



US Army Corps
of Engineers
HUNTSVILLE DIVISION

DRAFT

Defense Environmental Restoration Program
for
Formerly Used Defense Sites

Ordnance and Explosive Waste
Chemical Warfare Materials

ARCHIVES SEARCH REPORT

CONCLUSIONS AND RECOMMENDATIONS

CAMP ABBOT

Deschutes County, Oregon

Project No. F10OR004102

JULY 1995

Prepared by
US ARMY CORPS OF ENGINEERS
ST. LOUIS DISTRICT

200.1f

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
CONCLUSIONS AND RECOMMENDATIONS
for
CAMP ABBOT
Deschutes County, Oregon

Project No. F10OR004102

TABLE OF CONTENTS

Section		Page
1.0	Introduction	
1.1	Authority	1-1
1.2	Subject	1-2
1.3	Purpose	1-2
1.4	Scope	1-2
2.0	Conclusions	
2.1	Summary of Conclusions	2-1
2.2	Historical Site Summary	2-1
2.3	Real Estate	2-2
2.4	Site Inspection	2-3
2.5	Confirmed Ordnance Presence	2-4
2.6	Potential Ordnance Presence	2-5
2.7	Uncontaminated Areas	2-5
2.8	Site Information Analysis	2-5
3.0	Recommendations	
3.1	Summary of Recommendations	3-1
3.2	Preliminary Assessment Actions	3-1
3.3	Other Environmental Actions	3-1

APPENDICES

- A Risk Assessment Code Procedure Form
- B Glossary and Acronyms
- C Report Distribution List

REPORT PLATES

- RP-1 Vicinity Map
- RP-2 General Layout Map
- RP-3 Sunriver Resort Current Map
- RP-4 Current Map with Range Overlay
- RP-5 Findings
- RP-6 Aerial Photo 1951
- RP-7 Aerial Photo 1968

1.0 Introduction

1.1 Authority

In 1986, Congress established the Defense Environmental Restoration Program at 10 U.S.C. 2701 et.seq. This program directed the Secretary of Defense to "carry out a program of environmental restoration at facilities under the jurisdiction of the Secretary."

In March, 1990, the EPA issued a revised National Contingency Plan. Under 40 C.F.R. 300.120, EPA designated DOD to be the removal response authority for incidents involving DoD military weapons and munitions under the jurisdiction, custody and control of DoD.

Since the beginning of this program, the U.S. Army Corps of Engineers has been the agency responsible for environmental restoration at Formerly-Used Defense Sites (FUDS). Since 1990, the U.S. Army Engineering and Support Center, Huntsville, has been the Mandatory Center of Expertise and Design Center for Ordnance and Explosives.

1.0 Introduction

1.1 Authority

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) 42 USC 9601 et seq. Ordnance and explosive wastes are included in the CERCLA definition of pollutants and contaminants that require a remedial response.

In 1983, the Environmental Restoration Defense Account (ERDA) was established by Public Law 98-212. This Congressionally-directed fund was to be used for environmental restoration at Department of Defense (DOD) active installations and formerly used properties. The DOD designated the Army as the sole manager for environmental restoration at closed installations and formerly used properties. The Secretary of the Army assigned this mission to the Corps of Engineers (USACE) in 1984.

The 1986 Superfund Amendments and Reauthorization Act (SARA) amended certain aspects of CERCLA, some of which directly related to OEW contamination. Chapter 160 of the SARA established the Defense Environmental Restoration Program (DERP). One of the goals specified for the DERP is "correction of environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment".

The DERP requires that a CERCLA response action be undertaken whenever such "imminent and substantial endangerment" is found at:

- A. A facility or site that is owned by, leased to, or otherwise possessed by the United States and under the jurisdiction of the Secretary of Defense.
- B. A facility or site that was under the jurisdiction of the Secretary of Defense and owned by, leased to, or otherwise possessed by the United States at the time of actions leading to contamination.
- C. A vessel owned or operated by the Department of Defense.

The National Contingency Plan (NCP) was established by the Clean Water Act of 1972. The NCP has been revised and broadened several times since then. Its purpose is to provide the organizational structure and procedures for remedial actions to be taken in response to the presence of hazardous substances, pollutants, and contaminants at a site. Section 105 of the 1980 CERCLA states that the NCP shall apply to all response actions taken as a result of CERCLA requirements.

The March 1990 National Oil and Hazardous Substances Pollution Contingency Plan given in 40 CFR part 300 is the latest version of the NCP. Paragraph 300.120 states that "DOD will be the removal response authority with respect to incidents involving DOD military weapons and munitions under the jurisdiction, custody, and control of DOD."

On April 5, 1990, U.S. Army Engineer Division, Huntsville (USAEDH) was designated as the USACE Mandatory Center of Expertise (MCK) and Design Center for Ordnance and Explosive Waste (OEW). As the MCK and Design Center for OEW, USAEDH is responsible for the design and successful implementation of all Department of the Army OEW remediations required by CERCLA. USAEDH will also design and implement OEW remediation programs for other branches of the Department of Defense when requested. In cooperation with the Huntsville Division, the U.S. Army Corps of Engineers St. Louis District has been assigned the task of preparing Archives Search Reports for those Formerly Used Defense Sites (FUDS) suspected of ordnance and explosive waste (OEW) and chemical warfare materials (CWM) contamination.

1.2 Subject

The former Camp Abbot installation was a World War II Army Engineering Replacement and Training Center. The site, located in Deschutes County, Oregon, consisted of several small arms firing ranges, grenade and artillery ranges, ordnance storage magazines and support facilities, and a gas chamber for training. Various documents refer to the site as Camp Abbott.

1.3 Purpose

This Archives Search Report (ASR) compiles information obtained through historical research at various archives and records holding facilities, interviews with persons associated with the site or its operations, and personal visits to the site. All efforts were directed towards determining possible use or disposal of ordnance and/or CWM on the site. Particular emphasis was placed on establishing the type of munitions, quantities and area of disposal. Information obtained during this process was used in developing recommendations for further actions at the site.

