constituent	1962 PHS Drinking Water Standards Mandatory	1962 PHS Drinking Water Standards Recommended	Well #4	Well #5	Frontier Well	Swanson Well	Carlson Well
Sulfate as SO_4		250	120.0	77.5	64.5	43.5	64.5
Calcium as Ca		NS*	66.4	52.8	56.8	70.4	74.4
Phosphate as PO_4		NS	0.13	0.12	0.10	0.17	0.12
Aluminum as Al		NS	0.005	0.033	0.066	0.083	0.016
Sodium as Na		NS	58.21	199.00	50.19	52.77	66.83
Fluoride as F	2.0	1.3	1.18	1.27	0.95	0.68	0.55
Iron as Fe		0.3	0.227	1.019	0.794	0.277	0.214
Magnesium as Mg		NS	20.64	12.96	13.92	28.32	26.40
Zinc as Zn		5	0.008	0.030	0.165	0.028	0.289
Chromium as Cr	0.05		<0.001	<0.001	<0.001	<0.001	<0.001
Manganese as Mn		0.05	0.004	0.005	0.004	0.002	0.006
Vanadium as V		NS	<0.001	<0.001	<0.001	<0.001	<0.001
Copper as Cu		1.0	0.008	0.006	0.011	0.007	0.016
Cadmium as Cd	0.01		<0.001	<0.001	<0.001	<0.001	<0.001
Lead as Pb	0.05		0.009	0.011	0.014	0.013	0.012
Selenium as Se	0.01		<0.01	<0.01	<0.01	<0.01	<0.01
Silicon as SiO_2		NS	14.00	12.90	12.00	10.00	12.00

*NS - No Standard.

In summary, it appears that if leaching from the gypsum storage areas to the ground water has occurred, the constituents are highly reduced in concentration along the travel path to the extent that water quality is not adversely affected and drinking water standards are not exceeded in ground water sampled where the effects of such leaching would be most likely to be detected.

3.5 PLANTS

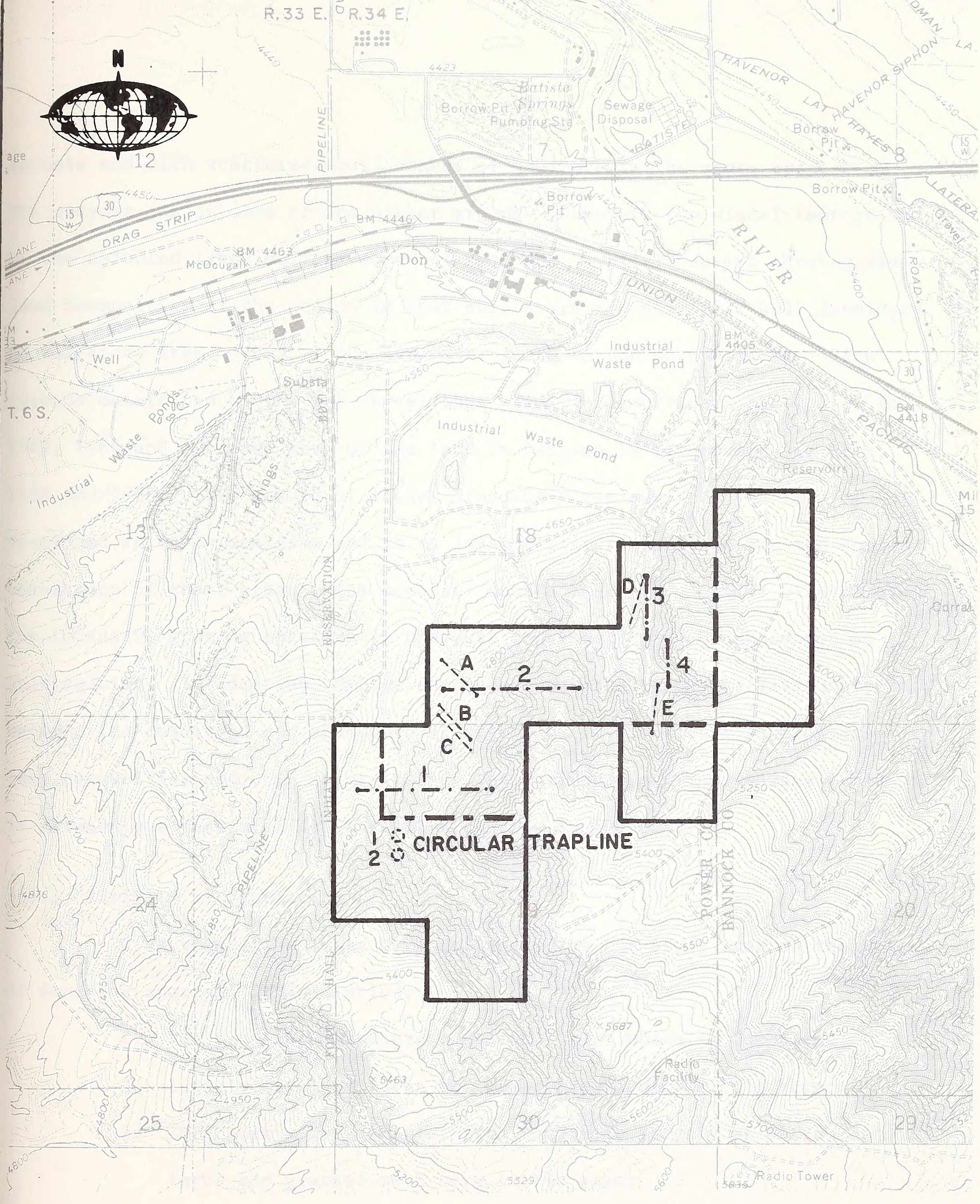
3.5.1 Study Methods

Vegetation on the selected lands was studied by field reconnaissance methods during the late spring of 1975. Dominant vegetation types were delineated and mapped. Quantitative data on the composition and structure of the plant communities was obtained by establishing three transects in the "A" Priority portion of the tract (Plate 3.5-1). Vegetation was sampled by means of 0.5 by 2.0 meter rectangular quadrats located at 30 meter intervals along the transects. This method has been described by Oosting (1956) as that preferred for low herbaceous vegetation and it is generally accepted that rectangular units are significantly more efficient than squares of equal area since they will tend to include a better representation of the variation in a stand. Size of the quadrat area (1 m^2) is well above that recommended for grassland communities and was used to insure collection of representative data.

3.5.2 General Vegetative Aspect

Foothill plant communities indigenous to the region are generally described as desert shrub-grassland communities. The species composition varies with changes in elevation, slope and exposure. In the past, these areas covered large expanses of the Intermountain West, but they have undergone a significant reduction due to expansion of dryland farming activities and the pressure of other kinds of resource use.

The general vegetative aspect of the selected lands is one of a mixed grass and desert shrub foothill community with numerous perennials and



REFERENCE

TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

KEY

—·— VEGETATION TRANSECT

- - - MAMMAL TRAPLINES

LOCATION OF VEGETATION TRANSECTS AND SMALL MAMMAL TRAPLINES

FEET

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DAMES & MOORE

PLATE 3.5—1

annuals and with scattered small stands of junipers in the upper reaches of the canyons and on some of the higher ground. However, the visual impression of the selected lands differs somewhat from the "typical" desert shrub-grassland communities of the region in that shrubs are not nearly as well developed on the study area. This is due, in major part, to the burn history. Fire records maintained by the BLM reveal that wildfire occurred in Section 18 in 1962, 1966 and 1967 and much of the land in Section 19 also burned in 1946, 1954 and 1968. This record of rather frequent fires explains the lack of well developed shrub communities and is at least partly responsible for the common occurrence of cheat grass which occupies much of the area. It is also probable the intensive grazing pressure in the past contributed to the abundance of this species. In addition, debate continues over the precise relationship between the condition and abundance of sagebrush in the desert shrub-grassland communities and some maintain that the dominance of sage in many areas is primarily a result of too intensive grazing in the past.

3.5.3 Analysis of Vegetation

Five vegetative types were delineated on the study area on the basis of dominant species. These include:

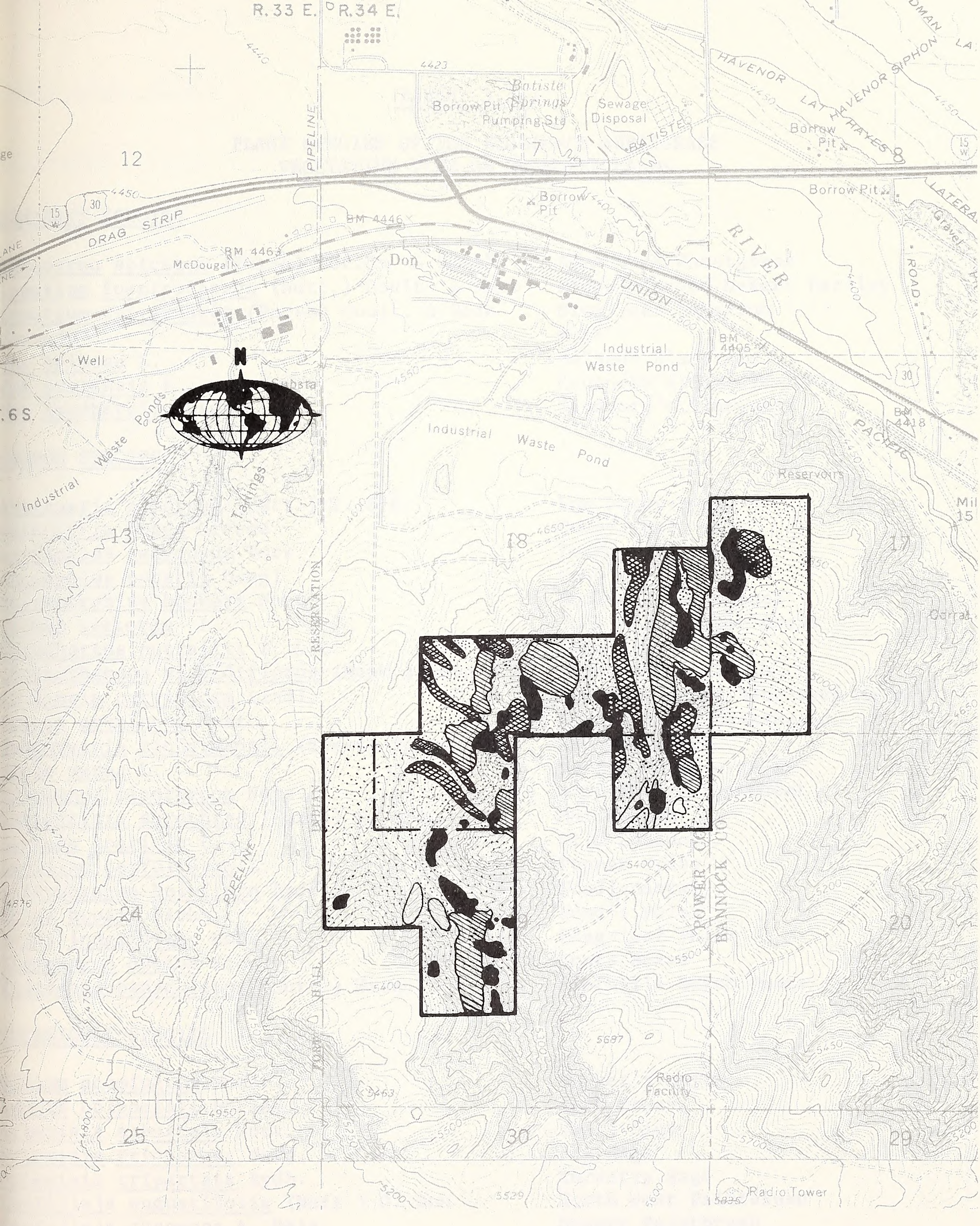
1. The Bluebunch Wheatgrass dominant type which is comprised largely of mixed forbs and grasses with very little sage;
2. The Cheat grass dominant type comprised largely of mixed forbs and grasses with very little sage;
3. The Sagebrush type;

4. The Juniper type; and,

5. The Micro-habitat type existing within the sage-grass zone.

A map showing the distribution of these types on the selected lands is shown on Plate 3.5-2 and the dominant, common and occasional species of each type are listed in Tables 3.5-1 through 3.5-5. A listing of all plant species encountered on the study area is presented in Table 3.5-6. Plant taxonomy follows Hitchcock and Cronquist (1973). None of the plant species are considered rare or endangered.

Data obtained on the vegetation transects is summarized in Tables 3.5-7 and 3.5-8. Bluebunch Wheatgrass, Cheat Grass, Sandberg's Bluegrass, Wild Lettuce, Woodlandstar and Fennel-leaved Desert Parsley were the dominant species along all transects. The average number of species per quadrat (i.e., per square meter) averaged nearly 10 for the 69 quadrats analyzed and ranged from four to 19. On the average, about three-fourths of the ground surface within the quadrats was covered with vegetation but this ranged from zero percent to 99 percent. The percentage of ground covered with vegetation generally increases with progression of the season as the plants mature and would be expected to increase on the study area because of the late spring during 1975.



REFERENCE
TOPOGRAPHIC BASE MAP
U.S.G.S. QUADRANGLE MAP
TITLED MICHAUD, IDAHO 1971

VEGETATIVE TYPES ON SELECTED LANDS

KEY

- BLUEBUNCH WHEATGRASS DOMINANT
- CHEAT GRASS DOMINANT
- SAGEBRUSH DOMINANT
- UTAH JUNIPER DOMINANT
- MICRO HABITATS

FEET

2000 0 2000

DAMES & MOORE

PLATE 3.5-2

TABLE 3.5-1

PLANT SPECIES OF THE BLUEBUNCH WHEATGRASS VEGETATIVE TYPE ON SELECTED LANDS

DOMINANT SPECIES

Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Lomatium foeniculaceum (Nutt.) Coult. & Rose	Fennel-leaved Desert Parsley
Lomatium triternatum (Pursh) Coult. & Rose	Nine-leaf Lomatium
Mosses	Moss
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass

COMMON SPECIES

Antennaria dimorpha (Nutt.) T. & G.	Low Pussy-toes
Antennaria rosea Greene	Pussy-toes
Astragalus calycosus Torr.	Torrey Milkvetch
Astragelus purshii Dougl.	Loco Weed
Balsamorphiza hookeri Nutt.	Hooker's Balsamroot
Bromus tectorum L.	June Grass, Cheat Grass
Calochortus nuttallii T. & G.	Sego Lily
Chrysothamnus viscidiflorus (Hook.) Nutt.	Green Rabbit-brush
Collinsia parviflora Lindl.	Small-flowered Blue-eyed Mary
Crepis acuminata Nutt.	Long-leaved, Hawksbeard
Descurainia richardsonii (Sweet) Schulz	Tansy-mustard
Draba verna L.	Spring Whitlow-grass
Eriogonum micothecum Nutt.	Slenderbush Buckwheat
Gutierrizia sarothrae (Pursh) B. & R.	Matchbrush
Lactuca scariola L.	Wild Lettuce
Lepidium perfoliatum L.	Pepper Grass
Lithophragma bulbifern Rydb.	Woodlandstar
Phlox hoodii Richn.	Hood's Phlox
Phlox longifolia Nutt.	Long-leaf Phlox
Tragopogon dubius Scop.	Goats Beard
Zigadenus paniculatus (Nutt.) Wats.	Foothills Death Camas

OCCASIONAL SPECIES

Allium acuminatum Hook	Hooker's Onion
Arabis holboellii Hornem.	Rock Cress
Artemisia arbuscula Nutt.	Swarf Sage
Artemisia tridentata Nutt.	Big Sage
Artemisia tripartata Rydb.	Threetip Sage
Castilleja angustifolia (Nutt.) G. Don	North West Paintbrush
Castilleja chromosa A. Nels	Desert Paintbrush
Castilleja hispida Benth.	Harsh Paintbrush
Cirsium sp.	Thistle
Comandra pallida A. D. C.	Bastard Toad-Plax
Delphinium andersonii Gray	Desert Larkspur

TABLE 3.5-1 (Cont)

OCCASIONAL SPECIES (Cont)

Delphinium nuttallianum Pritz.	Upland Larkspur
Dodecatheon pulchellum (Raf.) Merrell	Shooting Star
Elymus cinereus Scribn. & Merr.	Giant Wildrye
Erigeron pumilus Nutt.	Shaggy Fleabane
Fritillaria atropurpurea Nutt.	Fritillaria, Checker Lily
Fritillaria pudica (Pursh) Spreng.	Yellow Bell
Grindelia squarrosa (Pursh) Dunal	Gumplant
Hackelia floribunda (Lehm.) Johnst.	Forget-me-not, stickweed
Helianthus annuus L.	Common Sunflower
Hydrophyllum capitatum Dougl.	Ballhead Waterleaf
Mertensia oblongifolia (Nutt.) Don.	Bluebells
Orogenia linearifolia Wats.	Turkey Peas
Oryzopsis hymenoides (R. & S.) Ricker	Indian Rice Grass
Penstemon deustis Dougl.	Hot-rock Penstemon
Penstemon humilis Nutt.	Lowly Penstemon
Polygonum aviculare L.	Prostrate Knotweed
Ranunculus glaberrimus Hook.	Sagebrush Buttercup
Ranunculus testiculatus Crantz	Hornseed Buttercup
Senecio sp.	Senecio
Sphaeralcea munroana (Fougl.) Spach.	Desert Mallow