1.4 Scope

The entire site of the former military installation, consisting of 9686.41 acres, was evaluated in assessing the potential for OEW contamination. It is designated as DERP-FUDS Site No. F10OR004100.

The ASR FINDINGS presents the history of the site, description and characterization of the immediate surrounding area, real estate ownership information, findings of a visual field survey, and OEW (CWM) site analysis, including an evaluation of potential ordnance contamination. This Executive Summary supplements the ASR FINDINGS and furnishes the CONCLUSIONS AND RECOMMENDATIONS.

2.0 Conclusions

2.1 Summary of Conclusions

The Risk Assessment Procedures Form prepared for the Camp Abbot site inspected results in a RAC score of 2, based on the type of ordnance recovered and probability of additional ordnance remaining on the lands. However, due to the short duration this site was used and the high degree of development and recreational usage, no concentration of OEW is believed to exist. A RAC score of 2 indicates that further action is necessary to completely characterize the extent of the OEW contamination and subsequently to effect the remediation of the same.

2.2 Historical Site Summary

Camp Abbot was established as an Engineer Replacement Training Center (ERTC) in 1943, and the soldiers first arrived for training in March of that year. Up to 10,000 men at a time trained at the camp, and in the 14 months of its operation, 90,000 men proceeded under the famed castle entrance.

The 17 week training cycle at Camp Abbot was divided into three distinct phases. The first phase included training in hand grenades and anti-tank grenades; defense against chemical, air, and mechanized attack; and rifle marksmanship. The next segment provided the troops with demolition training. Nitrostarch and other explosives were used to blast bridges (Abbot Engineer 1944). The last phase of the ERTC program was a three week field maneuver spent under combat zone conditions. (O'Reilly 1989).

Camp Abbot also served as the headquarters for the Oregon Maneuver War Games of 1943, the largest maneuver ever held in the northwest (Abbot Engineer 1943). The engineers took part in the games as a crucial training component for the Allies final push across France and Germany (O'Reilly 1989).

Historical maps show that the camp's facilities included: a tactical training area, a night training area, grenade courts, an anti-aircraft range, field target range, sub-machine gun range, demolition area, ordnance magazines, an anti-tank demonstration area, gas chamber, transition range and a rifle range. On the sub-machine gun range, men crawled under concentration wire with live fire overhead and simulated land mines exploding in the area (Bend Bulletin 1943). On the grenade court, live grenades known as the "G.I. Pineapple" were used by the troops. (Abbot Engineer 1943). On the demolition course, soldiers attacked "enemy" pillboxes.

Gas training was a vital component of the 17 week training cycle. Troops learned how to handle a thermite bomb during a class in incendiary control. Soldiers were instructed how "to combat" the hazardous magnesium bomb along with white phosphorous (Abbot Engineer 1944). A photograph of a pyrotechnic-like explosion in the Base newspaper shows the use of white phosphorous (Abbot Engineer 1944). The paper did not provide a definitive statement

saying the chemical was actually used at Camp Abbot. The base newspaper in 1943 stated that a Mustard-Lewisite mixture had been added to the list of chemical agents because it was the standard Japanese blistering agent. Historical research conducted by the St. Louis District yielded no further information on this subject. Copies of pertinent newspaper articles are located at Appendix G, ASR Findings.

Camp Abbot ceased operations in June 1944. A letter dated 25 September 1946, states that "A recent inspection of Camp Abbot was made by the chemical officer of the 6th U.S. Army to determine whether poisonous gases were present on the area. This inspection showed that the land was free of any such contamination" (Corps of Engineers 1946). Another letter dated 30 October 1946 reported, "Camp Abbot has been inspected for decontamination and dedudding and that said camp is hereby declared safe for return to private use" (Corps of Engineers 1946). An additional letter, dated 18 November 1947, states "The lands have been examined and have been cleared of all explosives or explosive objects reasonably possible to detect by visual inspection " (Corps of Engineers 1947).

Today, a portion of the former Camp Abbot is the private resort community of Sunriver. A historical brochure published by Sunriver states that a group of youths found bazooka rockets, bullets, hand grenades and barbed wire that were used in the engineers' bivouac training (O'Reilly 1989). Attempts to pursue this statement have been unsuccessful. According to the INPR, an artillery round and a bazooka round have been found west of the Sunriver Resort and were reported to the Deschutes County Sheriffs Department.

2.3 Real Estate

2.3.1 Confirmed DOD Ownership

The FDE indicates that the Army acquired 8,672.45 acres of land by permit from the Department of Agriculture, U.S. Forest Service in October 1942. An additional 984.84 acres of fee land and 29.12 acres of easements were acquired from private parties. The property was originally acquired for use as an Army Engineering Replacement and Training Center. Declared surplus in April 1946, the property, totalling 9686.41 acres, was disposed of through surrender of the use permit and the transfer of the remaining property to the War Assets Administration. Current owners are the Forest Service and Sunriver Properties Oregon, LTD.

None of the real estate documents examined contained ordnance and explosive waste related land use restrictions. Certificates of clearance, indicating that no chemical or ordnance related hazards exist, are included at Appendix E, ASR Findings.

2.3.2 Potential DOD Ownership

No information indicating DOD ownership of any lands other than those mentioned above was uncovered during the archive search.

2.3.3 Significant Past Ownership

There is nothing in the records to indicate that there were any historically significant past ownerships, other than DOD's, with respect to possible OEW or CWM contamination.

2.3.4 Present Ownership

The portion of the former site east of the Deschutes River is owned by Sunriver Properties Oregon, LTD. The majority of the lands west of the river are federally owned (National Forest Service). Individual residential tracts are interspersed within the Forest Service and those lands south of Sunriver.

2.4 Site Inspection

The site inspection was conducted on 22-23 May 1995, by the following personnel of the St. Louis District:

Dennis W. Gilmore	Project Manager
Randy Fraser	Safety Specialist
M. Kevin McCaffrey	QASAS
C. John Daly	Historian

All local research was completed in the Fall of 1994, during the conduct of preparing an ASR for the Northwest Maneuver Area (NWMA), DERP-FUDS Site No. F10OR020801. At that time a limited inspection of the site was conducted, focusing specifically on areas of past recoveries. This approach was taken with the knowledge that a more thorough investigation of the site was scheduled. Camp Abbot served as the headquarters for the exercise conducted in the NWMA.

During this initial effort, historical information was obtained from the Sunriver Nature Center including historical photographs and news articles. Most significant was the display of ordnance and related items which had been found on the site. Items observed in the display cabinet included parts of a grenade, a 2.36" bazooka round, and different caliber bullets. Photographs of these items were taken and are included at Appendix I.

The only ordnance related item observed on the site was a grenade spoon, in the vicinity of the grenade courts. The location is defined as Longitude North 43° 58' 52.1", Latitude West 120° 03' 08.0".

During the period 22-23 May 1995, a thorough site visit was conducted. The research indicated that ordnance had been recovered at several locations throughout the former installation as noted in Section 4.1. The location given for these recoveries did not correspond with that of any known or documented range. Our focus was on the thorough examination of these areas and those formally occupied by range facilities.

The presence of several bunkers and targets were identified along with a suspected demolition area. The most potentially significant find was an unvegetated hill side, on which is located a concrete pillbox. At the foot of this hill, southeast of the pillbox were several depressions which may have been used as demolition pits or were very large craters. The pillbox is located at longitude North 43° 54' 46.6" and latitude West 121° 27' 05.4". Historical research did not identify this location as a range. Its discovery lends credence to the fact that ordnance has reportedly been found in the cliffs northwest of the airport, a site which was not identified in historical documents as a range.

The three bunkers, of wood construction with earth cover, were located within the field target range. These structures are approximately eight feet wide, three feet deep, and seven feet high, facing in a westerly direction. It is believed that they provided overhead cover from artillery for troops assaulting the hill. The middle bunker is located at Longitude North 42° 58' 50.9" and Latitude West 120° 03' 12.6". The two remaining bunkers were approximately 100 yards away.

In addition to the ranges, the ordnance storage area, chemical storage area, and landfill site was investigated. Of these three sites, the only remaining visual evidence is of the ordnance storage area. The foundations of the three structures and berms were identified. (N43° 55' 37.1", W121° 26' 14.7")

East of the ordnance area was what may have been an ordnance disposal pit. The potential pit was horseshoe in shape, bermed and ringed with stone. (N43° 55' 46.5", W121° 26' 14.7")

No evidence of OEW, of a hazardous nature, was found in the course of the site inspection.

2.5 Confirmed Ordnance Presence

Due to the nature of the training, the types of ordnance recovered, and the information derived relative to past incidents, OEW contamination is thought to be limited. This assumption is based on the fact that the site was only utilized for fourteen months and that the recoveries have been infrequent. From interviews of individuals knowledgeable of the site and general descriptions of areas from which ordnance has been recovered, the following areas of concern are presented, in order of the probability of contamination:

1. Cliffs northwest of the Sunriver Airport across from Cardinal Landing Bridge
2. Former grenade range
3. Suspected demolition/assault range
4. Landfill

Of the listed areas, the cliffs and the suspected demolition site are not documented in the historical records as having been utilized as ranges. This may imply that other areas of the site were used, never recorded, and may harbor a potential for OEW contamination.

The site inspection confirmed the contamination of the site with military munitions from past DOD activities. It is possible that chemical munitions may be present on the site. Documentation in the form of present site photographs (Appendix I, ASR Findings) and selected historical documents are provided in the Findings of this ASR.

2.6 Potential Ordnance Presence

There is a definite potential for additional ordnance being discovered at the former ranges. Extensive areas of this site, west of the Deschutes River, have been only minimally disturbed from the contours that existed when it was an active site. Recreational usage of the area is high.

2.7 Uncontaminated Areas

The only area considered free of OEW is the extensively developed Sunriver Resort properties.

2.8 Site Information Analysis

This ASR was prepared to identify the potential for CWM and OEW at the former Camp Abbot site. The review of historical information related to the training installation provided no evidence of CWM contamination, and, although once utilized on the site, the probability of remaining CWM contamination is remote. Information obtained in preparing this ASR confirmed the contamination of the site with ordnance and explosive wastes.

The area of the chemical training facilities has been totally developed. During the performance of extensive development no mention of any encounter with either chemical munitions or containerized chemical were reported. The most probable disposal location of any containerized agent would have been the installation's landfill. A housing area currently occupies the former landfill site.

3.0 Recommendations

3.1 Summary of Recommendations

Based on previous recoveries of ordnance, the site merits further investigation. It is believed that any additional munitions found on the site will be individual, isolated rounds. It is recommended therefore, that initially, the former ranges straddling the Deschutes River be surveyed to determine the extent of contamination. This area receives the highest degree of recreational use. Subsequently, a physical survey should also be conducted of the lands with particular attention given to the sites of previous recoveries and the suspected demolition area. The areas of potential contamination are:

1. The cliffs northwest of the Sunriver Airport across from Cardinal Landing Bridge
2. The former grenade range
3. The suspected demolition/assault range
4. The former landfill

Of the above listed areas, the cliffs and the suspected demolition site are not documented in the historical records as having been utilized as ranges. This may imply that other areas of the site were used for training and the employment of ordnance, never recorded, and may harbor a potential for OEW contamination.

3.2 Preliminary Assessment Actions

No other potential FUDS sites were identified.

3.3 Other Environmental Actions

No other areas of concern were identified.