TABLE 3.5-2

PLANT SPECIES OF THE CHEAT GRASS VEGETATIVE TYPE ON SELECTED LANDS

DOMINANT SPECIES	
Bromus tectorum L.	June Grass, Cheat Grass
COMMON SPECIES	
Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Allium acuminatum Hook.	Hooker's Onion
Arabis holboellii Hornem.	Rock Cress
Astragalus calycosus Torr.	Torrey Milkvetch
Astragalus purshii Dougl.	Loco Weed
Lomatium foeniculaceum (Nutt.) Coult. & Rose	Fennel-leaved Desert Parsley
Lomatium triternatum (Pursh) Coult. & Rose	Nine-leaf Lomatium
Phlox hoodii Richn.	Hood's Phlox
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass
OCCASIONAL SPECIES	
Antennaria dimorpha (Nutt.) T. & G.	Low Pussy-toes
Antennaria rosea Greene	Pussy-toes
Artemisia arbuscula Nutt.	Dwarf Sage
Artemisia tridentata Nutt.	Big Sage
Artemisia tripartata Rydb.	Threetip Sage
Balsamorhize hookeri Nutt.	Hooker's Balsamroot
Castilleja angustifolia (Nutt.) G. Don	North West Paintbrush
Castilleja chromosa A. Nels	Desert Paintbrush
Castilleja hispida Benth.	Harsh Paintbrush
Cirsium sp.	Thistle
Crepis acuminata Nutt.	Long-leaved Hawksbeard
Descurainia richardsonii (Sweet) Schulz	Tansy-mustard
Draba verna L.	Spring Whitlow-grass
Erigeron pumilus Nutt.	Shaggy Fleabane
Erigonum microthecum Nutt.	Slenderbush Buckwheat
Grindelia squarrosa (Pursh) Dunal	Gumplant
Gutierrizia sarothrae (Pursh) B. & R.	Matchbrush
Hackelia floribunda (Lehm.) Johnst.	Forget-me-not Stickweed
Hackelia patens (Nutt.) Johnst.	Spreading Stickweed
Helianthus annuus L.	Common Sunflower
Hydrophyllum capitatum Dougl.	Ballhead Waterleaf
Lactuca scariola L.	Wild Lettuce
Lepidium perfoliatum L.	Pepper Grass
Lupinus argenteus Pursh	Lupine
Oryzopsis hymenoides (R.&S.) Ricker	Indian Rice Grass
Polygonum aviculare L.	Prostrate Knotweed
Ranunculus glaberrimus Hook.	Sagebrush Buttercup
Ranunculus testiculatus Crantz	Hornseed Buttercup

TABLE 3.5-2 (Cont)

OCCASIONAL SPECIES (Cont)

Rumex crispus L.	Sour Dock
Sphaeralcea munroana (Dougl.) Spach.	Desert Mallow
Tragopogon dubius Scop.	Goats Beard

TABLE 3.5-3

PLANT SPECIES OF THE SAGEBRUSH VEGETATIVE TYPE ON SELECTED LANDS

DOMINANT SPECIES	
Artemisia arbuscula Nutt.	Dwarf Sage
Artemisia tridentata Nutt.	Big Sage
Artemisia tripartata Rydb.	Threetip Sage
Chrysothamnus nauseosus (Pall.) Britt.	Gray Rabbit-Brush
Chrysothamnus viscidiflorus (Hook.) Nutt.	Green Rabbit-Brush
COMMON SPECIES	
Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Antennaria dimorpha (Nutt.) T. & G.	Low Pussy-toes
Atriplex canescens (Pursh) Nutt.	Fourwing Saltbush, Shadscale
Balsamorphiza hookeri Nutt.	Hooker's Balsamroot
Bromus tectorum L.	June Grass, Cheat Grass
Calochortus nuttallii T. & G.	Sego Lily
Castilleja angustifolia (Nutt.) G. Don	North West Paintbrush
Castilleja chromosa A. Nels	Desert Paintbrush
Castilleja hispida Benth.	Harsh Paintbrush
Gutierrizia sarothrae (Pursh) B. & R.	Matchbrush
Lichens	Lichen
Lomatium foeniculaceum (Nutt.) Coult. & Rose	Fennel-leaved Desert Parsley
Lomatium triternatum (Pursh) Coult. & Rose	Nine-leaf Lomatium
Mosses	Moss
Opuntia polyacantha Kaw.	Prickly Pear Cactus
Oryzopsis hymenoides (R.&S.) Ricker	Indian Rice Grass
Phlox hoodii Richn.	Hood's Phlox
Phlox longifolia Nutt.	Long-leaf Phlox
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass
Purshia tridentata (Pursh) DC.	Bitterbrush
OCCASIONAL SPECIES	
Allium acuminatum Hook.	Hooker's Onion
Balsamorhiza sagittata (Pursh) Nutt.	Arrowleaf Balsamroot
Collinsia parviflora Lindl.	Small-flowered Blue-eyed Mary
Comandra pallida A. D. C.	Bastard Toad-flax
Crepis accuminata Nutt.	Long-leaved Hawksbeard
Delphinium andersonii Gray	Desert Larkspur
Delphinium nutallianum Pritz.	Upland Larkspur
Dodecatheon pulchellum (Raf.) Merrill	Shooting Star
Erigeron pumilus Nutt.	Shaggy Fleabane
Fritillaria atropupurea Nutt.	Frilillaria Checker Lily
Fritillaria pudica (Pursh) Spreng.	Yellow Bell
Gilia aggregata (Pursh) Spreng.	Scarlet Gilla
Lupinus argenteus Pursh	Lupine
Mertensia oblongifolia (Nutt.) Don.	Bluebells

TABLE 3.5-3 (Cont)

OCCASIONAL SPECIES (Cont)

Microsteris gracilis (Hook.) Greene	Microsteris
Orogenia linearifolia Wats.	Turkey Peas
Penstemon deustus Dougl.	Hot-rock Penstemon
Penstemon humilis Nutt.	Lowly Penstemon
Ranunculus glaberrimus Hook.	Sagebrush Buttercup
Ranunculus testiculatus Crantz	Hornseed Buttercup
Rumex crispus L.	Sour Dock
Senecio sp.	Senecio
Sphaeralcea munroana (Dougl.) Spach.	Desert Mallow
Stipa comata Trin. & Rupr.	Needle & Thread Grass
Tragopogon dubius Scop.	Goats Beard
Zigadenus paniculatus (Nutt.) Wats.	Foothill Death Camas

TABLE 3.5-4

PLANT SPECIES OF THE JUNIPER VEGETATIVE TYPE ON SELECTED LANDS

Scientific Name	Common Name
DOMINANT SPECIES	
Juniperus osteosperma (Torr.) Little	Utah Juniper
COMMON SPECIES	
Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Antennaria dimorpha (Nutt.) T. & G.	Low Pussy-toes
Artemisia tridentata Nutt.	Big Sage
Artemisia tripartata Rydb.	Threetip Sage
Chrysothamnus nauseosus (Pall.) Britt.	Gray Rabbit-brush
Chrysothamnus viscidiflorus (Hook.) Nutt.	Green Rabbit-brush
Elymus cinereus Scribn. & Merr.	Giant Wildrye
Lichens	Lichen
Mosses	Moss
Phlox hoodii Richn.	Hood's Phlox
Phlox longifolia Nutt.	Long-leaf Phlox
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass
Purshia tridentata (Pursh) DC.	Bitterbrush
OCCASIONAL SPECIES	
Allium accuminatum Hook.	Hooker's Onion
Astragalus calycosus Torr.	Torrey Milkvetch
Astragalus purshii Dougl.	Loco Weed
Balsamorhiza sagittata (Pursh) Nutt.	Arrowleaf Balsamroot
Bromus tectorum L.	June Grass, Cheat Grass
Collinsia parviflora Lindl.	Small-flowered Blue-eyed Mary
Crepis acuminata Nutt.	Long-leaved Hawksbeard
Delphinium andersonii Gray	Desert Larkspur
Delphinium nuttallianum Pritz.	Upland Larkspur
Dodecatheon pulchellum (Raf.) Merrill	Shooting Star
Gutierrizia sarothrae (Pursh) B.& R.	Matchbrush
Juniperus scopulorum Sarg.	Rocky Mountain Juniper
Lithophragma bulbifera Rydb.	Woodlandstar
Lupinus argenteus (Nutt.)	Lupine
Microsteris gracilis (Hook.) Greene	Microsteris
Opuntia polyacantha Kaw.	Prickly Pear Cactus
Oryxopsis hymenoides (R.& S.) Ricker	Indian Rice Grass
Penatemon deustus Dougl.	Hot-rock Penstemon
Penstemon humilis Nutt.	Lowly Penst mon
Stipa comata Trin. & Rupr.	Needle and Thread Grass
Tagopogon dubius Scop.	Goats Beard
Zigadenus paniculatus (Nutt.) Wats.	Foothill Death Camas

TABLE 3.5-5

PLANT SPECIES OF THE MICROHABITAT
VEGETATIVE TYPE ON SELECTED LANDS

COMMON SPECIES

Allium accuminatum Hook.	Hooker's Onion
Collinsia parviflora Lindl.	Small-flowered Blue-eyed Mary
Delphinium andersonii Gray	Desert Larkspur
Delphinium nuttallianum Pritz.	Upland Larkspur
Dodecatheon pulchellum (Raf.) Merrill	Shooting Star
Hackelia floribunda (Lehm.) Johnst.	Forget-me-not
Hackelia patens (Nutt.) Johnst.	Spreading stickweed
Lithophragma bulbifera Rydb.	Woodlandstar
Lupinus argenteus Pursh	Lupine
Mertensia oblongifolia (Nutt.) Don.	Bluebells
Microsteris gracilis (Hook.) Greene	Microsteris
Mosses	Moss
Penstemon humilis Nutt.	Lowly Penstemon
Phlox hoodii Richn.	Hood's Phlox
Phlox longifolia Nutt.	Long-leaf Phlox
Prunus virginiana L.	Chokecherry
Rhus trilobata Nutt.	Smooth Sumac, Squawbush
Ribes aureum Pursh.	Golden Currant
Ribes sp.	Gooseberry, Currant
Rosa woodsii Lindl.	Wild Rose
Symphoricarpos oreophilus Gray	Snowberry
Viola nuttalli Pursh	Nuttall's Violet
Viola purpurea Kell.	Purplish Violet
Cystopteris fragilis (L.) Bernh.	Bladder-fern

OCCASIONAL SPECIES

Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Astragalus calycosus Torr.	Torrey Milkvetch
Astragalus purshii Dougl.	Loco Weed
Juniperus osteosperma (Torr.) Little	Utah Juniper
Lomatium foeniculaceum (Nutt.) Coult. & Rose	Fennel-leaved Desert Parsley
Lomatium triternatum (Pursh) Coult. & Rose	Nine-leaf Lomatium
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass

TABLE 3.5-6

PLANT SPECIES RECORDED ON SELECTED LANDS

Agropyron spicatum (Pursh) Scribn. & Smith	Bluebunch Wheatgrass
Allium acuminatum Hook.	Hooker's Onion
Antennaria dimorpha (Nutt.) T.& G.	Low Pussy-toes
Antennaria rosea Greene	Pussy-toes
Arabis holboellii Hornem.	Rock Cress
Artemisia arbuscula Nutt.	Dwarf Sage
Artemisia tridentata Nutt.	Big Sage
Artemisia tripartata Rydb.	Threetip Sage
Astragalus beckwithii T.& G.	Beckwith's Milkvetch
Astragalus calycosus Torr.	Torrey Milkvetch
Astragalus newberryi Gray	Newberry's Milkvetch
Astragalus purshii Dougl.	Loco Weed
Atriplex canescens (Pursh) Nutt.	Fourwing Saltbush, Shadscale
Balsamorhiza hookeri Nutt.	Hooker's Balsamroot
Balsamorhiza sagittata (Pursh) Nutt.	Arrowleaf Balsamroot
Berberis repens Lindl.	Oregon Grape
Bromus tectorum L.	June Grass, Cheat Grass
Calochortus nuttallii T.& G.	Sego Lily
Castilleja angustifolia (Nutt.) G. Don	North West Paintbrush
Castilleja chromosa A. Nels	Desert Paintbrush
Castilleja hispida Benth.	Harsh Paintbrush
Chrysothamnus nauseosus (Pall.) Britt.	Gray Rabbitbrush
Chrysothamnus viscidiflorus (Hook.) Nutt.	Green Rabbitbrush
Cirsium arvense (L.) Scop.	Canada Thistle
Cirsium utahense Petrak.	Utah Thistle
Cirsium vulgare (Savi.) Airy-Shaw.	Bull Thistle
Collinsia parviflora Lindl.	Small-flowered Blue-eyed Mary
Comandra pallida A. D. C.	Bastard Toad-flax
Crepis acuminata Nutt.	Long-leaved Hawksbeard
Cryptantha humilis (Greene) Pays.	Cat's Eye
Cystopteris fragilis (L.) Bernh.	Bladder-fern
Delphinium andersonii Gray	Desert Larkspur
Delphinium nuttallianum Pritz.	Upland Larkspur
Descurainia richardsonii (Sweet) Schulz	Tansy Mustard
Dodecatheon pulchellum (Raf.) Merrill	Shooting Star
Draba verna L.	Spring Whitlow-grass
Elymus cinereus Scribn. & Merr.	Giant Wildrye
Erigeron pumilus Nutt.	Shaggy Fleabane
Eriogonum microthecum Nutt.	Slenderbush Buckwheat
Fritillaria atropurpurea Nutt.	Fritillary, Checker Lily
Fritillaria pudica (Pursh) Spreng.	Yellow Bell
Geranium viscosissimum Fish. and Traut.	Sticky Geranium
Gilia aggregata (Pursh) Spreng.	Scarlet Gilia
Grindelia squarrosa (Pursh) Dunal.	Gumplant
Gutierrizia sarothrae (Pursh) B.& R.	Matchbrush
Hackelia floribunda (Lehm.)	Forget-me-not, Stickweed
Hackelia patens (Nutt.) Johnst.	Spreading Stickweed
Helianthus annuus L.	Common Sunflower

TABLE 3.5-6 (Cont)

Hydrophyllum capitatum Dougl.	Ballhead Waterleaf
Juniperus osteosperma (Torr.) Little	Utah Juniper
Juniperus scopulorum Sarg.	Rocky Mountain Juniper
Lactuca scariola L.	Wild Lettuce
Lepidium perfoliatum L.	Pepper Grass
Lichens	Lichens
Lithophragma bulbifera Rydb.	Woodlandstar
Lomatium foeniculaceum (Nutt.) Coult. & Rose	Fennel-leaved Desert Parsley
Lomatium grayi Coult. & Rose	Gray's Lomatium
Lomatium triternatum (Pursh) Coult. & Rose	Nine-leaf Lomatium
Lupinus argenteus Pursh	Lupine
Mertensia oblongifolia (Nutt.) Don.	Bluebells
Microsteris gracilis (Hook.) Greene	Microsteris
Mosses	Moss
Opuntia polyacantha Kaw.	Prickly Pear Cactus
Orogenia linearifolia Wats.	Turkey Peas
Oryzopsis hymenoides (R. & S.) Ricker	Indian Rice Grass
Penstemon deustus Dougl.	Hot-rock Penstemon
Penstemon humilis Nutt.	Lowly Penstemon
Phlox hoodii Richn.	Hood's Phlox
Phlox longifolia Nutt.	Long-leaf Phlox
Poa bulbosa L.	Bulbous Bluegrass
Poa pratensis L.	Kentucky Bluegrass
Poa sandbergii Vasey	Sandberg's Bluegrass
Polygonum aviculare L.	Prostrate Knotweed
Prunus virginiana L.	Chokecherry
Purshia tridentata (Pursh) DC.	Bitterbrush
Ranunculus glaberrimus Hook.	Sagebrush Buttercup
Ranunculus testiculatus Crantz	Hornseed Buttercup
Rhus trilobata Nutt.	Smooth Sumac, Squawbush
Ribes aureum Pursh.	Golden Currant
Ribes sp.	Gooseberry, Currant
Rosa woodsii Lindl.	Wild Rose
Rumex crispus L.	Sour Dock
Senecio sp.	Senecio
Sphaeralcea munroana (Dougl.) Spach.	Desert Mallow
Stipa comata Trin. & Rupr.	Needle and Thread Grass
Symphoricarpos oreophilus Gray	Snowberry
Tragopogon dubius Scop.	Goats Beard
Viola nuttalli Pursh	Nuttall's Violet
Viola purpurea Kell.	Purplish Violet
Zigadenus paniculatus (Nutt.) Wats.	Foothills Death Camas

TABLE 3.5-7

SUMMARY OF VEGETATION TRANSECT DATA

Transect No.	No. of 1 sq. m Quadrats	No. of Species Per Quadrat		Percent Plant Cover Per Quadrat	
		Mean	Range	Mean	Range
1	18	8.9	5-13	71	15-99
2	29	10.4	6-19	76	20-95
3	9	9.8	8-13	77	54-98
4	13	8.2	4-19	70	0-95

TABLE 3.5-8

DOMINANT PLANT SPECIES ALONG VEGETATION TRANSECTS

Transect No.	Scientific Name	Common Name	Mean Density Per Quadrat
1	*Agropyron spicatum*	Bluebunch Wheatgrass	27.0
	Bromus tectorum	June Grass, Cheat Grass	36.0
	Poa sandbergii	Sandberg's Bluegrass	48.0
2	*Agropyron spicatum*	Bluebunch Wheatgrass	11.3
	Bromus tectorum	June Grass, Cheat Grass	34.8
	Lithophragma bulbifera	Woodlandstar	24.3
	Lomatium foeniculaceum	Fennel-leaved Desert Parsley	6.2
3	*Agropyron spicatum*	Bluebunch Wheatgrass	17.8
	Bromus tectorum	June Grass, Cheat Grass	44.4
	Poa sandbergii	Sandberg's Bluegrass	51.0
	Phlox hoodii	Hood's Phlox	3.0
4	*Agropyron spicatum*	Bluebunch Wheatgrass	8.5
	Bromus tectorum	June Grass, Cheat Grass	34.6
	Poa sandbergii	Sandberg's Bluegrass	34.7

3.5.4 Range Conditions and Succession

On the selected lands, range conditions could be described as good, and this is reflected in the moderately high species diversity with more than 90 plant species recorded in the area. During June and July of 1975, grazing pressure was light and the condition of shrubs did not indicate that the area had received significant pressure from browsing animals (particularly deer) in the winter of 1974-1975. These factors and the cool, moist weather, experienced throughout much of the Intermountain West in the spring of 1975, combined to give the study area a relatively lush appearance and one where disturbance was masked.

In terms of successional state or seral stage, the area would be described as a fire disclimax with the frequency and abundance of perennials and annuals indicating good recovery since the last fire. The successional history of the area, although not well documented, suggests that the area underwent a shift from predominantly grassland to shrubs, especially sage, a process largely resulting from heavy grazing pressure. More recently the frequency of wildfire seems to have resulted in reversal of this trend and the reestablishment of predominantly grassland communities. It is probable that this successional pattern will continue.

3.6 ANIMALS

3.6.1 Mammals

Based upon distributional data and habitat preference information contained in the literature and field work conducted at the site, some 35 species of wild mammals listed in Table 3.6-1, are known to occur or would

be likely to occur on the selected lands. None of these species is considered endangered or threatened. Of the 35 species, 10 were observed or collected during field investigations at the site. Among the larger mammals which may occur on the area are included Mule Deer, Bobcat, Spotted Skunks, Badgers, Red Foxes, Coyotes, Marmots, Cottontails and two species of Jack Rabbits.

During field work at the site in late spring of 1975, two deer were observed as were numerous fresh tracks particularly in the canyon bottoms of the "B" Priority lands at the southern portion of the selected lands. The lands lie within Deer Herd Management Unit 70 of the Idaho State Fish and Game Department. According to information received from personnel of this Department (Dale Jensen and Perry Johnson, personal communication) there are some year-around resident deer present but the general area also serves as winter range for deer migrating from the Caribou National Forest and other lands farther south. Over the past several winters deer use in the area has been declining and in one censusing effort during the late winter of 1975, no animals were observed in the study area on and near the selected lands. One reason for the decline in use of the area as winter range may be that deer have had their migration route interrupted by development along Mink Creek some eight to 10 miles south of the study area (Perry Johnson, personal communication). Another factor may be increased human activity in the general winter range area including frequent indiscriminate target shooting.

TABLE 3.6-1

SPECIES OF WILD MAMMALS KNOWN OR EXPECTED TO OCCUR ON SELECTED LANDS

(Taxonomy follows Larrison, 1967)

Scientific Name	Common Name
Sorex vagrans	Vagrant Shrew
Myotis lucifugus	Little Brown Bat
Myotis evotis	Long-eared Bat
Myotis volans	Long-legged Bat
Myotis californicus	California Bat
Myotis subulatus	Small-footed Bat
Myotis thysanodes	Fringed Bat
Myotis yumanensis	Yuma Bat
Eptesicus fuscus	Big Brown Bat
Lasiurus cinereus	Hoary Bat
Plecotus townsendii	Townsend's Big-eared Bat
Sylvilagus nuttallii	Nuttall's Cottontail
Lepus townsendii	White-tailed Jack Rabbit
Lepus californicus	Black-tailed Jack Rabbit
*Eutamias minimus	Least Chipmunk
*Marmota flaviventris	Yellow-bellied Marmot
Thomomys townsendii	Townsend's Pocket Gopher
*Thomomys talpoides	Northern Pocket Gopher
*Perognathus parvus	Great Basin Pocket Mouse
Dipodomys ordii	Ord's Kangaroo Rat
Reithrodontomys megalotis	Western Harvest Mouse
*Peromyscus maniculatus	Deer Mouse
Onychomys leucogaster	Northern Grasshopper Mouse
*Neotoma cinerea	Bushy-tailed Wood Rat
Microtus montanus	Montane Vole
Lagurus curtatus	Sagebrush Vole
Mus musculus	House Mouse
*Canis latrans	Coyote
Vulpes vulpes	Red Fox
*Mustela frenata	Long-tailed Weasel
Mustela erminea	Ermine
*Taxidea taxus	Badger
Spilogale gracilis	Spotted Skunk
Lynx rufus	Bobcat
*Odocoileus hemionus	Mule Deer

*Denotes species observed or collected on selected land.

Some deer hunting does take place on or near the selected lands although this cannot be quantified. The area is not considered a prime deer hunting area and is not thought of as one of the traditional places to which large numbers of "serious" hunters go to pursue this activity (Perry Johnson, personal communication). However, it does provide an area to which deer hunters can obtain rapid and easy access from the Pocatello area and which can provide success, particularly to those persons familiar with deer movement patterns and activity sites.

Small mammal populations were investigated by conducting trapping with Museum Special snap-traps baited with rolled oats and peanut butter. Three trapping designs were utilized including three 400-foot-long single lines, one pair of 400-foot long parallel lines 100 feet apart and two 50 foot circular lines. Trapping stations were 20 feet apart with either two or three traps per station and a trapline was run for either two or three consecutive nights. Traplines were set covering a total of six separate nights during June, 1975. All major vegetative types were sampled. The locations of the traplines are shown in Plate 3.5-1.

The total trapping effort of 940 trap-nights yielded 13 captures consisting of eight Deer Mice, five Great Basin Pocket Mice and two Northern Pocket Gophers. Based on these results in comparison with long-term extensive trapping in nearby areas (Barry Keller, unpublished), species diversity is low on the selected lands and rodent population density is probably less than one animal per acre. On the desert grassland-sagebrush communities northwest of the study area, rodent population density is often in excess

of 10 animals per acre. There was also an indication that Deer Mouse density was higher in the Juniper vegetative type than in the other vegetative types sampled on the selected lands.

Cattle and horses graze the selected lands primarily during the spring and fall under terms of grazing rights issued by BLM to Michaud Creek Ranches. Their total grazing allotment on BLM land is 3,870 acres of which approximately 200 acres is included on the selected lands. According to BLM records, the total allotment held by Michaud Creek ranches is as follows:

10 horses (20 AUM) from April 1 to May 30, 1975

10 horses (30 AUM) from August 1 to October 30, 1975

250 cattle (500 AUM) from May 1 to June 30, 1975

The vegetative types of the selected lands have grazing capacities of 7 acres per AUM (animal unit month) and forage production averages 110 pounds of dry forage per acre. During field investigations during June of 1975 not more than 30 cattle were ever observed on the study area and these were usually located at higher elevations in the southern part of the tract.

3.6.2 Birds

Observations on the avian fauna of the selected lands were made during the early morning and late afternoon periods from May 31 through June 12, 1975. Data collected included the kinds and numbers of birds, locations, activity and nesting behavior. All major portions of the selected lands were covered during these surveys. The results of this study are summarized in Table 3.6-2. In addition to the 39 species observed during field work, Dr. Charles H. Trost, Resident Ornithologist, Idaho State

University, Pocatello, compiled a listing of an additional 70 species which might be expected to utilize the selected lands for nesting, over-wintering or as a migration stop (Table 3.6-3).

Of the total of 109 species of birds which may utilize the selected lands, two, the Bald Eagle and the Peregrine Falcon are considered "endangered" i.e., in danger of extinction throughout all or a significant portion of its range (Office of Endangered Species and International Activities, 1974). With regard to the former, only the southern subspecies of Bald Eagle (Haliaeetus leucocephalus leucocephalis) is considered endangered; the northern subspecies (H.l. alascanus) is not. There is some disagreement concerning the distribution of the northern and southern subspecies (Snow, 1973) but the bald eagles which utilize the selected lands and other nearby lands during the winter for hunting grounds, coming from a major roost approximately five miles to the southeast, are, according to Dr. Trost, the northern subspecies.

The American Peregrine Falcon has seldom been seen in Idaho other than in the Birds of Prey Natural Area along the Snake River in the western part of the state (Mohler, 1974). It would be extremely unlikely that a Peregrine would be seen near the selected lands and then only as a transient.

TABLE 3.6-2

BIRD SPECIES OBSERVED ON SELECTED LANDS, JUNE 1975

Species	Area of Observation*	Nesting Status**	Maximum No. Observed
Sharp-shinned Hawk	B	F	1
Marsh Hawk	A,B	F	2
Golden Eagle	A,B	N	2
Sparrow Hawk	A,B	P	4
Hungarian Partridge	A,B	E	2
Killdeer	A	E	2
California Gull	A,B	F	7
Ring-billed Gull	A	F	5
Rock Dove	A,B	E	11
Mourning Dove	A,B	N	10
Nighthawk	A	F	1
Great Horned Owl	B	N	2
Calliope Hummingbird	A	E	1
Common Flicker	A,B	E	2
Eastern Kingbird	A	M	1
Western Kingbird	A	E	5
Violet-green Swallow	A,B	E	3
Pinyon Jay	B	F	2
Black-billed Magpie	A,B	N	3
Rock Wren	A,B	P	5
Canyon Wren	A,B	E	2
Townsend's Solitaire	B	F	1
Blue-gray Gnatcatcher	B	E	2
Starling	A,B	E	2
Yellow Warbler	A	E	2
Western Meadowlark	A,B	N	14
Brewer's Blackbird	B	M	2
Brown-headed Cowbird	B	E	1
Western Tanager	B	M	2
Black-headed Grosbeak	B	F	2
Lazuli Bunting	A,B	P	6
Green-tailed Towhee	B	P	3
Grasshopper Sparrow	A,B	P	5
Vesper Sparrow	A,B	E	7
Lark Sparrow	A,B	E	5
Tree Sparrow	A,B	E	1
Chipping Sparrow	A,B	E	18
Brewer's Sparrow	A,B	P	5
Sage Sparrow	A	M	1

* A - Priority "A" selected lands; B - Priority "B" selected lands.

** N - Nests of these species were located; P - Probable nesting species as indicated by behavior, but nest not located; E - Expected nesting species, but nesting behavior not observed; F - Species using area for foraging but which do not nest on site; M - Migratory species utilizing site as a stop-over area.

TABLE 3.6-3

BIRD SPECIES NOT OBSERVED ON SELECTED LANDS
WHICH MAY BE EXPECTED TO UTILIZE SUCH LANDS
FOR NESTING, OVER-WINTERING OR DURING MIGRATION

Species	Status*	Species	Status
Goshawk	M	Red-winged Blackbird	N
Cooper's Hawk	M	Robin	N
Red-tailed Hawk	NW	Mountain Bluebird	M
Swainson's Hawk	M	Ruby-crowned Kinglet	M
Rough-legged Hawk	W	Bohemian Waxwing	M
Ferruginous Hawk	M	Cedar Waxwing	M
Bald Eagle	W	Northern Shrike	M
Prairie Falcon	M	Loggerhead Shrike	N
Peregrine Falcon	M	Warbling Vireo	M
Ruffed Grouse	N	Black-throated Gray Warbler	M
Sage Grouse	N	MacGillivary's Warbler	M
Chukar	N	Audubon's Warbler	M
Barn Owl	M	Yellow-breasted Chat	M
Black-chinned Hummingbird	M	Wilson's Warbler	M
Broad-tailed Hummingbird	M	House Sparrow	N
Rufows Hummingbird	M	Evening Crosbeak	M
Lewis' Woodpecker	M	Cassin's Finch	M
Say's Phoebe	M	House Finch	M
Gray Flycatcher	M	Bullock's Oriole	M
Olive-sided Flycatcher	M	Gray-crowned Rosy Finch	N
Horned Lark	W	Black Rosy Finch	W
Tree Swallow	M	Common Redpoll	M
Bank Swallow	M	Pine Siskin	M
Cliff Swallow	M	American Goldfinch	M
Barn Swallow	M	White-winged Crossball	M
Rough-winged Swallow	M	Rufous-Sided Towhee	M
Common Crow	M	Lark Bunting	M
Black-capped Chickadee	M	Savannah Sparrow	M
Plain Titmouse	M	Song Sparrow	M
Common Bushtit	M	Black-throated Junco	M
Red-breasted Nuthatch	M	Slate-colored Junco	M
Brown Creeper	M	Oregon Junco	M
House Wren	M	Gray-headed Junco	M
Catbird	M	White-crowned Sparrow	M
Sage Thrasher	N	Snow Bunting	M

*N = species expected to nest on selected lands
W = species which over-winter in the area
M = species which migrate through selected lands; some may nest nearby in different habitats

Source: Charles H. Trost (personal communication).

Another species listed, the Prairie Falcon, has been recognized as "threatened," i.e., one which, although not presently threatened with extinction, is in such small numbers throughout all or part of its range that it may become endangered if its environment becomes worse (Office of Endangered Species and International Activities, 1973). This raptor has disappeared from many localities over its range but the Birds of Prey Natural Area in southern Idaho probably contains the largest concentration of these birds known to man (Mohler, 1974). Although no Prairie Falcons were observed during field studies, an occasional sighting would not be unlikely. Charles Trost (personal communication) related knowledge of an historical eyrie of this species high on the cliffs in the southern portion of the selected lands.

Atypical weather conditions in Idaho and other western states during the spring of 1975 resulted in observation of a number of bird species which were still migrating to breeding grounds farther north. Although the occurrence of these species on the study area during the June observation period was unusual, it does indicate that a number of species use the area during normal migration as a stop-over on their migration route to traditional nesting grounds.

Of the 39 species which were recorded from the selected lands during the field studies, the most numerous were Western Meadowlarks, Chipping Sparrows, Mourning Doves, Rock Doves, Rock Wrens, Lark Sparrows, California Gulls, Lazuli Buntings and Brewer's Sparrows. While only five species were actually observed on nests, including Western Meadowlarks, Mourning Doves, Great Horned Owls, Golden Eagles and Black-billed Magpies, the behavior of

six other species indicated that nesting territories were established and that breeding and nesting were in progress. Another sixteen species of those observed would be expected to be nesting on the selected lands but nesting behavior was not noted. Ten additional species which were not observed on the selected lands could also be expected to nest on the area.

Fourteen species of passerine birds utilize the sagebrush and grassy slopes below 5,000 feet in elevation for nesting activities. These include the Western Kingbird, Black-billed Magpie, Robin, Starling, Yellow Warbler, House Sparrow, Western Meadowlark, Red-winged Blackbird, Brewer's Blackbird, Lazuli Bunting, Green-tailed Towhee, Grasshopper Sparrow, Vesper Sparrow, and Brewer's Sparrow. Mourning Doves and Hungarian Partridge also nest below 5,000 feet. Chukar, Rock Wrens, Canyon Wrens, Common Flickers, Violet-green Swallows, Blue-gray Gnatcatchers, Lazuli Buntings, Lark Sparrows, Gray-crowned Rosy Finches, and Chipping Sparrows nest in Junipers and along rock slides above 5,000 feet.

Three species of raptors nest in the rock cliffs in the southern portion of the selected lands. Two pairs of Sparrow Hawks were observed displaying breeding behavior in this area. A pair of Great Horned Owls nest in similar habitat on the "B" Priority portion of the selected lands; this nest has been occupied for the past few years. Finally, a pair of Golden Eagles has an eyrie in the cliffs.

With regard to the Golden Eagle nesting, this area has been a nesting site for the past 30 years according to Morlan W. Nelson, (personal communication). Actually, there are at present two nest

sites less than one-quarter mile apart; having two or three alternate nest sites is quite typical of this species (Snow, 1973). Reproductive success of the pair nesting on the selected lands has only been recorded for the past two years with two young fledged in 1974 and one of two nestlings fledged in 1975. Golden Eagles show a wide diversity in food habits depending upon locality and prey availability but show a strong preference for rabbits, hares and the larger small rodents, with these mammals comprising 70 to 90 percent by weight of an eagle's diet (Brown and Amadon, 1968). Their killing success depends on hunting skill and basic principles of aerodynamics. They require thermal or escarpment updrafts to gain altitude and most generally attack into the wind. The rocky cliffs and canyons on the selected lands provide an ideal area for air mass circulation conducive to raptorial hunting. The territory over which Golden Eagles hunt is quite variable and not well documented but Reynolds (1969) studied a nesting pair in Montana and found they spent most of their time in the 13 square-mile area although they used a total of 32 square miles while Smith and Murphey (1973) found that Golden Eagles on their study area in eastern Utah maintained average home ranges of about nine square miles.

Four species of game birds, Mourning Doves, Hungarian Partridge, Chukars and Sage Grouse, may nest on the selected lands. Doves and Hungarian Partridge were observed during the field investigation, with nests of the former species located. No Chukars were seen but they were heard calling from the rocky cliffs on several of the days spent in the field and could be nesting. No indication of Sage Grouse presence was obtained but according

...se less than one-quarter mile apart ... [illegible] ...

...se is quite typical of this species ... [illegible] ...

...the pair nesting ... [illegible] ...

...years with some young ... [illegible] ...

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...y spent most of their time ... [illegible] ...

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Four species of game birds ... [illegible] ...

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...rtridge were observed during the field investigations ... [illegible] ...

...ary species ... [illegible] ...