APPENDIX A

RISK ASSESSMENT CODE PROCEDURE FORM

RISK ASSESSMENT PROCEDURES FOR
 ORDNANCE AND EXPLOSIVE WASTE (OEW) SITES

Site Name CAMP ARROT Rater's Name DENNIS W. GILMORE
 Site Location DESCHUTES COUNTY, OR Phone No. 314 331-8108
 DERP Project # F100R004102 Organization CELMS-PM-M
 Date Completed JUNE 1995 RAC Score 2

OEW RISK ASSESSMENT:

This risk assessment procedure was developed in accordance with MIL-STD 882C and AR 385-10. The RAC score will be used by CEHND to prioritize the remedial action at Formerly Used Defense Sites. The OEW risk assessment should be based upon best available information resulting from records searches, reports of Explosive Ordnance Disposal (EOD) detachment actions, and field observations, interviews, and measurements. This information is used to assess the risk involved based upon the potential OEW hazards identified at the site. The risk assessment is composed of two factors, hazard severity and hazard probability. Personnel involved in visits to potential OEW sites should view the CEHND videotape entitled "A Life Threatening Encounter: OEW."

Part I. Hazard Severity. Hazard severity categories are defined to provide a qualitative measure of the worst credible mishap resulting from personnel exposure to various types and quantities of unexploded ordnance items.

TYPE OF ORDNANCE
 (Circle all values that apply)

A. Conventional Ordnance and Ammunition	VALUE
Medium/Large Caliber (20 mm and larger)	10
Bombs, Explosive	10
Grenades, Hand and Rifle, Explosive	(10)
Landmines, Explosive	10
Rockets, Guided Missiles, Explosive	(10)
Detonators, Blasting Caps, Fuzes, Boosters, Bursterns	6
Bombs, Practice (w/spotting charges)	6
Grenades, Practice (w/spotting charges)	4
Landmines, Practice (w/spotting charges)	4
Small Arms (.22 cal - .50 cal)	(1)
Conventional Ordnance and Ammunition (Select the largest single value)	<u>10</u>

What evidence do you have regarding conventional OEW? S&L FR

B. Pyrotechnics (For munitions not described above.)

VALUE

Munition (Container) Containing
White Phosphorus (WP) or other
Pyrophoric Material (i.e.,
Spontaneously Flammable)

10

Munition Containing A Flame
or Incendiary Material (i.e., Napalm,
Triethylaluminum Metal Incendiaries)

6

Flares, Signals, Simulators, Screening
Smokes (other than WP)

4

Pyrotechnics (Select the largest single value) _____

What evidence do you have regarding pyrotechnics? _____

C. Bulk High Explosives (Not an integral part of conventional ordnance;
uncontainerized.)

VALUE

Primary or Initiating Explosives
(Lead Styphnate, Lead Azide,
Nitroglycerin, Mercury Azide,
Mercury Fulminate, Tetracene, etc.)

10

Demolition Charges

10

Secondary Explosives
(PETN, Compositions A, B, C,
Tetryl, TNT, RDX, HMX, HBX,
Black Powder, etc.)

8

Military Dynamite

6

Less Sensitive Explosives
(Ammonium Nitrate, Explosive D, etc.)

3

High Explosives (Select the largest single value) _____

What evidence do you have regarding bulk explosives? _____

D. Bulk Propellants (Not an integral part of rockets, guided missiles, or
other conventional ordnance; uncontainerized)

VALUE

Solid or Liquid Propellants

6

Propellants _____

What evidence do you have regarding bulk propellants? _____

E. Chemical Warfare Materiel and Radiological Weapons

	VALUE
Toxic Chemical Agents (Choking, Nerve, Blood, Blister)	25
War Gas Identification Sets	20
Radiological	15
Riot Control Agents (Vomiting, Tear)	5
Chemical and Radiological (Select the largest single value)	_____

What evidence do you have of chemical/radiological OEW? _____

=====

TOTAL HAZARD SEVERITY VALUE _____
 (Sum of Largest Values for A through E--Maximum of 61)
 Apply this value to Table 1 to determine Hazard Severity Category.

TABLE 1

HAZARD SEVERITY*

Description	Category	Hazard Severity Value
CATASTROPHIC	I	21 and greater
CRITICAL	II	10 to 20
MARGINAL	III	5 to 9
NEGLIGIBLE	IV	1 to 4
**NONE		0

* Apply Hazard Severity Category to Table 3.

**If Hazard Severity Value is 0, you do not need to complete Part II. Proceed to Part III and use a RAC Score of 5 to determine your appropriate action.

Part II. Hazard Probability. The probability that a hazard has been or will be created due to the presence and other rated factors of unexploded ordnance or explosive materials on a formerly used DOD site.

AREA, EXTENT, ACCESSIBILITY OF OEW HAZARD
 (Circle all values that apply)

A. Locations of OEW Hazards

	VALUE
On the surface	5
Within Tanks, Pipes, Vessels or Other confined locations.	4
Inside walls, ceilings, or other parts of Buildings or Structures.	3
Subsurface	2

Location (Select the single largest value) 5

What evidence do you have regarding location of OEW? _____

B. Distance to nearest inhabited locations or structures likely to be at risk from OEW hazard (roads, parks, playgrounds, and buildings).

	VALUE
Less than 1250 feet	5
1250 feet to 0.5 miles	4
0.5 miles to 1.0 mile	3
1.0 mile to 2.0 miles	2
Over 2 miles	1

Distance (Select the single largest value) 4

What are the nearest inhabited structures? Houses

C. Numbers of buildings within a 2 mile radius measured from the OEW hazard area, not the installation boundary.

	VALUE
26 and over	5
16 to 25	4
11 to 15	3
6 to 10	2
1 to 5	1
0	0
Number of Buildings <u>(Select the single largest value)</u>	<u>5</u>

Narrative _____

D. Types of Buildings (within a 2 mile radius)

	VALUE
Educational, Child Care, Residential, Hospitals, Hotels, Commercial, Shopping Centers	5
Industrial, Warehouse, etc.	4
Agricultural, Forestry, etc.	3
Detention, Correctional	2
No Buildings	0
Types of Buildings <u>(Select the largest single value)</u>	<u>5</u>