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...nesting. ... [illegible] ...

to Perry Johnson (personal communication) a few of these birds may utilize the selected lands.

Some hunting pressure is exerted on these game birds on the selected lands but quantitative data regarding this pressure or harvest is not available. According to Perry Johnson (personal communication) the selected lands are not part of a major hunting area for upland game birds and hunting pressure is light. The major species sought by hunters here is the Hungarian Partridge and, to a lesser extent, the Chukar; this probably reflects the relative abundance of the two species. Hunting effort expended upon Mourning Doves and Sage Grouse or the harvest of these birds is not known.

3.6.3 Reptiles

Based upon distributional data and habitat preference information contained in the literature and field work conducted during June and July, 1975, two species of lizards and nine species of snakes are known to occur or would be likely to occur on the selected lands. These reptiles are listed in Table 3.6-4.

Gopher Snakes and Western Racers were commonly observed, and three Western Skinks, two Sage Lizards, and three Great Basin Rattlesnakes were also encountered during field work. It is very likely that the winter hibernacula of the Great Basin Rattlesnake are located in rocky areas of the selected lands.

TABLE 3.6-4

SPECIES OF REPTILES KNOWN OR EXPECTED TO OCCUR ON SELECTED LANDS

(Taxonomy follows Linder and Fichter, 1970)

Scientific Name	Common Name
* Sceloporus graciosus	Sage Lizard
* Eumeces skiltonianus	Western Skink
Charina bottae	Rubber Boa
Thamnophis elegans	Western Garter Snake
Thamnophis sirtalis	Common Garter Snake
Diadophis punctatus	Western Ring-necked Snake
* Coluber constrictor	Western Racer
Masticophis taeniatus	Desert Striped Whip Snake
* Pituophis melanoleucus	Gopher Snake
Hypsiglena torquata	Spotted Night Snake
* Crotalus viridis	Great Basin Rattlesnake

*Denotes species observed or collected on selected lands.

3.7 ECOLOGICAL INTERRELATIONSHIPS

Although incompletely understood, interrelationships and interdependencies among plants, animals and their abiotic environment obviously are of great significance in maintaining varied and viable communities. These relationships for the selected lands can only be inferred or obtained from literature reports since the detailed and long term studies required to elucidate these interactions have not been conducted on the lands in question.

Many of the important feeding and community relationships among the key species of birds and mammals inhabiting the selected lands have been discussed in Section 3.6 and those which will be significantly impacted will be further discussed in Section 4.0. A basic conclusion from these studies is the fact that the numerous kinds of animal life which occur in the area has as its basis the high species diversity represented in the plant communities. The lack of a permanent source of free water, however, may serve to limit the kinds and numbers of animals which utilize the selected lands.

Plant succession, another key process affecting ecological interrelationships, was discussed in Section 3.5 where it was noted that the effects of fire and grazing pressure on the selected lands had altered and influenced successional trends.

Insight into the ecological relationships of plant species found on the selected lands can be gained by study of Table 3.7-1. For each of the common and dominant plant species information is summarized which pertains to such characteristics as soil, moisture and elevation tolerance and preference, palatability and utilization by domestic animals and wildlife, tolerance to disturbance factors, competitiveness, etc.

SCIENTIFIC NAME AND FAMILY NAME	CHARACTERISTICS
<u>Agropyron</u> <u>spicatum</u> (Pursh) Scridn. & Smith Family: Gramineae Common Name: Bluebunch Wheatgrass	A native bunch grass which can be found growing from the plains to middle elevations in the mountains; has dense root masses which protect against water erosion; there tends to be a reduction in the ability of the soil surface to absorb water when this species is reduced or eliminated; is a good soil binder; when this grass is eliminated there is a decrease in aeration of the soil, a loss of other plant species and an increase in erosion of the top-soil; is one of the first grasses to be eradicated by overgrazing; cures well; excellent forage for livestock and game animals.
<u>Artemisia</u> <u>tridentata</u> Nutt. Family: Compositae Common Name: Big Sage	A woody perennial found in soils ranging from wet to dry but predominant in dry areas; grows in valleys and hills to timberline in soils ranging from strongly alkaline to non-alkaline; has a narrow range of tolerance to total soil moisture stress; needs high calcium levels for healthy growth; is sensitive to soil pH, growing better in neutral or slightly acidic conditions; is sensitive to chlorides; absorbs little sodium and generally has lower phosphorus levels than many other shrub species; fixes nitrogen in its roots; is one of the most drought tolerant of the species of <u>Artemisia</u>; uses enough soil moisture to curtail the growth of grasses and other annual plants; competes with <u>Agropyron</u>; shows preference for cool soil and air temperatures typical of Great Basin Desert conditions in late spring; comes in abundantly when overgrazing or other disturbances kill grasses; is a native plant and is valuable to wildlife as food, shelter, and as nesting sites; deer, elk and moose graze or browse it heavily, especially in late winter;

SCIENTIFIC NAME AND FAMILY NAME	CHARACTERISTICS
Artemisia tridentata Nutt. (cont.)	primary food source for antelope; is a necessary plant for sage thrasher, sage grouse, and many other animals; mourning doves nest most successfully where it is found with other native plants.
Balsamorhiza hookeri (Pursh) Nutt. Family: Compositae Common Name: Hooker's Balsamroot	Perennial without an obvious stem found in dry, open places at low and moderate elevations, frequently in association with *Artemisia*; is damaged or killed by sage spraying, overgrazing and inundation; elk, deer, cattle, sheep and antelope eat the tender young shoots; horses select flowering heads; many birds utilize the fruits.
Bromus tectorum L. Family: Gramineae Common Name: June Grass; Cheat Grass	Annual that sometimes overwinters; is an invader species found on roadsides, canal banks, waste places and overgrazed sage areas; is not found in good stands of native vegetation that have not been over-exploited; helps bind soil that would otherwise be left exposed by poor management; causes problems in mouths of livestock when fruit ripens; causes fire hazards because it burns readily; is one of the most widespread grasses in Idaho.
Chrysothamnus nauseosus (Pall.) Britt. Family: Compositae Common Name: Grey Rabbit-brush	Shrubby perennial found in open places from lowlands to mid-elevations in mountains; common in dry areas in association with sagebrush and/or areas disturbed by spraying, plowing, ant colonies, etc.; thrives on poor soil; is often an indicator of overgrazing and eroded soil; is a reserve food for antelope, jackrabbits, mountain sheep, mule deer and elk.

SCIENTIFIC NAME AND FAMILY NAME	
<u>Gutierrizia</u> <u>sarothrae</u> (Pursh) B.& R. Family: Compositae Common Name: Matchbrush	Perennial shrub which grows in dry open places, generally at low elevations; often found in association with sagebrush and rabbitbrush; is found in abundance only in areas that have been overgrazed; if consumed in large quantities can be poisonous to livestock.
<u>Hackelia</u> <u>patens</u>(Nutt.) Johnst. Family: Boraginaceae Common Name: Spreading Stickweed	Biennial or perennial which grows in moist to medium-dry soil of plains and hills up to 8,000 ft.; is part of the native vegetation and can be found along streams, in brush copses and on hillsides; overgrazing of an area will reduce its abundance as will impoundments, cultivation and overuse.
<u>Juniperius</u> <u>osteosperma</u> (Torr.) Little Family: Cupressaccae Common Name: Utah Juniper	A rough, bushy tree found in dry plains and foothills; frequently grows on south-facing slopes; provides winter food for deer and elk as well as shelter and protection for many animals; is important to deer migration and use of an area; is killed by fire and spray.
<u>Lomatium</u> <u>foeniculaceum</u> (Nutt) Coult. & Rose Family: Umbelliferae Common Name: Fennel-leaved Desert Parsley	A perennial herb found on dry, open slopes, valleys and plains; often associated with sagebrush; eaten by livestock and game animals; birds consume the seeds.
<u>Lithophragma</u> <u>bulbifera</u> Rydb. Family: Saxifragaceae Common Name: Woodlandstar	Perennial herb found mostly in association with sagebrush in rich, medium-dry soil from low valleys to about 9,000 ft. elevation; rodents, chukars and Hungarian partridge feed on the bulblets; is killed by spray, overgrazing and inundation.

SCIENTIFIC NAME AND FAMILY NAME	CHARACTERISTICS
Phlox _hoodii_ Richn. Family: Polemoniaceae Common Name: Hood's Phlox	Low shrub, common among sagebrush at lower elevations; good ground cover; probably too spiny to be of much forage value; is killed by spraying, fires, and overgrazing; in early stages of overgrazing, however, it tends to increase; due to soil erosion its presence may result in its growing on a mound.
Poa _sandbergii_ Vasey Family: Gramineae Common Name: Sandberg's Bluegrass	Non-rhizomatous perennial generally of the desert or of dry exposed areas in the lower mountains; frequently found in association with _Agropyron spicatum_; tends to flower between April and late June; is good forage for livestock.

3.8 HUMAN VALUES

3.8.1 Landscape Character

The discussion in this section will relate primarily to the visual environment of the selected lands and surrounding area and how the selected lands and the existing gypsum disposal areas are visually perceived from a number of locations in the general vicinity.

Portions of the selected and surrounding BLM lands offer an easily accessible area from which residents of the Pocatello area can obtain a vista of the Snake River Plain and the Pocatello Valley from an elevation some 500 feet above that of the city. The viewpoints do not have high aesthetic appeal in themselves, being primarily a desert foothill community composed of mixed grasses and shrubs with occasional juniper trees. However, to a resident of an urbanized area, there are seemingly natural qualities to the lands, which undoubtedly provide relief from the congestion of the city. Although the land is relatively undisturbed, the connotation of wildness or seclusion would be difficult to achieve due to the continual reminders of human activities and presence such as motorcycle and four-wheel drive vehicle trails and roads, fences, cattle and various sorts of human debris.

The vista which is perceived from the selected lands is interesting but not unique consisting of flat to rolling rangeland and irrigated and non-irrigated cropland dissected by the Portneuf River and by the bottomlands and riparian vegetation along the Snake River. The foreground of this vista, however, contains many reminders of man's activities; the J. R. Simplot Company gypsum storage areas and plant complex; the FMC Corporation's slag piles, industrial waste ponds and plant complex; Chevron Oil Company's storage tanks;

the Pocatello Municipal Air Terminal; Highway I-15W; the Union Pacific Railroad's main line; power transmission lines and gravel pits.

When viewed from a distance of some five miles, as when traveling along Highway I-15 on the bench east of Pocatello, the general area of the selected lands is perceived as being at the northern terminus of a mountain range which gradually makes the transition to the valley floor. The mountain range itself is not particularly impressive either from the standpoint of topographic features or vegetative aspects which, during most of the year, consists of brownish, low-growing grassland and desert shrubs with occasional low trees. While traveling along I-15W in the near vicinity of the selected lands at a distance of one and one-half to two miles, the steep rocky outcrops and canyons of the selected lands can be easily seen and provide an aesthetic value to the traveling public. However, it is a matter of conjecture whether the motoring public's visual attention is focused on these natural landscape features or whether it is more captivated by the dominant industrial facilities (i.e., the J. R. Simplot Company and the FMC Corporation plants and waste disposal areas).

The visual aesthetic impact of the present J. R. Simplot Co. gypsum storage area was assessed by driving along major routes in the area and recording the degree of visibility from a number of locations.

Approaching the J. R. Simplot Company plant site from the west while driving east on Highway I-15W, the gypsum disposal area is not visible until one crosses the Taghee Canal approximately 1.5 miles west of the plant; this is due to the fact that the FMC Corporation's slag piles are of such a height as to obscure the gypsum disposal area. The gypsum storage area disappears from a forward or side view shortly after the Portneuf River is

crossed. Total exposure to a motorist traveling east on Highway I-15W is thus approximately two miles or slightly more than two minutes at average freeway speeds. During at least a portion of this distance and time, visual attention would be directed toward the plant complex rather than the storage area.

When driving north and west on U. S. Highway 30 from Pocatello, the gypsum storage areas are hidden by the topography until one is within 1,000 feet of the old storage area, approximately at the point where the Bannock-Power County line is crossed. On this route there is a very sudden visual transition from a desert shrub-grassland foothill landscape to one of an industrial complex. For the previous mile or two, however, a motorist has been subjected to land use which is not aesthetically pleasing with the operations of a ready-mix concrete company, a paving company, a concrete pipe company and a scrap metal salvage company located near the roadside.

Traveling north on Highway I-15, the first visual perception of the gypsum storage area, this being the now abandoned storage area, is at a distance of four miles near the Pocatello Creek Interchange, located about one mile south of the junction of Highways I-15 and I-15W. Identification of the area as a waste disposal area is difficult at this distance; the general impression is that there is some form of land use at the site which gives rise to a contrast in color with the foreign site being gray as opposed to the prevailing brown of the surrounding area. Proceeding north along Highway I-15, the expanse of the "gray area" is noted to increase but the area passes from a side view after the I-15 and I-15W junction is passed. Driving south on I-15, the extent of the gray gypsum storage area is more

apparent and is intermittently visible, due to roadside topography, for approximately five miles north of the I-15 and I-15W junction.

The greatest visual perception of the disposal area for the longest duration occurs when traveling west on I-15W from the junction of I-15 and I-15W, for a distance of 4.5 miles over an average time of five minutes at typical freeway speeds. Along this route, one is driving directly toward the J. R. Simplot Company facility and the area occupies progressively more and more of the visual landscape. At first only the old gypsum storage area is visible and then gradually the operating storage area comes in view. By the time Philbin Road, two miles east of the plant, is crossed, the combined gypsum storage areas and the plant facilities have become the dominant landscape features and the size of the operation is rather striking. Just before crossing the Portneuf River, the plant facility captures and holds visual attention for approximately one-half mile, after which the plant and storage areas pass from a side view.

The storage areas are generally not visible south of Quinn Road, an east-west road one-half mile south of and paralleling I-15W. This road forms part of the northern boundary of the City of Pocatello and over 90 percent of Pocatello's area lies to the south of this road. Chubbuck lies primarily to the north of I-15W and the gypsum storage areas can be seen from here but do not form a significant portion of the visually perceived landscape due to the distance (three miles) involved, the flat topography and the visual restrictions imposed by residences, businesses and landscaping.

Visual impact is, in part, a function of the number of viewers. Since most of the discussion presented has been based upon visibility from major highways, it is appropriate to summarize their traffic volume.

Data taken from the Idaho Department of Highways Monthly Rural Automatic Traffic Counter Bulletins for 1974 was analyzed. This data showed that the average daily traffic flow during 1974 of all classes of vehicles on I-15W just west of the U. S. 30 interchange at the Simplot plant was 6,690 vehicles or slightly more than 2.4 million vehicles for the entire year. Traffic volumes were greatest during the months from June through October and minimum volume occurred during the months from December through February. Traffic volume on I-15 just north of Pocatello was approximately 20 percent greater than the figures cited for I-15W.

Depending upon the approach and take-off patterns utilized, the gypsum storage areas can be viewed by passengers in commercial airliners. During fiscal year 1974, the Pocatello Municipal Air Terminal recorded 44,557 enplaned passengers on the two commercial airlines serving the airport (Southeast Idaho Council of Governments, 1975).

While the existing gypsum storage areas are not in harmony with the existing natural landscape, the proposed extension of the gypsum storage areas would not be in conflict with the altered present landscape, i.e., one which is currently being utilized for gypsum storage, or the general land use on adjacent lands, i.e., industrial phosphate processing industrial complexes, and would add only incremental disharmony to the natural landscape.

3.8.2 Cultural Values

During June, 1975, B. Robert Butler, Curator of Archaeology, Idaho State University, conducted an archaeological survey of the selected lands. His letter report is reproduced in full in Plate 3.8-1.

Only one archaeological site was located, an open site marked by a concentrated scatter of chipping debris. This site, at 5,500 foot elevation, is located well above the proposed maximum elevation of the gypsum storage area and occurs on Priority B Lands. It shows evidence of some human disturbance and a road suitable for four-wheel drive vehicles passes very close to the site.

In the immediate locality, the site is unique, largely because of its location on a high promontory overlooking the lower end of the Portneuf River Valley, Bannock Creek and the Snake River Plain. It may have served as an observation post, but when and for how long only excavation will reveal. No comparable site has been excavated in the Upper Snake River country and there is no local ethnographic information bearing on the site. Mr. Butler recommends further evaluation of the site by conducting a well-designed, small-scale excavation to determine the depth, areal extent and general contents.

3.8.3 Socioeconomic Conditions

3.8.3.1 Introduction

In this section, the past, present and projected future socioeconomic baseline conditions for the area will be discussed. Important parameters covered include population trends, employment and level of economic activity, income and services.

Idaho State University
POCATELLO, IDAHO
83209

Anthropology, Box 8005
Telephone: 208-236-2309

June 18, 1975

Dr. Fred Rose
Western Environmental Research
P. O. Box 4794
Pocatello, Idaho 83201

Dear Dr. Rose:

Over a period of several days earlier this month, at the request of WERA, a subcontractor, I conducted an intensive archaeological survey of certain portions of public lands immediately south of the J. R. Simplot plant settling pond, Power County, Idaho, to wit: parts of Sections 17, 18, 19 and 20, T6S, R34E, as shown on J.R.S. drawing 130-0701-0-116 "B" revised 5-21-75.

With a crew consisting of myself and one other person, all of the canyon bottoms and slopes below 5100' a.s.l. were examined first: the rimrock and plateaus above were examined next. While an occasional flake and a fragment of projectile point were observed in the course of the survey, all outside of the proposed extension of the settling pond, only one archaeological site was noted. This site, 10-PR-93, is situated on the 5500' high ridge in the NW corner of Section 19, on the leeward (southeast) side of the rock outcrop forming the spine of this ridge. It is an open site marked by a concentrated scatter of chipping detritus made up of flakes of jasper, chalcedony, quartzite, ignimbrite and obsidian. No artifacts, such as projectile points or scrapers, were observed. However, as evidenced by modern debris and the road leading up on the site, there is considerable impact on the site by local users of this public land. Although the ridge in question is well above the proposed extension of the settling pond, steps should be taken to preserve the site or to have it properly excavated.

Sincerely yours,

B. Robert Butler, Acting Chairman
Associate Professor of Anthropology
Curator of Archaeology, Museum

BRB/lr
CC: Rich Harrison, BLM, Boise
CC: Nick Cozakos, BLM, Burley

Idaho State University
POCATELLO, IDAHO
83209

...opology, Box 8005
...hone: 208-236-2209

June 18, 1975

Dr. Fred Rose
Western Environmental Research
P. O. Box 4794
Pocatello, Idaho 83201

Dear Dr. Rose:

Over a period of several days earlier this month, at the request of WERA, a subcontractor, I conducted an intensive archaeological survey of certain portions of public lands immediately south of the J. R. Simplot plant settling pond, Power County, Idaho, in the W parts of Sections 17, 18, 19 and 20, T6S, R34E, as shown on J.R.S. drawing 130-0001-0-115 (B) revised 5-21-75.

With a crew consisting of myself and one other person, all of the canyon bottoms and slopes below 5100' a.s.l. were examined closely; the rimrock and plateaus above were examined next. While an occasional flake and a fragment of projectile point were observed in the course of the survey, all outside of the proposed expansion of the settling pond, only one archaeological site was noted. This site, 10-PR-85, is situated on the 5000' high ridge in the NW corner of Section 19, on the leeward (southeast) side of the rock outcrop forming the spine of this ridge. It is an open site marked by a concentrated scatter of chipping detritus made up of flakes of jasper, chalcedony, quartzite, ignimbrite and obsidian. No diagnostic tools or projectile points of any sort were observed. Because of collection by vandals and the road leading up to the site, there is considerable impact on the site by local users of this public land. Although the ridge in question is well above the proposed extension of the settling pond, steps should be taken to preserve the site or to have it properly excavated.

Sincerely yours,

B. Robert Butler

B. Robert Butler, Acting Chairman
Associate Professor of Anthropology
Curator of Archaeology, Museum

BRB/jc
CC: Dick Harrison, BLM, Boise
CC: Nick Casakos, BLM, Burley

ARCHAEOLOGICAL REPORT

The functional region defined for these studies is primarily the Pocatello area (i.e., the City of Pocatello, its suburb of Chubbuck and its former suburb of Alameda, which was annexed to Pocatello in 1972) and Bannock County, and, to a lesser degree of emphasis, Power County. Although limiting the analysis to this area is somewhat arbitrary, it may be justified on the basis of the relationship to the immediate impact area of the operations of the J. R. Simplot Company phosphate plant and the proposed project actions involving the selected lands.

3.8.3.2 Population

The geographic features of Bannock County have tended to restrict the population of the county to the Portneuf Valley. This concentration of population has given rise to one large city, the county seat of Pocatello, which is the largest city and center of commerce and industry in southeast Idaho.

With the exception of the Pocatello area, the general region of Bannock and Power counties may be described as rural and sparsely populated with an average 1970 population density of 3.4 per square mile in Power County and 8.3 per square mile in Bannock County excluding the Pocatello area.

Table 3.8-1 portrays the population trends in Bannock and Power counties and in the Pocatello area since 1940 and includes projections through 1978. Noteworthy is the continuing trend toward concentration of the Bannock County population in the Pocatello area. The 1970 census revealed that 82.3 percent of the county population was located here in contrast to 67.8 percent in 1940. Projections through 1978 indicate that this percentage will increase to more than 93 percent by that time. From 1960 to 1970, the Bannock County urban population increased 9.6 percent while the rural population declined 9.0 percent.

TABLE 3.8-1

POPULATION TRENDS IN BANNOCK COUNTY, POWER COUNTY AND THE POCATELLO AREA

(Source: U. S. Bureau of Census Data and Pocatello/Bannock County Economic Impact Projections, Idaho State University, September, 1974)

	Bannock County			Pocatello Area (Pocatello, Alameda and Chubbuck)				Bannock County Excluding Pocatello Area		Power County	
Year	Population	% Change From Previous Period	% Change From 1970	Population	% Change From Previous Period	% Change From 1970	% of County Population	Population	% Change From Previous Period	Population	% Change From Previous Period
1940	34,759	-	-	23,566	-	-	67.8	11,193	-	3,965	-
1950	41,745	+20.1	-	30,945	+31.3	-	74.1	10,800	- 3.5	3,988	+ 0.6
1960	49,342	+18.2	-	40,784	+31.8	-	82.6	8,558	-20.8	4,111	+ 3.2
1970	52,200	+ 5.8	-	42,960	+ 5.3	-	82.3	9,240	- 8.0	4,864	+18.3
1974	56,464	+ 8.2	+ 8.2	51,428	+19.7	+19.7	91.1	5,036	-45.5	-	-
1975	60,956	+ 8.0	+16.8	55,833	+ 8.6	+30.0	91.6	5,123	+ 1.8	-	-
1976	66,917	+ 9.8	+28.2	61,716	+10.5	+43.6	92.2	5,201	+ 1.5	-	-
1977	75,465	+12.8	+44.6	70,202	+13.8	+63.4	93.0	5,263	+ 1.2	-	-
1978	80,758	+ 7.0	+54.7	75,414	+ 7.4	+75.5	93.4	5,344	+ 1.5	-	-

During the 1940's and 1950's the Pocatello area population grew rapidly in excess of 30 percent during each of the two 10-year periods while the remainder of Bannock County declined at 3.5 percent during the 1940's and 20.8 percent during the 1950's. In the 1960's the growth rate of the Pocatello area slowed to 5.3 percent while the rest of the county decreased at 8.0 percent.

Highlights of the reasons behind these growth trends will be discussed, based on information in Pocatello Planning and Research Dept. (1975). The 20-year period from 1940 to 1960 witnessed a rapid growth in the Pocatello area. Growth of industry and military facilities related to World War II and the Korean War were responsible, in large part, for this growth while phosphate refining began to the west of the city in this same time period. Although agriculture was not a major contributor to the economy of Bannock County, there was migration away from the farms to obtain employment in other areas of the economy located in the urbanized areas.

In the decade of the 1960's, the outmigration from rural areas to urban areas continued, although at a somewhat lower rate than in the previous two decades. The growth rate of the Pocatello area slowed dramatically from the two previous decades. This can be viewed as a period of consolidation and stabilization in the economy with little growth, heavy outmigration, job shortages, and little new industry and construction. What expansion there was, was not in the high employment industries. Railroad employment remained relatively static. A major exception was the growth of enrollment at Idaho State University with the student population growing by more than 50 percent during this period.

The years since 1970 have seen an impressive change take place in the economy of the Pocatello area, so much so that the emphasis is now on how to control growth rather than to attract growth. A study of projected economic conditions in the Pocatello area recently completed by a team of Idaho State University economists (Idaho State University, 1974) concluded that the population of the Pocatello area will probably grow as much from 1974-78 as it did in the preceding 40 years. The change since 1970 has been generally due to an economic turnaround and a number of commercial and industrial developments. The latter include centralizing of Union Pacific Railroad operations at Pocatello; American Micro-Systems initiating the manufacture of electronic components; development of several major retail facilities and shopping centers; numerous small, independent and franchised businesses adding significantly to employment; additional employment at the major phosphate refineries west of the city; and Bucyrus-Erie purchasing the former Pocatello Naval Ordnance Plant to initiate the manufacture of heavy mining equipment. It appears that the combination in the area of natural resources, available energy, accessibility and available manpower has attracted major industries with the capability to change the entire economy.

3.8.3.3 Employment

The 1974 total employment for the Pocatello area (which includes Bannock County and the eastern edge of Power County) was estimated at 23,947 (Idaho Dept. of Employment, 1975). This was an increase of 5.3 percent over 1973, 23.9 percent over 1970 and 42.5 percent over 1960. The average unemployment rate was 3.7 percent during 1974 and 3.9 percent the previous year.

Table 3.8-2 presents a breakdown of employment for the Pocatello area by industry group for 1960 and 1974 and indicates the percentage change occurring during this period. The strong position of the manufacturing, services and government categories and the decreased contribution of the agricultural and transportation categories is evident. A general trend is that the area is becoming more diversified and is losing its reputation as being primarily a transportation center.

TABLE 3.8-2

AVERAGE ANNUAL LABOR FORCE BY INDUSTRY FOR THE POCATELLO AREA

(Data from Idaho Dept. of Employment, 1975)

Industry	1960 No. Employed	1960 %	1974 No. Employed	1974 %	% Change 1960-1974
Manufacturing	1790	10.6	3291	13.7	+83.8
Construction	910	5.4	1140	4.8	+25.3
Transportation, communication and utilities	3520	21.0	3176	13.3	- 9.8
Wholesale Trade	640	3.8	1044	4.3	+63.1
Retail Trade	2450	14.6	3882	16.2	+58.4
Finance, Insurance, Real Estate	820	4.9	1222	5.1	+49.0
Services & Miscellaneous	1440	8.6	2948	12.3	+104.8
Government	2640	15.7	5086	21.2	+92.6
Agriculture	1030	6.1	707	3.0	-31.3
Non-agricultural Self Employed	1560	9.3	1451	6.0	- 7.0
Total	16,800		23,947		+42.5

This diversity is further evidenced by the listing of leading employers in the Pocatello area as of early 1975 shown in Table 3.8-3. Future trends in employment and economic activity in general are suggested by the projected gross dollar output for Bannock County by industry sector for 1975 and 1978 shown in Table 3.8-4.

TABLE 3.8-3

LEADING EMPLOYERS IN THE POCATELLO AREA, APRIL 1975

(Source: Idaho Dept. of Employment, Pocatello, May 1975)

Firm	Product or Service	Number of Employees
Idaho State University	Education	1000+
Union Pacific Railroad	Railroad	1000+
School District No. 25	Public Schools	1000+
Lamb-Weston	Potato Processing	1000+
Bucyrus-Erie	Mining Machinery	500-999
J. R. Simplot Co.	Phosphate Fertilizer	500-999
FMC Corp.	Elemental Phosphorus	500-999
Garrett Freightlines	Trucking	500-999
American Micro-Systems	Integrated Circuits	300-499
Mountain Bell	Telephone Service	300-499
Farmer's Insurance	Insurance	250-299
City of Pocatello	Community Government	250-299
Kraft Foods	Cheese Products	250-299

TABLE 3.8-4

PROJECTED GROSS OUTPUT FOR BANNOCK COUNTY BY INDUSTRY SECTOR

(Source: Pocatello/Bannock County Economic Impact Projections, Idaho State University, September 1974)

	1975		1978		
	Millions of Dollars	%	Millions of Dollars	%	% Change 1975-1978
Agriculture, Forestry, Fisheries	21.8	2.8	24.5	2.3	12.4
Construction	46.3	5.9	60.1	5.6	29.8
Manufacturing, Mining, Chemicals	35.1	4.5	41.6	3.8	18.5
Communications	13.5	1.7	16.8	1.6	24.4
Fabricated Steel	1.8	0.2	2.4	0.2	33.3
Machinery	39.1	5.0	170.1	15.7	335.0
Freight	90.6	11.6	104.1	9.6	14.9
Utilities	7.2	0.9	9.3	0.8	29.2
Wholesale Trade	147.1	18.8	189.4	17.5	28.8
Retail Trade	163.0	20.8	200.3	18.5	22.9
Finance	62.7	8.0	78.1	7.2	24.6
Services	27.0	3.4	33.3	3.1	23.3
Government	121.5	15.5	143.8	13.3	18.4
Travel	5.9	0.8	7.8	0.7	32.2
Total	782.6		1081.6		38.2

Announcement by Bucyrus-Erie in 1974 that they purchased the Pocatello Naval Ordnance Plant and would become the city's largest employer with some 2,200 expected to be working at the plant by 1978 has been the major economic news in the past several years. The company manufactures heavy mining machinery. Major considerations for locating at Pocatello were the

mining potential of the Intermountain West, the availability of the plant, excellent academic and vocational training facilities at Idaho State University and a labor force that could expand with the economy.

Bucyrus-Erie is having difficulty finding workers in the local market with the requisite skills. Presently about 80 percent of the Bucyrus-Erie employees are coming from out-of-state. The next few years will present a tremendous challenge to both the public and private sectors of Pocatello's economy in providing essential services in a planned environment and the financing and housing necessary for the projected influx of population (Idaho Dept. of Employment, 1975).

Growth in a basic industry (one which exports its production outside the local area) such as manufacturing, determines growth in non-basic industries such as construction, trades and services. A study conducted using the 1960 Bannock County census data (Bannock Development Council, 1970) revealed that the ratio of basic workers to non-basic workers was 1:1.96. This means that for each worker employed by a company categorized as a basic industry (such as Bucyrus-Erie or the J. R. Simplot Company) an additional 1.96 workers are required to supply needed goods and services. The 1974 study by Idaho State University economists to project future conditions in the Pocatello area employed a basic:non-basic ratio of 1:1.65 in its calculations.

3.8.3.4 Income

Table 3.8-5 shows the reported 1969 income distribution of families and unrelated individuals in Bannock and Power Counties. The 1969 per capita income in Bannock County was $2,670 while in Power County it was $2,585 (Southeast Idaho Council of Governments, 1975). These figures were 32 and 34 percent, respectively, below the United States average of $3,933.

TABLE 3.8-5

1969 INCOME OF BANNOCK AND POWER COUNTY FAMILIES & UNRELATED INDIVIDUALS

(Source: SICOG, 1975)

Income	Bannock County No.	Bannock County %	Power County No.	Power County %
Less than $2,999	1241	9.7	115	9.7
$3,000 - $5,999	2092	16.3	126	10.6
$6,000 - $9,999	4267	33.3	412	34.6
$10,000 - $11,999	1680	13.1	209	17.6
$12,000 - $14,999	1811	14.1	190	16.0
$15,000 - $24,999	1462	11.4	113	9.5
$25,000 - $49,999	210	1.6	20	1.6
$50,000 or more	49	0.4	5	0.4
Medium Family Income	$8,866		$9,341	
Mean Family Income	$9,737		$9,732	
Per Capita Income	$2,670		$2,585	

Median and mean incomes per family in 1969 were, respectively, $8,866 and $9,737 in Bannock County and $9,341 and $9,732 in Power County. Approximately ten percent of the families in Bannock County were below the poverty level income while about 12 percent of the families had incomes in excess of $15,000. In Power County, almost eight percent of the families had incomes below the poverty level while nearly 12 percent had incomes in excess of $15,000.

3.8.3.5 Services

Most of the information in this section pertains only to the City of Pocatello and was extracted from the "Pocatello Industrial Survey-Summary Report," dated October 15, 1974 provided by the Pocatello Chamber of Commerce.

Pocatello has a City Manager - Council form of government. Its police department consists of 58 men with 21 pieces of motorized equipment. The fire department is composed of 63 men located at four stations with 17 pieces of equipment at its disposal.

Educational facilities include 15 elementary, four junior high, two senior high and two parochial schools. Total school enrollment during 1974 in grades one through 12 was 10,914. In recent years, total school membership has been declining. Major problems center around renovation of school structures and their distribution in relation to population. Idaho State University, with its Colleges of Liberal Arts, Medical Arts, Pharmacy, Education, Business and School of Vocational-Technical Education has an enrollment of approximately 8,000.

In the area of health services, Pocatello has two hospitals with a total of 269 beds and three licensed nursing homes with a capacity of 216. In Bannock County in 1970 there were 58 physicians, 23 dentists and 257 registered nurses. Ratios per 1,000 population in Bannock County were 1.11 physicians, 0.44 dentists and 4.92 registered nurses (Southeast Idaho Council of Governments, 1975). Comparative ratios for the United States were, respectively, 1.43, 0.47, and 3.07 while for all of Idaho the comparative ratios were 0.94, 0.44 and 2.74.

Water in Pocatello is supplied principally (80 percent) from deep wells and also from nearby streams. There were 12,286 water users in 1974

with an average consumption of 12.5 million gallons per day. Sewage is handled by a primary and secondary treatment system designed for a population of 105,000 with a capacity of 8.75 million gallons per day; slightly less than two-thirds of this capacity was being utilized in 1974.

Electric service is provided by the Idaho Power Company through an interconnected hydroelectric generating system with 16 plants. In 1974 there were 17,334 power users in Pocatello.

Natural gas is available through the Intermountain Gas Company. In 1974, 11,452 gas meters were located in the city.

Complete telephone services are available through Mountain Bell Telephone Company. There were 34,009 telephone connections in Pocatello in 1974.

In the area of transportation, Pocatello is the Idaho headquarters of the Union Pacific Railroad and is on the main Union Pacific rail line from Chicago to Portland. Ten motor freight companies are located in Pocatello along with four buslines. Interstate Highways I-15 and I-15W junction at Pocatello as do U. S. Highways 91, 191 and 30N. Daily airline service is provided by Hughes Air West and Western Airlines at the air terminal located northwest of the city.