Describe types of buildings in the area. _____
WOOD RESIDENTIAL STRUCTURES

E. Accessibility to site refers to access by humans to ordnance and explosive wastes. Use the following guidance:

BARRIER	VALUE
No barrier or security system	5
Barrier is incomplete (e.g., in disrepair or does not completely surround the site). Barrier is intended to deny egress from the site, as for a barbed wire fence for grazing.	4
A barrier, (any kind of fence in good repair) but no separate means to control entry. Barrier is intended to deny access to the site.	3
Security guard, but no barrier	2
Isolated site	1
A 24-hour surveillance system (e.g., television monitoring or surveillance by guards or facility personnel) which continuously monitors and controls entry onto the facility; or An artificial or natural barrier (e.g., a fence combined with a cliff), which completely surrounds the facility; and a means to control entry, at all times, through the gates or other entrances to the facility (e.g., an attendant, television monitors, locked entrances, or controlled roadway access to the facility).	0

Accessibility (Select the single largest value)

5

Describe the site accessibility. _____

F. Site Dynamics - This deals with site conditions that are subject to change in the future, but may be stable at the present. Examples would be excessive soil erosion by beaches or streams, increasing land development that could reduce distances from the site to inhabited areas or otherwise increase accessibility.

	VALUE
Expected	5
None Anticipated	0
Site Dynamics <u>(Select largest value)</u>	<u>0</u>

Describe the site dynamics. _____

TOTAL HAZARD PROBABILITY VALUE

(Sum of Largest Values for A through F--Maximum of 30)

Apply this value to Hazard Probability Table 2 to determine Hazard Probability Level.

24

TABLE 2

HAZARD PROBABILITY

Description	Level	Hazard Probability Value
FREQUENT	A	27 or greater
PROBABLE	B	21 to 26
OCCASIONAL	C	15 to 20
REMOTE	D	8 to 14
IMPROBABLE	E	less than 8

* Apply Hazard Probability Level to Table 3.

Part III. Risk Assessment. The risk assessment value for this site is determined using the following Table 3. Enter with the results of the hazard probability and hazard severity values.

TABLE 3

Probability Level		FREQUENT A	PROBABLE B	OCCASIONAL C	REMOTE D	IMPROBABLE E
Severity Category:						
CATASTROPHIC	I	1	1	2	3	4
CRITICAL	II	1	2	3	4	5
MARGINAL	III	2	3	4	4	5
NEGLIGIBLE	IV	3	4	4	5	5

RISK ASSESSMENT CODE (RAC)

- RAC 1 Expedite INPR, recommending further action by CEHND - Immediately call CEHND-ED-SY--commercial 205-955-4968 or DSN 645-4968.
- RAC 2 High priority on completion of INPR - Recommend further action by CEHND.
- RAC 3 Complete INPR - Recommend further action by CEHND.
- RAC 4 Complete INPR - Recommend further action by CEHND.
- RAC 5 Usually indicates that no further action (NOFA) is necessary. Submit NOFA and RAC to CEHND.

Part IV. Narrative. Summarize the documented evidence that supports this risk assessment. If no documented evidence was available, explain all the assumptions that you made.

SEE ESR

APPENDIX B
GLOSSARY AND ACRONYMS

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
FINDINGS

for
CAMP ABBOT
Deschutes County, Oregon

Project No. F10OR004102

APPENDIX B -- GLOSSARY AND ACRONYMS

AAF	Army Air Field
AA	Anti-Aircraft
AEC	Army Environmental Center
AGO	Adjutant General's Office
AP	Armor Piercing
APDS	Armor Piercing Discarding Sabot
APERS	Antipersonnel
APT	Armor Piercing with Tracer
ASR	Archives Search Report
Aux	Auxiliary
BAR	Browning Automatic Rifle
BD	Base Detonating
BD/DR	Building Demolition/Debris Removal
BE	Base Ejection
BGR	Bombing and Gunnery Range
BLM	Bureau of Land Management
BRAC	Base Realignment And Closure
CADD	Computer-Aided Design/Drafting
Cal	Caliber
CBDA	Chemical and Biological Defense Agency
CBDCOM	Chemical and Biological Defense Command
CE	Corps of Engineers
CEHND	Corps of Engineers, Huntsville Division
CELMS	Corps of Engineers, St. Louis
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERFA	Community Environmental Response Facilitation Act
CFR	Code of Federal Regulations
cfs	Cubic Feet Per Second
COE	Chief of Engineers
COMP	Composition
CTG	Cartridge
CSM	Chemical Surety Material
CSM	Command Sergeant Major
CWM	Chemical Warfare Material
CWS	Chemical Warfare Service
DA	Department of the Army
DARCOM	Development and Readiness Command

DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DERP-FUDS	Defense Environmental Restoration Program- Formerly Used Defense Sites
DoD	Department of Defense
DOE	Department of Energy
DOI	Department of Interior
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EOD	Explosives Ordnance Disposal
EPA	Environmental Protection Agency
ERDA	Environmental Restoration Defense Account
ERTC	Engineer Replacement Training Center
FDE	Findings and Determination of Eligibility
FFMC	Federal Farm Mortgage Corporation
FLCH	Flechette
FS	Feasibility Study
FWS	U. S. Fish and Wildlife Service
FUDS	Formerly Used Defense Sites
GIS	Graphic Information System
GSA	General Services Administration
HE	High Explosive
HEAT	High Explosive Anti-Tank
HEI	High Explosive Incendiary
HEP	Plastic
HE-S	Illuminating
HTRW	Hazardous Toxic and Radioactive Waste
HTW	Hazardous and Toxic Waste
IAS	Initial Assessment Study
INPR	Inventory Project Report
IRP	Installation Restoration Program
MCX	Mandatory Center of Expertise
MG	Machine Gun
MG	Major General
mm	Millimeter
MT	Mechanical Time
MTSQ	Mechanical Time Super Quick
NARA	National Archives and Records Administration
NAS	Naval Air Station
NCDC	National Climatic Data Center
NCP	National Contingency Plan
NFS	National Forest Service
NG	National Guard
NGVD	National Geodetic Vertical Datum
NOAA	National Oceanic and Atmospheric Administration
NOFA	No Further Action
NPRC	National Personnel Records Center
NRC	National Records Center
NWMA	Northwest Maneuver Area
OEW	Ordnance and Explosive Waste
OSHA	Occupational Safety and Health Act
PA	Preliminary Assessment
PD	Point Detonating

PIBD	Point Initiating, Base Detonating
PL	Public Law
QASAS	Quality Assurance Specialist Ammunition Surveillance
RA	Removal Action
RAC	Risk Assessment Code
RD	Remedial Design
RG	Record Group
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SCS	Soil Conservation Service
SLD	St. Louis District, Corps of Engineers
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SWMU	Solid Waste Management Units
TECOM	Test Evaluation Command
TEU	Technical Escort Unit
TNT	Trinitrotoluene
TP	Target Practice
USA	United States of America
USACE	U.S. Army Corps of Engineers
USADACS	U.S. Army Defense Ammunition Center and School
USAED	U.S. Army Engineer District
USAEDH	U.S. Army Engineer Division, Huntsville, AL
USATHMA	U.S. Army, Corps of Engineers, Toxic and Hazardous Materials Agency
USC	United States Code
USDA	U.S. Department of Army
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UXO	Unexploded Ordnance
WAA	War Assets Administration
WD	War Department
WNRC	Washington National Records Center

APPENDIX C
REPORT DISTRIBUTION LIST

ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
CONCLUSIONS AND RECOMMENDATIONS

for
CAMP ABBOT
Deschutes County, Oregon

Project No. F10OR004102

APPENDIX C -- REPORT DISTRIBUTION LIST

<u>Addressee</u>	<u>No. Copies</u>
Commander, U.S. Army Engineer Division Huntsville, ATTN: CEHND-ED-SY-A P.O. Box 1600 Huntsville, Alabama 35807-4301	2
Commander, U.S. Army Chemical Materiel Destruction Agency ATTN: SFIL-NSM Bldg E4585 Aberdeen Proving Ground, Maryland 21010-5401	1
Commander, U.S. Army Chemical & Biological Defense Command ATTN: AMSCB-CIH, Bldg E5183 Aberdeen Proving Ground, Maryland 21010-5323	1
U.S. Army Technical Center for Explosives Safety ATTN: SMCAC-ESM Savannah, IL 61074-9639	1
Commander, U.S. Army Engineer District, Portland ATTN: CENPP-PE-DC P.O. Box 2946 Portland, OR 97204-3945	1
CELMS-ED-G	1
CELMS-ED-H	1
CELMS-PD-A	1
CELMS-PM-M	1