Other facilities offered in Pocatello include two public libraries, a daily newspaper with a circulation of more than 18,000, three radio broadcasting stations, and two television broadcasting stations, eighty-one churches representing 27 denominations are located in the city. A natural history museum and a county historical museum are also located here.

Recreational facilities include 6 theaters, 18 parks, 15 playgrounds, 1 zoo, 1 amusement park, golf, swimming, tennis, bowling, hand ball,

ice skating, roller skating, horse racing, auto racing and archery facilities. The Minidome, an all-weather indoor football stadium with a seating capacity of 13,000 is located on the Idaho State University Campus and is a center for a wide variety of spectator events.

Perhaps the most serious problem facing Pocatello at present and in the near future is the lack of adequate housing (Pocatello Planning and Research Department, 1975). Although new housing starts in 1974 set an all-time record in terms of both numbers and dollar volume, the supply did not come close to meeting the demand for shelter in the market area. The projections for community growth in the next few years have created a situation which projects the need for substantial effort on the part of builders and developers to meet the needs of a diversifying population. These projections show that the average annual housing needs for the next four years exceed the total production of housing units for the most recent five years within the city. The Pocatello Planning and Research Department (1975) estimates that over 8,000 units will need to be constructed in the community within the next four years to accommodate the anticipated growth, over 700 units are currently in need of removal or repair, and over 1,100 additional new housing units would be needed to bring the current market to a tolerable level of housing availability.

In summary, with the exception of housing, most of the services provided in Pocatello are deemed adequate at present, but the projected population increases may stress their sufficiency in the next few years.

3.8.4 Attitudes

A management framework plan for BLM lands in the Pocatello area was developed during 1974 by the Burley District Office of the BLM. A public

meeting was held in Pocatello on May 20, 1974 to obtain input into the development of this plan. It was during this meeting that the general public became aware for the first time that the J. R. Simplot Company had requested acquisition of BLM land adjacent to its south boundary for use as a gypsum disposal area. The initial request for this land was dated December 30, 1971.

At this meeting, opposition to the land exchange was voiced by representatives of the Idaho Trail Machine Association and the Pocatello Trail Machine Association since they thought they would be losing access and motorcycle riding areas.

Opposition to the land exchange has also been voiced by members of the Idaho State University faculty and staff who are concerned with interference with the pair of Golden Eagles which nest in the area and also from the viewpoint of loss of areas which are said to be utilized for rock-climbing (Citizens Environmental Council, Pocatello, personal communication, 1975).

Mr. Robert Swanson, Michaud Creek Ranches (personal communication, 1975), expressed opposition to the land exchange on the basis that his grazing allotment would be reduced if the land was removed from public ownership.

Public awareness of the proposed land exchange was minimal until August 1, 1975 when Gary Hayden wrote an article appearing in the Idaho State Journal (Pocatello). This article appears in its entirety in Plate 3.8-2. After this exposure, there was no indication that strong reaction was generated either in support or in opposition to the proposed action. Mr. Hayden advised (personal communication, September 18, 1975), that no written comments had been received by the Idaho State Journal in response to the article.

JOURNAL REGIONAL news

BY GARY HADEN
Regional Editor

From 200 to 500 acres of public land used by hunters, trail bikers and livestock grazers from Pocatelly may be buried under 350 feet of waste gypsum, if the J.R. Simplot Co. is successful in a land swap they will offer the Bureau of Land Management.

The land being eyed by Simplot lies immediately south of Simplot's Pocatello plant and is adjacent to land already used for disposal of gypsum tailings produced at the fertilizer plant.

Jack Smith, manager of planning and development for the Simplot Company's minerals and chemicals division, said Thursday the acquisition would fit into a long-range plan for the plant's operation. "We're studying the possibility of exchange for the land; we're running out of storage space for gypsum," Smith said.

SMITH SAID his company has considered acquisition of up to 500 acres, but probably won't seek that much in the proposal that could go to the BLM within two months. The company would obtain the land by trading private land purchased for that purpose for the National Resource Land, he explained.

The land Simplot wants was identified during public hearings last year as property that should be retained for the public. The Pocatello Management Framework Plan developed by the BLM as a result of the hearings said the land should be retained because use for industrial purposes "would disturb an eagle nesting site and upland game bird habitat, delete acreage from a deer winter range and spring cattle range, and conflict with off-road vehicle use."

Though Simplot had expressed an interest to the BLM in 360 acres of land in the areas, it did not send a representative to speak at the public hearings. Smith said the public in this area was not let in on Simplot's plans because Simplot's legal department "didn't appreciate the significance of the planning process going on in Pocatello. There had been prior contact with the BLM. Frankly, we didn't appreciate the process. The legal contacts were with the Boise BLM office. They handled it as a routine land acquisition," Smith said.

NICK J. COZAKOS, Burley District BLM supervisor, said Thursday that if Simplot makes a formal application for a land exchange, an environmental analysis report and a public hearing would be necessary. While exchanges don't require public hearings, the official said "because of the public participation in the MFP meetings, we'd certainly want to hold another meeting to talk about the exchange and other MFP decisions."

If the land exchange is proposed, Cozakos said, Simplot would have to give the BLM land it wants—land that is of equal dollar value as certified by professional appraisers. The BLM, during the MFP process, identified land in Blackrock Canyon and land in the Petticoat Peak area east of Lava as property it would like to have. Cozakos said the Petticoat Peak area isn't available now because it is tied up in an estate proceeding. He said the Blackrock Canyon land is still desired because it would allow the BLM to develop a campground. "It's my understanding that Simplot has an option on some land, but they haven't exercised it. I think they are afraid it would ruin the deal," the BLM official said. Smith confirmed his company is negotiating with landowners for exchange property, but he would not confirm nor deny reports circulating among Pocatello environmentalists that the land involved is indeed property in Blackrock Canyon.

IF SIMPLOT CANNOT get the land it wants, it's a matter of conjecture how long the Pocatello plant could operate on the land available before completely covering it with waste tailings, Smith said. "If we tried to truck it out, we might have environmental problems elsewhere. We would have to develop new storage sites. In theory it's possible to haul it back to the mines in empty trains, but that's also very unattractive," Smith said. "We're downhill from both mines (the Gay on Fort Hall and the Conda Mine), and it would take a great deal of energy to get it back up the hill." Logistical problems at the mines and freezing gypsum in ore cars in the winter would present other problems, he said.

DESPITE THE fact Simplot sat back silently and then threw a wrench into the BLM's land-use plan Cozakos says he's not discouraged. "I still think it's worthwhile to plan. It also points out that industry has to become a part of the planning process, and it shows that plans have to be changed. I don't think we can predict what growth patterns of Pocatello will be in 15 years. We'll have to update. When you stop to consider that we have to manage public lands based on 3,000 laws, we have to consider things as they come up," Cozakos said.

NEWSPAPER ARTICLE CONCERNING PROPOSED PROJECT ACTIONS IN IDAHO STATE JOURNAL

DAMES & MOORE

PLATE 3.8-2

Comment on the proposed land exchange has been received from the following:

1. Pocatello Trail Machine Association and Idaho Trail Machine Association.
2. International Union of Operating Engineers.
3. S. Albert Johnson, Idaho State House of Representatives.
4. Oil, Chemical and Atomic Workers International Union.
5. John Evans, Pocatello City Council.
6. Ralph M. Wheeler, Idaho State House of Representatives.
7. H. S. Hilbert, Coordinator, Idaho State University Outdoor Program.

These comments are reproduced in their entirety in the letters shown in Plates 3.8-3 to 3.8-9.

October 31, 1975

Mr. Jack Smith
Manager - Planning & Development
J. R. Simplot Co.
P. O. Box 912
Pocatello, ID 83201

Re: Trail Cycle Group Leadership Disposition on Proposed JRS/BLM land exchange.

Land Description: Approximately 200 acres of BLM land in Section 18 & 19, T. 6S., R. 34E., Boise Meredian, located directly south of and adjoining the J. R. Simplot Company property in the same section 18, west of Pocatello, Idaho.

Dear Mr. Smith:

We have become aware that an exchange of the above described BLM land for a parcel of J. R. Simplot owned land located in Black Rock Canyon, North East of Pocatello, is proposed by the two parties.

Review of this proposal with BLM and J. R. Simplot officials has resulted in our following individual conclusions:

Having a specific interest in trail motorcycling and a direct familiarity with the above described land, we don't believe that the acquisition of this land by Simplot will have any direct detrimental effect or detracting value for trailcycling in the Pocatello area. We would, however, like to urge Simplot to act in a civic spirit by offering a generous exchange acreage in Black Rock to aid the BLM's effort to consolidate its resources and management effectiveness there. We feel that a BLM consolidation in Black Rock holds excellent recreation potential for Pocatello area residents.

Respectfully submitted,

Paul Kidd
President, Pocatello Trail Machine Association
1744 Syringa
Pocatello, Idaho 83201

Floyd Betty
President, Idaho Trail Machine Association
Route 2N, Box 21E
Pocatello, Idaho 83201

Ernie LaMiller
Secretary, Idaho Trail Machine Association
137 Mesa Drive
Pocatello, Idaho 83201

cc: Dames & Moore - Salt Lake City, Utah
Bureau of Land Management - Burley, Idaho

COMMENT ON PROPOSED LAND EXCHANGE

ernational Union of Operating Engineers

A. F. L. C. I. O.

OISTING AND PORTABLE ENGINEERS — LOCAL UNIONS 370, 370-A, 370-B, 370-D

P.O. BOX 3386, T.A. • 514 SOUTH ELM • SPOKANE, WASHINGTON 99220 • (509) 624-5365

Jurisdiction Eastern Washington and State of Idaho

Pocatello, Idaho
November 4, 1975

Mr. Richard Chojnacki
Dames & Moore
Suite 200
250 East Broadway
Salt Lake City, Utah 84111

Dear Mr. Chojnacki:

For many years the J. R. Simplot Company's Pocatello facilities have provided many jobs, not only to plant operating personnel, but also for construction workers and, indirectly, for many service workers in the Pocatello area.

As a representative of organized labor in the Pocatello area, I want to see this continue. Eventual shutdown of Simplot's Pocatello plant if the BLM land exchange does not occur would terminate many jobs in and around Pocatello and would produce considerable hardship. I support the exchange of the Blackrock Canyon land offered by Simplot for the land which the Company has requested south of its plant.

Sincerely,

Robert C. Kinghorn
Special Representative
Local 370

flc

cc: Mr. William H. Dunn, Business Mgr., Local 370

COMMENT ON PROPOSED LAND EXCHANGE

S. ALBERT JOHNSON
DISTRICT NO. 35
BANNOCK BINGHAM AND
POWER COUNTIES

HOME ADDRESS
ROUTE 2 NORTH, BOX 219
POCATELLO, IDAHO 83201
PHONE: 237-3163

COMMITTEES
EDUCATION
AGRICULTURAL AFFAIRS
PRINTING AND LEGISLATIVE
EXPENSE

House of Representatives
State of Idaho

November 6, 1975

Mr. Richard Chojnacki
Dames & Moore
Suite 200
250 E. Broadway
Salt Lake City, Utah 84111

Dear Mr. Chojnacki:

As a farmer and rancher who has lived in Eastern Idaho for many years, I have long used the products of the J. R. Simplot Company plant at Pocatello. I am very desirous of seeing the plant continue to operate providing these valuable products to our important Idaho agricultural community and competing with other fertilizer producers and suppliers.

It appears that the operation of this plant and related mines generates over 20 million dollars per year, in wages, taxes and purchases, in Eastern Idaho. The loss of these Simplot payrolls and purchases would seriously injure the economies of Bannock, Bingham, Power and Caribou Counties. Plant shutdown would also cause great personal hardship for the Simplot employees and others whose livelihoods depend on the continuing operation of the plant.

For all of these reasons, I support the proposed land exchange between the J. R. Simplot Company and the Bureau of Land Management, which will permit the Simplot plant to continue in operation for many years.

Sincerely,

S. Albert Johnson

S. Albert Johnson

COMMENT ON PROPOSED LAND EXCHANGE

House of Representatives
State of Idaho

November 6, 1985

ichard Chojnacki
& Moore
200
Broadway
ake City, Utah 84111

r. Chojnacki:

armer and rancher who has lived in Eastern Idaho for many years, I have long the products of the J. R. Simplot Company plant at Pocatello. I am very ous of seeing the plant continue to operate providing these valuable products r important Idaho agricultural community and competing with other fertilizer cers and suppliers.

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ll of these reasons, I support the proposed land exchange between the J. R. ot Company and the Bureau of Land Management, which will permit the Simplot to continue in operation for many years.

Sincerely,

S. Albert Johnson

COMMENT ON PROPOSED LAND EXCHANGE

Oil, Chemical and Atomic Workers International Union

ARY CUMMINGS, *President*

P. O. BOX 2031
POCATELLO, IDAHO 83201

POCATELLO LOCAL NO. 2 632

November 6, 1975

Mr. Richard Chojnacki
Dames & Moore
Suite 200
250 E. Broadway
Salt Lake City, Utah 84111

Dear Mr. Chojnacki:

For the past 30 years the J. R. Simplot Company has provided employment for many people in the Pocatello area for the operation of its fertilizer plant. Over the years the number of people working at the plant has grown a great deal and employment has been stable. At the present time there are 642 people working at the Simplot Pocatello plant, of whom 457 are members of the Oil, Chemical and Atomic Workers International Union, Local 2-632.

It is my belief that if the land exchange between Simplot and the Bureau of Land Management does not take place, the future of the plant and the future of these jobs is threatened. I urge the Bureau of Land Management to accept the exchange proposed by the J. R. Simplot Company.

Sincerely,

Gary Cummings

GC/vh

cc: file

COMMENT ON PROPOSED LAND EXCHANGE

November 7, 1975

Mr. Richard Chojnacki, Associate
Dames & Moore
Suite 200
250 East Broadway
Salt Lake City, Utah 84111

Dear Mr. Chojnacki:

I would just like to give you my thoughts on the proposed land trade between the B.L.M. and Simplot Industries.

As far as being a property owner in the area I can see no devaluation of our property due to any trade that would allow Simplots to use the B.L.M. land in our area. If this land trade is allowed this will insure continued growth and economic value to the City of Pocatello.

Not only as a land owner in the immediate area, but as a councilman for the City of Pocatello I feel this trade would be advantages to everyone concerned.

In regard to the difference in the land value, it appears to me that Simplots is getting mainly rocky ground with very little vegetation, and the trade they are giving to B.L.M. is much better for wild life and conservation, as the ground is much more suitable for this sort of thing.

Your favorable response to this trade would be greatly appreciated.

Sincerely,

John Evans
51 Fordham

JE:li
CC - Mr. Jack Smith
Simplot Industries

COMMENT ON PROPOSED LAND EXCHANGE

ALPH "MOON" WHEELER
DISTRICT NO. 35
BANNOCK, BINGHAM AND
POWER COUNTIES

HOME ADDRESS
659 GIFFORD AVENUE
AMERICAN FALLS, IDAHO 83211
PHONE: 226-2409 (HOME)
226-2411 (BUS.)

COMMITTEES
STATE AFFAIRS
LOCAL GOVERNMENT

House of Representatives
State of Idaho

11/8/75

Mr. Richard Chojnacki, Associate
Dames & Moore
Suite 200
250 East Broadway
Salt Lake City, Utah 84111

Dear Mr. Chojnacki:

This letter is in response to your request to comment on the preliminary Environmental Impact Statement relative to the proposal of the J. R. Simplot Company, Minerals Division, Pocatello, Idaho to effect a land exchange with the Bureau of Land Managemnt and to expand the waste pile adjacent to their fertilizer operation located in Power County, Idaho.

As a result of a rapid review of the preliminary report, I can state that I believe that the proposal is sound and reasonable and that I can support such a transaction and development.

The alternatives to: (1) close the plant and move to another site, or (2) to haul the waste to another site, are unacceptable for the following reasons.

The employment and the contribution to the economy are vital to the area. The expense involved to remove the waste to another site would add significantly to the cost of the product which would be inflationary and unnecessary. Moving the plant would also add to costs a may make the product too expensive to be competitive. The use of excessive amounts of energy either remove the waste or to reconstruct at another location would not be in the best interests of the nation.

Of course the company must be required to alleviate, to any reasonable extent, any impact on the eagle nesting in the area and to control dust. Planting of exposed slopes to reduce erosion and to mitigate the visual impact are in the best interests of the public and the company.

Sincerely,

Ralph M. Wheeler

COMMENT ON PROPOSED LAND EXCHANGE

DAMES & MOORE

PLATE 3.8-8

STUDENT UNION
IDAHO STATE UNIVERSITY
Pocatello, Idaho

83209

Employee	Act	Info	Noted
Dist. Mgr			NJC
Administration			
Resources Mgt.			
Operations			

RECEIVED
MAR 27 1975
Bur. of Land Management, Burley, Id

AM - MO			
AM - ES	X		
AM - RR			
All Field Per			
File			

March 26, 1975

Area Code 208

Director
236-~~2427~~ 2045

Asst. Director
236-3757

Program and Recreation Director
236-3451

Asst. Program and Recreation Director
236-3451

Reservations and Catering
236-2297

Games Area
236-3335

aintenance Supervisor
236-3781

Outing Program
236-2945

Arts & Craft Center
236-3281

Nick Cozakos, District Mgr.
Bureau of Land Management
Burley District
Burley, Idaho 83318

Dear Sir:

It has been drawn to my attention that the J. R. Simplot, Co. has proposed a "land swap" idea with you folks in the B.L.M. In return for some acreage located south of their existing Pocatello plant, Simplot apparently would buy the B.L.M. some land between Portneuf Gap and Inkom.