**ORDNANCE AND EXPLOSIVE WASTE
CHEMICAL WARFARE MATERIALS
ARCHIVES SEARCH REPORT
CONCLUSIONS AND RECOMMENDATIONS**

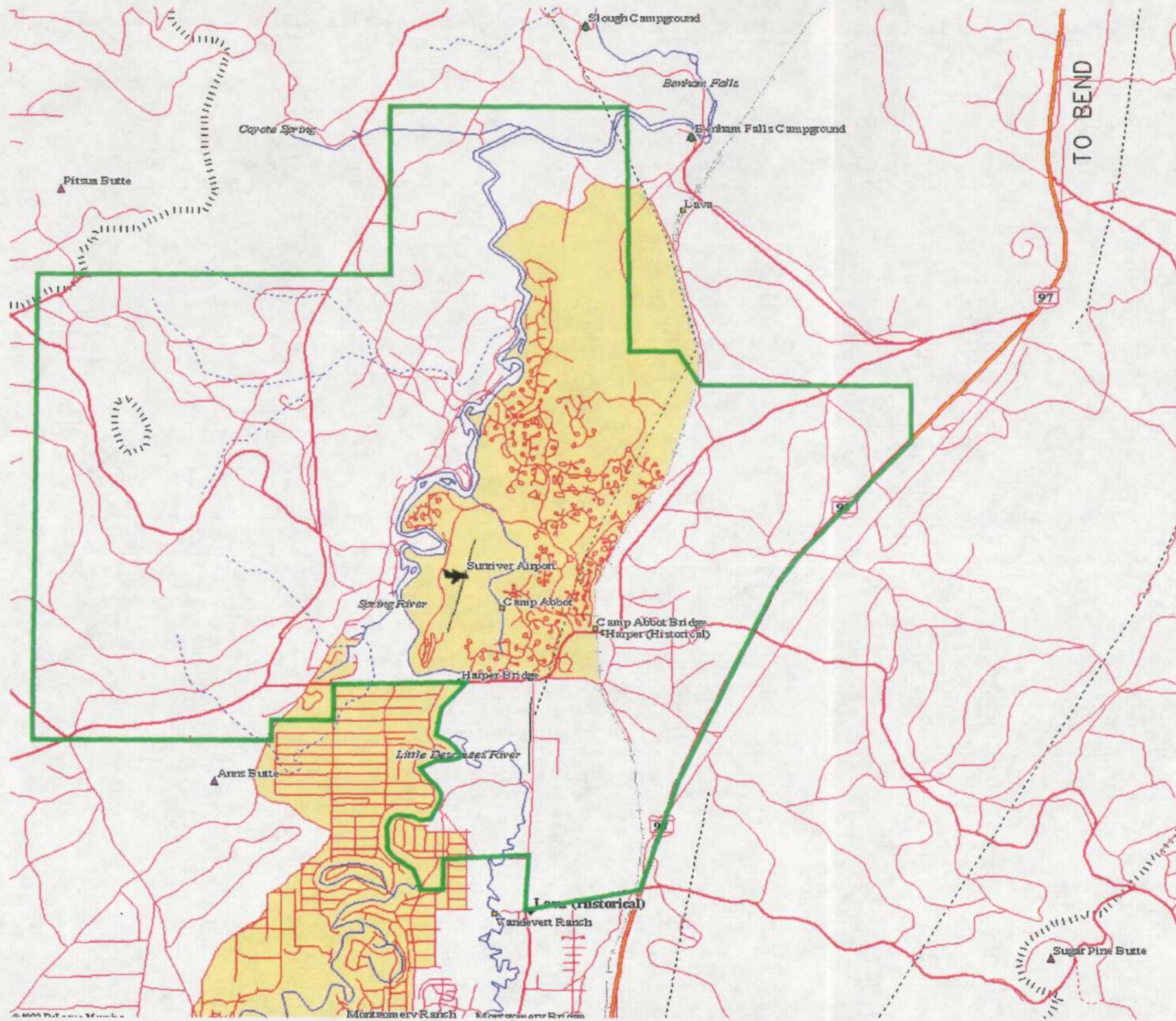
for
CAMP ABBOT
Deschutes County, Oregon

Project No. F10OR004102

REPORT PLATES

- RP-1 Vicinity Map
- RP-2 General Layout Map
- RP-3 Sunriver Resort Current Map
- RP-4 Current Map with Range Overlay
- RP-5 Findings
- RP-6 Aerial Photo 1951
- RP-7 Aerial Photo 1968

REPORT PLATES



— SITE BOUNDARY

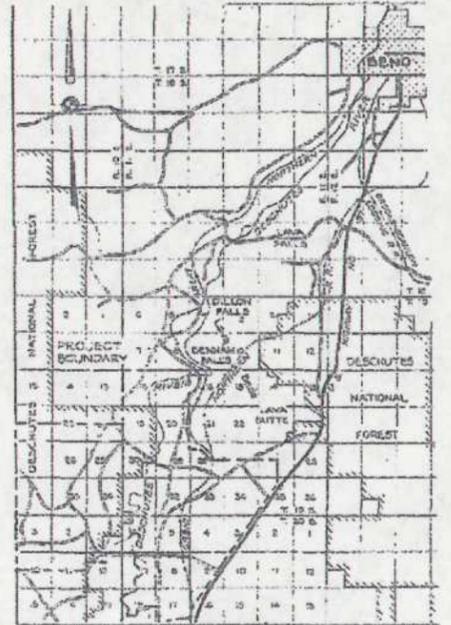
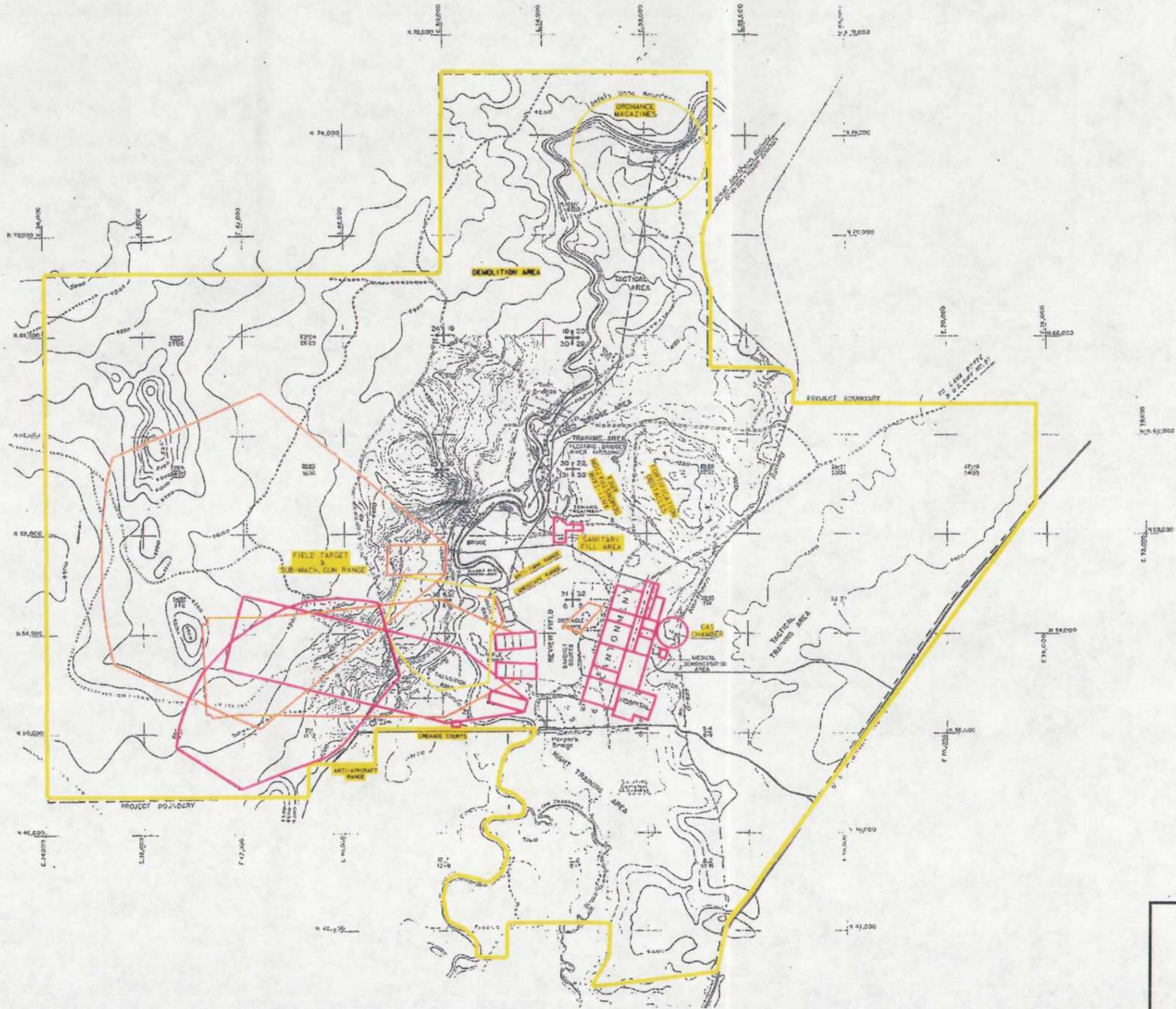