I do not know the exact plans that Simplots have for the area south of their existing plant. However, I assume that ultimately they will drastically alter the regions environment with slag piles and other residue from their plant's operation.

The Outdoor Program of the Student Union at Idaho State University uses the area (as it is) extensively. It is a micro wilderness area with some characteristics that make it a highly useful natural area. I offer the following examples of why it should be left as it is and perhaps why it should be excluded as a roadless area.

1. The area is high in unmechanizied recreational potential. It offers participants in the Program a unique experience to see the affects of a highly industrial development on the micro system that the industrial complex polutes. From a high vantage point of hills and basalt columns, participants can observe badly altered high mountain desert terrain. People can observe, almost within the city limits of Pocatello a variety of wildlife as they compete for survival in a situation being over run by man. With sharp eyes and keen interest, people can see bobcats on those crags, bald eagles, foxes, falcons, and a variety of smaller animals considered essential pray for the top line preditors. The educational value of the land is just barely becoming realized. In a period when gasoline is so expensive people can cut expenses, see and learn interesting natural phenomenon.

COMMENT ON PROPOSED LAND EXCHANGE

DAMES & MOORE

Pocatello, Idaho

83201

March 26, 1979

Area Code 208

Director

Asst. Director

Program and Recreation Director

Asst. Program and Recreation Director

Reservations and Cabins

Games Area

Maintenance Supervisor

Craft & Craft Center

[illegible], District Mgr.
Bureau of Land Management
Burley District
Burley, Idaho 83318

Dear Sir:

It has been drawn to my attention that the [illegible] has proposed a "land trade" [illegible] in return for some acreage located north of [illegible] Pocatello plant [illegible] between [illegible].

I do not know [illegible] south of their existing [illegible]. However, [illegible] they will [illegible] and other residue from their plant [illegible].

The [illegible] [illegible] [illegible] natural [illegible] and it should be left [illegible] and [illegible] should be [illegible].

The area [illegible] it affects [illegible] the effects of [illegible] that the [illegible] of [illegible] with [illegible] as they [illegible] [illegible]. With [illegible] and [illegible] interest [illegible] predators. The educational value of the land is [illegible] becoming realized. In a period when gasoline is so [illegible] people can not [illegible] see and learn interesting natural phenomena.

COMMENT ON PROPOSED LAND EXCHANGE

Nick Cozakos
Page Two
March 26, 1975

2. The proposed land swap region is an excellent region for teaching techniques of rock climbing, mountain rescue procedure and wilderenss living. The canyon is a neat place to camp! Perhaps some consideration should be made toward turning the area into some kind of a wilderness camping/park area where people could walk into, visit, wander and ask questions about.

3. Again on the Educational theme, I suggest you consider the fact that this nearby region would make an excellent classroom for students of Geology, Biology, Outdoor and Park Recreation as well as for a pure enjoyable recreation area away from, but within easy reach of a major Idaho metropolitan area.

Please give some heavy thought to Mr. Simplots proposal. I know that in their own minds they are thinking of what is best for them and I'll accept their ideas. However, I'm concerned with the destruction or altering of such a prestine area. It seems to me that the area could benefit alot more people if it was left at it is.

Sincerely,

H. S. Hilbert

H. S. Hilbert, Coordinator
ISU Outdoor Program

kr

cc: Mr. David R. Murray
Assistant Area Manager
B.L.M. Burley District
Burley, Idaho 83318

2. The proposed land [illegible] is an excellent area for teaching techniques of rock climbing, mountain rescue techniques and wilderness living. The canyon is [illegible] of [illegible]. Perhaps some consideration should be given toward forming the area into some kind of a wilderness-type area where people could walk into [illegible], wander and see [illegible].

3. Again on the Educational theory, I suggest you consider the fact that this entire region offers much in [illegible] for students of Geology, Biology, [illegible] as well as for a more ecological [illegible] within easy reach of a major [illegible] area.

Please give some heavy thought to this complex problem. I know that we [illegible] for them and I'll accept their ideas. However, I am concerned with the destruction or altering of [illegible]. It seems to me that the area could greatly [illegible] people as it was left as it is.

Sincerely,

[signature]

[illegible], Coordinator
ISU Outdoor Program

kr

cc: Mr. David [illegible]
Assistant Area Manager
B.L.M. Burley District
Burley, Idaho 83318

4.0 ANALYSIS OF PROPOSED ACTION AND ALTERNATIVES

4.1 ENVIRONMENTAL IMPACTS

4.1.1 Anticipated or Possible Impacts

4.1.1.1 Air

Potential impacts on air quality resulting from approval of project actions are related to fugitive dust emanating from the storage area. Gypsum is slurried to the storage area and at any given time approximately 20 percent of the half of the storage area being filled is under water and would present no dust problems. The remaining portion of the half being filled and the half already filled to crest elevation contain gypsum in various stages of dryness. Upon drying, the gypsum forms a surface crust which does not readily yield particles to wind action. When new dikes are being constructed, the earth-moving equipment breaks this crust but compaction by the same equipment forms a new crust which offers about the same wind resistance. The residual moisture contained even in dry gypsum on the storage area promotes formation of the crust and in itself deters pick-up by wind action of gypsum particles.

The sides of the successive tiers of confining dikes are also crusted and inhibit wind pick-up of particles.

Some fugitive dust does result from vehicles traveling over the unpaved roads in the vicinity of the storage area and also from vehicle passage over the roads which have been constructed diagonally across the north face of the tiers of confining dikes. These conditions currently exist, and since no major change in the basic method of operation of the storage area is anticipated, approval of project actions would result in only the continuance of existing conditions or a small incremental increase related to lengthening of roads.

Denial of the proposed project actions involving all or a portion of the selected lands and failure to find a feasible alternative could result in eventual plant shutdown.

4.1.1.2 Land

The proposed action would remove 500 acres from public ownership or would remove 220 acres under the alternative action concerning the selected lands. However, because the project actions involve a land exchange there should be little net change in the amount of National Resource Land available to the public.

In the 200 square mile area centered on the selected lands analyzed in Section 3.3.4.1 and 3.3.4.2 for land ownership and land use, the proposed action would decrease federally owned land by slightly less than 3 percent; the alternate action involving 220 acres of selected lands would decrease federally owned land by slightly more than one percent. In the same area, the proposed action would decrease the total acreage used for range and pasture by just above one percent and increase the total used for urban and industrial purposes by nearly 2.5 percent. The alternative action involving the selected lands would decrease land used for range and pasture by less than 0.5 percent and increase the urban and industrial land category by one percent. These figures are somewhat misleading since the proposed exchange lands lie just outside of this 200 square mile area.

The basic land form of portions of the selected lands would be altered permanently. With regard to the proposed action, approximately 245 acres or 49 percent of the 500 acre total would be covered by gypsum by the year 2055. The alternative configuration would cover approximately 120 acres

Relief of the [illegible] [illegible] [illegible] [illegible] all [illegible] of the selected [illegible] and [illegible] [illegible] result in [illegible] [illegible] [illegible].

4.[illegible] Land

The [illegible] [illegible] or would [illegible] [illegible] and lands. [illegible] there should [illegible] available [illegible].

[illegible] in decision [illegible] action [illegible] the alternate [illegible] industrial [illegible] the planned [illegible] late by [illegible] and [illegible] industrial [illegible] the selected [illegible] than 0.[illegible] percent and [illegible] percent. These figures are [illegible] lands [illegible] [illegible].

The [illegible] land [illegible] [illegible] utilized [illegible] acres or 63 [illegible] year 20[illegible]. The [illegible] [illegible] or 55 percent of the total 220 acres of Priority A lands by the year 2035. Utilizing either configuration the encroachment of gypsum upon the land would be a gradual process averaging an increase in elevation of less than six feet per year.

The land surface would undergo a gradual transition from its current aspect and topography to one similar to the existing operating storage area, i.e., a step-like appearance of constant slope and appearance.

Utilization of other local sites for gypsum storage would have a significantly greater impact on land form than would use of the selected lands. Use of such sites would require the establishment of a foreign land form in new locations whereas utilization of the selected lands will require the expansion of an existing land form.

Land use on adjacent lands would not be directly affected by project actions other than as aesthetic characteristics of the storage pile might inhibit certain uses, but such uses are already incompatible with the industrial character of the area.

Recreational use of the selected lands would be reduced from its current limited level. This would include use of the land for hunting, rock climbing, nature study, hiking, trail-bike riding, and as a viewpoint. Such use is not necessarily excluded in the short-term since the J. R. Simplot Company, at its discretion, could grant permission for such use by the public at large or on a restricted basis. The land area potentially available for such use would be reduced only over the long-term by the physical encroachment of gypsum.

The proposed action would eliminate approximately three miles of motorcycle trail on the selected lands (see Plate 3.3-5). If the alternative

involving only the Priority A lands in a land exchange were implemented only approximately 1-1/2 miles of trail would be eliminated. Either alternative would not interfere with major access routes to the major motorcycle riding areas readily accessible from Pocatello.

The BLM grazing allotment on the selected lands would be eliminated by the proposed project actions. As detailed in Section 3.6.1, Michaud Creek Ranches holds a total grazing allotment on National Resource lands in the area of 3,870 acres. Approximately 500 acres or 13 percent of this allotment is on the selected lands with about 220 acres on the Priority A portion and about 280 acres on the Priority B portion. At an average of seven acres per animal-unit-month (AUM), (David B. Vail, BLM, personal communication, September 17, 1975), some 31 to 71 AUM's of forage would be eliminated by the proposed action or the alternative using only Priority A lands.

Soils on the selected lands have severe limitations of slope, erosion hazard and shallowness, which restrict their use to rangeland, wildlife habitat, recreation and watershed. Alternative uses such as these for the selected lands would probably be permanently precluded following coverage by gypsum.

4.1.1.3 Water

While the proposed action will involve increasing the size of the gypsum storage area, the perimeter will not be extended to encompass a larger drainage area. Therefore, the quantity of ephemeral stream flow retained within the storage area will be unchanged. Since additional natural ground surface would be covered by gypsum, there would be an increase in the moisture retention capacity of the drainage basin and a decrease in water losses by plant transpiration. Furthermore, there would be a larger surface area involving only the [illegible] approximately 1,6[illegible] acres [illegible] could not [illegible] have readily [illegible]

The [illegible] g the proposed [illegible] Ranches Holding [illegible] res of 3,610 [illegible] e on the selected [illegible] about 280 acres [illegible] ritical-[illegible] eptember [illegible] proposed [illegible]

[illegible] ision [illegible] fe habitat [illegible] e selected lands would [illegible] f expense.

.1.1.3 Water

While the proposed [illegible] rpeum storage area, the perimeter will not be [illegible] ainage area. Therefore, [illegible] thin the storage area [illegible] rface would be [illegible] e retention [illegible] plant transpiration. Furthermore, [illegible] available for evaporation and a greater area for retention of storm run-off. Since the surface area over which ground water recharge occurs on the portions of the selected lands which would be covered by gypsum is extremely small in comparison to the total recharge area, the impact of this loss would be negligible.

Since there are no direct discharges of effluent from the gypsum storage area to surface waters, there would be no impact from this source. Sufficient freeboard is maintained to prevent storm run-off from the surface of the storage area resulting from flooding conditions. However, intense storms could possibly result in sufficient surface runoff from the faces of the perimeter dikes and solutioning of residual materials in the gypsum to cause some contamination of surface waters to the north of the Simplot facility. Conditions resulting in such runoff would also result in great dilution of any such constituents when the surface water was reached.

Existing information is inadequate to determine the magnitude of present seepage losses from the gypsum storage area. The presently operating and proposed gypsum storage areas are underlain by silt loess soils of moderately low to low permeability and there is evidence that these soils tend to become cemented when exposed to the gypsum slurry resulting in a significant reduction of permeability. Chemical analyses of ground water in the immediate vicinity of the gypsum storage area indicated that if seepage has occurred, the contained constituents are highly reduced in concentration along the travel path by natural processes and have not adversely affected water quality to the extent of exceeding drinking water standards.

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4.1.1.4 Biota

Once gypsum slurry encroaches upon a given area of land the native vegetation is destroyed and the area has virtually no value for wildlife and domestic animals. Those animals which previously utilized such areas will no longer be able to do so. Evaluation of the impact of these direct effects, however, requires examination of the time sequencing of those components of project actions which result in the habitat loss.

The total land area which will be covered by gypsum as a result of proposed project actions is approximately 245 acres or 49 percent of the 500 acre total of both Priority A and B selected lands combined. This encroachment will take place over a period of 80 years with the gypsum elevation increasing an average of 4.4 feet per year. Loss of wildlife habitat will average about three acres per year.

Approval of the alternative action which would involve only the 220 acres of Priority A selected lands in the exchange would result in 120 acres or 55 percent of the total being covered by gypsum. This would occur over a period of 60 years with the gypsum elevation increasing an average of 5.8 feet per year. Loss of wildlife habitat would average two acres per year.

The long-term direct impact on the biota of the selected lands consists of the ultimate loss of vegetation and therefore habitat on from 120 to 245 acres occurring over a period of 60 or 80 years with the average loss being two or three acres per year. This loss amounts to less than one percent annually of the total land area contained in either the entire selected lands parcel or only the Priority A lands.

The process of gypsum encroachment upon new land will be so gradual under the proposed actions that little or no direct mortality of

even relatively immobile small mammals is anticipated. It is felt that, due to the short life spans characteristic of the majority of small bird and mammal species utilizing the area, the majority of individuals will not perceive a change in their habitat. Over the longer term, it is expected that all species will adapt to the gradual change with little if any effect on total population welfare.

Some individuals of small mammals will be forced to move into adjoining habitats. Some stress and indirect mortality may be associated with the process of eviction and resettlement.

There are no endangered or threatened species of plants or animals which will be affected by the proposed project actions and the habitat types which will eventually be destroyed are not unique. The areas involved are not considered critical habitats for any major terrestrial vertebrate species.

The standing water associated with stored gypsum on the surface of the storage area tends to serve as an attracting force for birds. Because of the high acidity and/or chemical constituents contained in the water, it might be postulated that birds which drink from or land on the wetted areas might suffer injury or death. Utilization of the wetted portions of the Simplot storage area by water birds and by land birds has been frequently observed. No evidence of harm to these birds has been detected. C. H. Trost (personal communication, 1975) has observed Mallards landing on the wetted portions of the Simplot gypsum storage area during the winter with no indication of detrimental effects.

Although the total Golden Eagle population is presently reproductively healthy and the species is not considered endangered or threatened (Snow, 1973), there is often local concern for the welfare of a particular individual or nesting pair. Such is the case in relation to the pair which

nests in the rocky terrain of the Priority A selected lands. While the immediate area of the Golden Eagle nesting sites would not be effected by gypsum encroachment, questions have been raised regarding the more subtle effects of increased human activity, loss of hunting habitat and decreased availability of prey species on the welfare of the nesting pair.

Based on literature reports, the tolerance of Golden Eagles to human activity depends on the individual nesting pair and their adaptability. While some will successfully raise young in areas where there is a lot of human activity, most are intolerant of extensive human intrusion (Snow, 1973). Boeker and Ray (1971) indicate that many traditional eyries in the Rocky Mountains have been abandoned because of human disturbance and Kochert (1972) found that twenty-one percent of the nesting failures in southwestern Idaho were man-caused in 1970 and 1971.

Available evidence indicates that Golden Eagles most frequently and readily desert their nests during the period of incubation. Once the eaglets have hatched, the probability of desertion decreases considerably. Dr. Charles Trost (personal communication, 1975) indicated that for successful nesting to take place at the Pocatello site, humans should not venture within one-quarter mile of the nesting site during the period between February and May. Such freedom from human disturbance apparently does not occur, however. Although trails or evidence of human use did not exist in the canyon immediately below the eagle nesting area, two separate motorcycle trails pass approximately one-quarter mile from the nest sites, and, as noted previously, the most popular season to ride begins in early April. It is also very likely that other human uses at this time of year, including rock-climbing,

hiking and other recreational uses, violate the recommended reserved space for the eagles. It can be speculated then, that the particular pair of eagles involved are relatively tolerant of human activity, have accepted the existence of the operating gypsum storage pile and associated activity as part of their environment, and could be expected to accept expansion of the gypsum storage area. Other eagles which may occupy the nest sites following death of the present pair may or may not be as tolerant. There is information (Snow, 1973) to indicate that adult eagles tolerate human activity at an elevation below the nests but are very intolerant of human activity above the nest sites.

In regard to loss of hunting habitat and a decrease in the availability of prey species for eagles, the impact of proposed project actions will be small and extremely gradual. It was noted in Section 3.6 that rodent populations on the selected lands were low and the primary species inhabiting the area were small nocturnal rodents. Because of their food intake requirements and the fact that they are diurnal hunters, eagles' diets generally consist of larger rodents and lagomorphs as well as carrion (Snow, 1973). It is probable that most of the food for the eagles nesting on the selected lands is obtained from habitats where such food items are more readily available and abundant. Since the hunting area of a pair of nesting eagles is relatively large with limited data suggesting an average home range of from 6,000 to more than 8,000 acres, the impact of removal of 120 to 245 acres of what is probably not prime hunting area gradually over a period of 60 to 80 years is not significant.

...iking and other recreational uses, ... [illegible]

for the eagles. It can be ... [illegible]

eagles involved are relatively tolerant of ... [illegible]

presence of the operating ... [illegible]

of their environment, and should be ... [illegible]

foraging area. Other eagles which ... [illegible]

at the present time ... [illegible]

Goos, 1973) ... [illegible]

breeding below the dam ... [illegible]

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[illegible]

...ty of prey ... eagles ... [illegible]

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the area were small ... [illegible]

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consist of larger ... [illegible]

probable that ... [illegible]

... is obtained from habitats ... [illegible]

... and abundant. Since the hunting area of ... [illegible]

relatively large ... limited data suggesting ... [illegible]

...,000 to more than ... [illegible]

of what is probably ... [illegible]

... years is ... [illegible]

4.1.1.5 Landscape Character

The existing gypsum storage areas have a relatively high visibility from portions of the nearby highways and residential areas. The proposed expansion increasing elevation ultimately by 350 feet will increase the visibility primarily to travelers and residents from the north, west and east but not significantly from the major portion of the city of Pocatello from which it is shielded by topography.

A gypsum disposal area as proposed cannot be considered to be in harmony with the existing natural landscape since it very obviously is an artificial terrain feature created by man's activities. However, the impact on the selected lands is not as severe as it would be in most other situations. This is simply because utilization of the selected lands would very gradually expand an existing altered landscape whereas establishment of such a storage area at almost any other site would result in an immediate and more striking contrast to the present landscape character.

4.1.1.6 Socioeconomic Conditions

Approval of project actions and utilization of either part or all of the selected lands for gypsum disposal will allow the continuation of operations as they presently are conducted and at about the same level of economic activity. The importance of the project lies in the fact that the continued operation of the J. R. Simplot Company fertilizer manufacturing plant is dependent upon providing long-term gypsum disposal capacity. Since the alternatives of utilizing existing sites, other local sites or distant sites for gypsum disposal are not considered feasible, disapproval of the proposed land exchange could result in plant shutdown in several years' time. Discussion in this section

will analyze the socioeconomic contribution of the J. R. Simplot Company plant to the community and the potential effects of its shutdown after first considering the economic value and demand for fertilizers and the impact on the market by the Company.

4.1.1.6.1 Economic Value and Demand for Fertilizer

Development of today's commercial fertilizers and the industry that produces them represents one of the most important agricultural advances of the 20th century. Fertilizers provide a source of 13 of the 16 essential plant nutrients that are missing or deficient in U. S. soils. By removing plant nutrient deficiencies in soil, fertilizers have enabled the farmer to produce high quality food and fiber in greater abundance and more economically than at any time in history and consumers have benefited in more stable prices of food and fiber.

Fertilizers have been among the least expensive production items used by farmers in crop production. When fertilizer prices were at their lowest, in the late 1960's, their economic value was obvious. It was not uncommon for farmers to receive three dollars in return for every dollar they invested in fertilizer. Yields increased two to five times depending upon the crop location and farming practices. Recent increases in the cost of fertilizer production have increased the price and have diminished the return somewhat but fertilizer is still the most productive element in the farm input spectrum.

Fertilizer use began a steady upward movement in the early 1940's after a quarter-century of stability. In 1942, farmers used a little more than ten million tons of fertilizer materials. By 1951, that figure had doubled, and by 1971, the amount had doubled again to 41 million tons of will analyze the production and consumption ...

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materials containing 16.9 million tons of nitrogen, phosphate and potash. Add to this an estimated 18 million tons going into U. S. export, and a highly sophisticated, production-oriented industry is reflected.

By 1974, although the growth rate had slowed down, total fertilizer consumption increased to 47 million tons containing 19.3 million tons of plant nutrient. During the past four years, fertilizer demand has been increasing consumption at a rate of four to five percent annually.

A plant's phosphorus requirements are much lower than its nitrogen and potassium requirements and the demand for phosphate has shown a slower growth rate than for the other two primary nutrients. This is in part due to the fact that phosphorus accumulates in the soils when applied in excess of plant needs, whereas nitrogen and, to some degree, potash must be replenished each year because of leaching. Nevertheless, demand for phosphate has increased from nearly two million tons in 1950 to 4.6 million tons in 1970 and is projected to increase to a level of 6.8 million tons by 1980.

This fertilizer plant has served the western and midwestern fertilizer market since 1945. In addition to its basic production function, the Company has established retail outlets in nine western and five midwestern states. At present the plant is one of the two largest producers of phosphate fertilizers west of the Mississippi River. The productive capacity of the operation will shortly represent about 20 percent of the total western phosphate capacity (including western Canada).

4.1.1.6.2 Socioeconomic Effects of Plant Shutdown

The J. R. Simplot Company plant is one of the leading employers in the Pocatello area with 642 persons on the payroll at the plant; this materials containing [illegible] million [illegible] phosphate [illegible] add to this [illegible] [illegible] [illegible] [illegible] [illegible]

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[illegible] [illegible]

The [illegible] [illegible] [illegible] the [illegible] with [illegible] percent [illegible] number constitutes approximately 2.7 percent of the 1974 average annual employed labor force in the Pocatello area which includes Bannock County and the eastern part of Power County (Idaho Dept. of Employment, 1975). These jobs would be lost as a result of plant shutdown. Although not considered further in this analysis, the Company employs over 1,400 in the entire Minerals and Chemical Division at various locations in Idaho, and it also employs a force of 231 at the Gay Mine and 179 at the Conda Mine; these jobs would be jeopardized by a plant shutdown.

As was noted in Section 3.8.3.3, employment in a basic industry determines employment in the non-basic industries such as construction, trades and services. The ratio of basic to non-basic workers was shown to be estimated at between 1:1.65 and 1:1.96. This means that for each worker employed in a basic industry such as the J. R. Simplot Company fertilizer plant, 1.65 to 1.96 local workers are required to supply needed goods and services. Thus, if 642 Simplot employees were to lose their jobs as a result of plant shutdown, from 1,059 to 1,258 additional local workers may become unemployed. Potentially, a total of from 1,701 to 1,900 workers in the local area may be affected by shutdown (642 from Simplot plus from 1,059 to 1,258 non-basic workers). This represents from seven to eight percent of the total employment in the Pocatello area.

The annual payroll for the entire J. R. Simplot Minerals and Chemical Division is approximately $13.25 million, that for the Gay and Conda Mines is $2.83 million, and the payroll for the Pocatello fertilizer manufacturing plant is $6.67 million. Considering only the Pocatello plant, the average wage is $10,389 for the 642 employees. If it is assumed that service workers earn one-half that wage or $5,194, it is possible to

calculate the approximate monetary loss to the service industry caused by plant shutdown. Using basic to non-basic ratios of 1:1.65 and 1:1.96, the total income which would be lost to the service industry would be approximately $5.5 to $6.53 million. The total loss to all Simplot employees and the service workers supporting them would be between $12.17 and $13.2 million.

Plant shutdown would have a serious effect upon suppliers of goods and services, the principal ones being railroads, trucking companies, utility companies, the petroleum industry, industrial equipment suppliers, steel fabricators, electrical equipment suppliers, construction companies and maintenance companies.

During 1974, rail and truck freight payments for the Simplot plant were over $11.5 million for the shipment of raw materials and finished products. Payment for electric power was $1.5 million and payment for natural gas was $5.4 million. As much of the required goods and services as possible is obtained from the local area, with over $10 million spent in the local area annually.

During 1974, the J. R. Simplot Company paid a total of $193,155 in property taxes to Power County. This amount was 18.3 percent of the total paid by industrial concerns (including utilities) and was 9.7 percent of the total real property taxes of $1,989,690 assessed in Power County (Power County Treasurer, personal communication).

4.1.2 Mitigating Measures

The proposed expansion of the gypsum disposal area onto the selected lands is an extension of the existing industrial land use of the area. Considering the vital need by society for continuing fertilizer production, the environmental impacts of expanding the gypsum disposal area appear to be relatively low and acceptable. This method of gypsum disposal is recognized as being the best disposal method presently available. Design criteria and operational methodology have been combined to create a storage facility which is safe from all reasonable hazards, which is compatible with local environmental conditions, and which maximizes the storage capacity of available acreage within these constraints. Every feasible effort will be made to minimize or eliminate adverse environmental impacts. The entire operation will be in compliance with federal, state and local requirements relating to environmental protection.

There are certain mitigating measures which are inherent in the proposed actions. The fact that the proposed action is a land exchange is a mitigating measure in itself in that it insures there will be no net loss of National Resource Lands. The impact of wildlife habitat destruction is mitigated by the long time periods over which such loss will occur gradually thereby reducing direct mortality and allowing adaptation and resettlement in other habitats. Visual impacts will be mitigated by the fact that the proposed actions consist of a gradual increase in size of an existing gypsum storage area rather than establishment of a new area in sharp contrast to the present landscape. Finally, use for gypsum storage may be the highest possible use for the lands when all factors are considered.

The impact on air quality resulting from fugitive dust could be reduced by sprinkling or oiling of the more highly used roads during those periods of the year when the combination of winds and dry weather create this problem. Planting of tall woody vegetation as windbreaks in native soils along the western boundary of the property might effectively reduce the force of prevailing winds and further reduce fugitive dust emanating from the face of the tiers of dikes.

In the event that zones of soil of high permeability were encountered upslope from the gypsum storage area, potential seepage impacts could be mitigated by covering such zones with a suitable liner prior to covering with the gypsum slurry.

Although the archeological site noted in Section 3.8.2 is not endangered by encroachment of gypsum, it could be preserved or excavated if it occurs on lands which are included in the land exchange.

The visual impact of the storage area might be improved by revegetation of the exposed face of the storage area. However, gypsum is an extremely unfavorable growth media and it would require a lengthy and detailed research program to locate plant species which might survive in this environment. Application of topsoil to the faces or benches of the dikes might be a more fruitful approach but this presents problems of finding sufficient topsoil to cover the area involved to the depth which may be required to offset the inhibitory influence of the gypsum base. Topsoil could be removed from the land surface in advance of covering with gypsum in those areas where the topsoil is deep. Where it is shallow, removal of topsoil could create seepage problems from the storage area by interfering with the natural low permeability. Additional possibilities exist in relation to the removal and stockpiling of

topsoil and revegetation of the storage area which have not yet been fully investigated. Such possibilities could be explored in conjunction with the Plant Material Center of the U. S. Soil Conservation Service at Aberdeen, Idaho. At the time of abandonment of the storage area, the Company will comply with whatever regulations are in effect regarding reclamation and revegetation of the area.

The low level loss of recreational usage of the selected lands could be mitigated if the J. R. Simplot Company were able to devise a method by which it could grant permission for certain recreational, scientific and educational uses of the land to continue while at the same time protecting property rights and being free from liability which might result from accidents.

4.1.3 Residual Impacts

Over a period of 80 years, a total of 245 acres of terrestrial wildlife habitat will be destroyed and replaced by gypsum if the proposed action is approved. If a land exchange involving only Priority A selected lands is approved, 120 acres will be made unsuitable for wildlife habitat over a period of 60 years. This loss will be permanent but is not considered to involve lands which are critical to the regional ecology or to any endangered, threatened or economically important species.

Some 220 or 500 acres of land at a particular location will be removed from public ownership in exchange for an approximately equal amount of land at another site. With the transfer to private ownership the land will be precluded from alternative public management plans and will be committed to industrial uses. As the land is covered by gypsum, even those

limited alternative land uses for which it currently has potential would be permanently precluded.

The various uses now made of this land by the general public will be reduced or eliminated. Recreational usage such as hunting, rock climbing, nature study, hiking and trail-biking would be affected. It may be assumed that, as part of the land-exchange process, the public's interest will be protected and that the exchanged lands will offer recreational opportunities and overall values equal to or greater than the selected lands.

There will be a reduction in the grazing allotment on National Resource lands in the local area. This reduction will amount to 500 acres or 71 AUM's under the proposed project actions or 220 acres or 31 AUM's if only Priority A lands are considered.

Over a period of 60 or 80 years, the storage area will increase in elevation by some 350 feet and in total volume by approximately ten times. Visibility will be considerably increased and the overall aesthetic impact will be displeasing to a portion of the viewers. Within the limits of current technology and economic priorities, this will be a permanent effect. Even revegetation would not hide the fact that the natural landscape has been permanently altered by man's activity.

Approval of project actions and utilization of either part or all of the selected lands for gypsum disposal will allow the Simplot phosphate fertilizer plant to continue operations and therefore continue to provide a substantial economic input to the community.

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4.2 RELATIONSHIP BETWEEN SHORT-TERM USE AND LONG-TERM PRODUCTIVITY

Short-term use is considered here to be the 60 to 80 years during which the land concerned is utilized as an operating gypsum storage area. Long-term is that time in which subsequent effects of the use for gypsum storage will still impact the environment.

Utilization of the land for gypsum disposal will displace natural vegetation and wildlife populations and will commit the land to permanent industrial use. If reclamation or revegetation of the storage area proves impossible or infeasible, the area will provide no beneficial use, other than as a limited habitat for wildlife, beyond its estimated waste-disposal lifetime. Aesthetic appeal of the area will be permanently damaged. Following termination of use as an operating gypsum storage area, restrictions on land use might have to be imposed to comply with restrictions in effect at that time.

The relationship between the proposed short-term use and the long-term environmental losses is primarily one of gain of phosphate fertilizer production and the associated local economic benefits over a period of 60 to 80 years versus the long-term loss of productivity and foreclosure of future land-use options on from 120 to 245 acres of land and reduction of aesthetic values over a larger area.

The immediate and projected future demand for phosphate fertilizer for agricultural production at a time when food shortages are being forecast on a worldwide basis justifies the importance of the proposed action. The short-term gain also includes the economic benefits to the community which accrue from employment and income multiplication resulting from the presence of a major local industrial concern.

4.3 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

Approval of project actions will result in the permanent loss of vegetation and associated wildlife and grazing capacity. The land form will be changed and options for alternative land use will be foreclosed. Continued operation of the fertilizer plant will require the commitment of raw materials such as phosphate rock, sulfur and other chemicals as well as energy sources such as diesel fuel, natural gas and electricity.

5.0 PERSONS, GROUPS AND GOVERNMENT AGENCIES CONTACTED

CONTACT	INPUT
U. S. Bureau of Land Management, Burley, Id. Nick J. Cozakos David B. Vail	General guidance, Motorcycle usage, Grazing information, Fire history
U. S. Soil Conservation Service, Pocatello and American Falls, Id. James Baird Hal Bigerstaff Gale Roberts	Soils, Land ownership, Land use
U. S. Geological Survey, Denver, Colorado Donald E. Trimble	Geology
U. S. Bureau of Mines, Metallurgy Research Center, Salt Lake City, Utah	Gypsum characteristics
U. S. Environmental Protection Agency	Surface water quality
U. S. Environmental Protection Agency, NERC-LV, Office of Radiation Programs Donald Hendricks	Radiation
National Climatic Center, Ashville, North Carolina	Meteorology
National Geophysical and Solar-Terrestrial Data Center	Seismicity
Idaho Department of Health & Welfare	Air quality, Water quality
Idaho Department of Health & Welfare, Radiation Control Section Gary F. Boothe	Radiation
Idaho Department of Highways Richard Christensen	Highway traffic
Idaho Department of Employment Thomas Velasik	Socioeconomic data
Idaho Department of Fish and Game Dale Jensen Perry Johnson	Wildlife Biology

CONTACT	INPUT
Idaho Department of Water Resources	Ground water hydrology
Southeast Idaho Council of Governments	Socioeconomic data
Bannock County Planning Commission	Socioeconomic data
Power County Treasurer	Socioeconomic data
Pocatello Chamber of Commerce	Socioeconomic data
Pocatello Planning and Research Department Jerry Mason	Socioeconomic data
Citizen's Environmental Council	Public attitudes
Idaho State Journal Gary Hayden	Public attitudes
Michaud Creek Ranches Robert Swanson	Grazing allotment
Charles Trost, Idaho State University	Ornithology
Morlan W. Nelson, BLM (retired)	Ornithology
A. C. Wiese, University of Idaho	Fluorides
Keith Schiager, University of Pittsburgh	Radiation
Union Pacific Railroad	Diesel fuel requirements
S. Albert Johnson, Idaho House of Representatives	Public attitudes
Gary Cummings, Oil, Chemical and Atomic Workers International Union	Public attitudes
Robert C. Kinghorn, International Union of Operating Engineers	Public attitudes
Idaho Trail Machine Association	Public attitudes
Pocatello Trail Machine Association	Public attitudes
John Evans, Pocatello City Council	Public attitudes

CONTACT	INPUT
H. S. Hilbert, Coordinator, Idaho State University Outdoor Program	Public attitudes
Ralph M. Wheeler, Idaho House of Representatives	Public attitudes
J. R. Simplot Company	
Jack L. Smith	
John F. Cochrane	
Melvin Alsager	
Joseph Francisco	
William Brissenden	
J. W. Anderson	
Steven Beebe	
Eugene L. Knickrehn	
Earl Mapes	General guidance, Project plans, Socioeconomic data, Historical information, Process information, Air quality, Water quality, Engineering data
Western Environmental Research Associates	
Karl E. Holte	Plant taxonomy
Fred L. Rose	Ecology
Barry L. Keller	Mammalogy
Bruce Dickau	Field botany
James Kennedy	Field botany
B. Robert Butler	Archaeology
Tim Reynolds	Ornithology
Douglas Shorey	Ornithology
Ronald Pace	Herpetology
Erica Hansen	Field coordination
Dames & Moore	
Richard Chojnacki	Principal-in-Charge
Peter F. Olsen	Project Management, Biology
George Condrat	Hydrology
Dennis Paulsen	Geology
Steven Vick	Seismicity
Ken Evans	Meteorology
Morton Schwartz	Radiation

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