NOT TO SCALE

RP-1

**CAMP ABBOT
DESCHUTES COUNTY, OREGON
DERP-FUDS# F100R004102
VICINITY MAP**

PROJ. DATE: JUN 1995	DATE OF MAP: 1993
6-JUN-1995 09:23	/N/OEW55C/G20/MAP/ABBOTVIC.DGN & .EXT



- LEGEND**
- ROAD, EXISTING, IMPROVED
 - - - - - ROAD, EXISTING, UNIMPROVED
 - - - - - RAILROAD, EXISTING
 - - - - - PROJECT BOUNDARY LINE
 - BUILDINGS, NON-GOVERNMENT, EXISTING
 - BUILDINGS, GOVERNMENT
 - OUTLINE OF WOODED AREA
 - ⬢ ROCK OUTCROP
 - ⋯ SWAMP
 - - - - - RAILROADS, AUTHORIZED

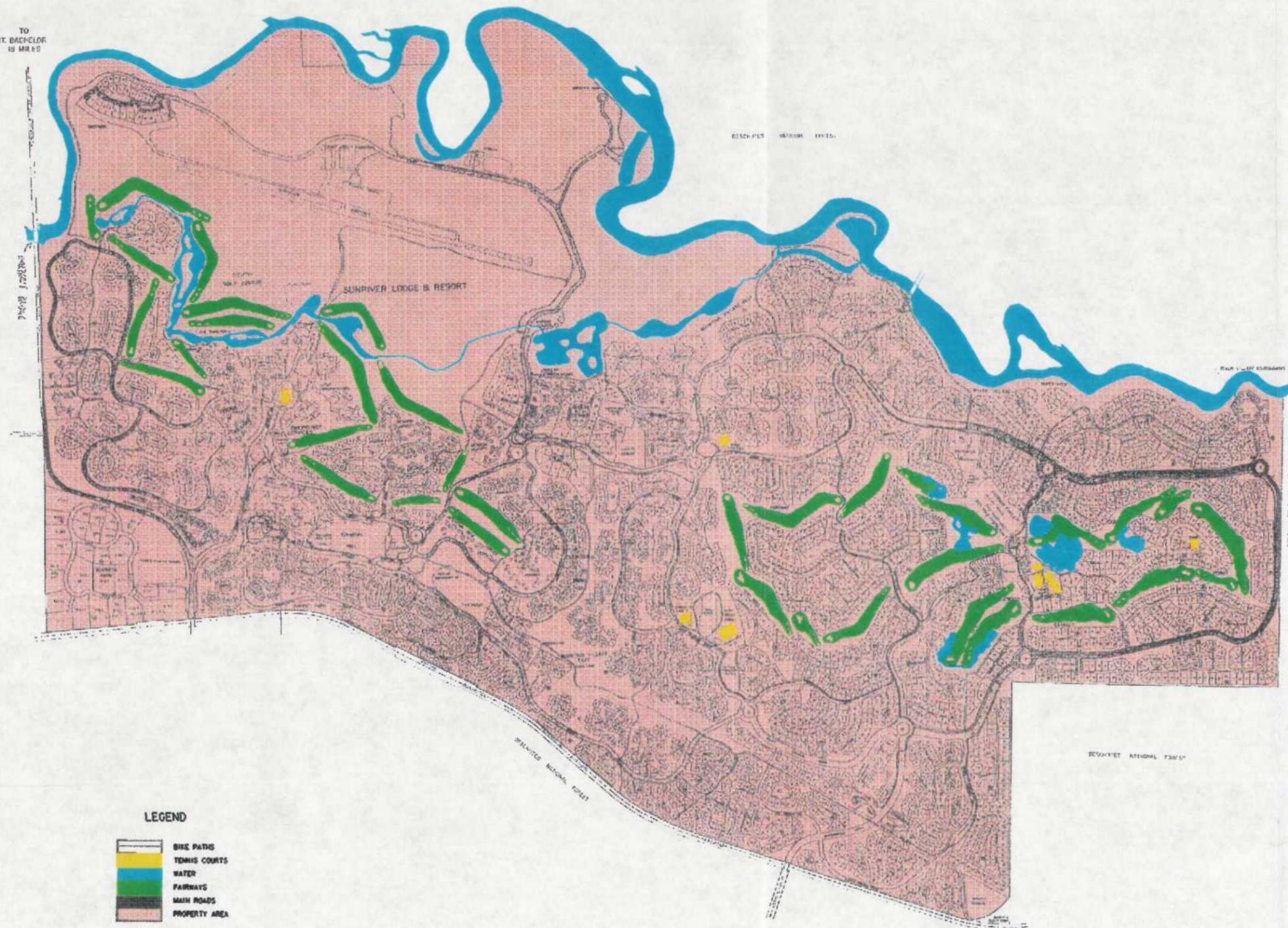


RP-2
CAMP ABBOT
DESCHUTES COUNTY, OREGON
DERP-FUDS# F100R004102
GENERAL LAYOUT MAP

NOT TO SCALE

PROJ. DATE: JUN 1995	DATE OF MAP: 1943
28-JUN-1995 14:12	/N/GEW95/G20/MAP/GENLAY.DGN & LAYOUT.CIT

TO
MT. BACHELOR
18 MILES



LEGEND

-  BIKE PATHS
-  TENNIS COURTS
-  WATER
-  FAIRWAYS
-  MAIN ROADS
-  PROPERTY AREA

RP-3

<p>SUNRIVER LODGE & RESORT DESCHUTES COUNTY, OREGON DERP-FUDS# F100R004102 CURRENT MAP</p>	
PROJ. DATE: JUN 1995	DATE OF MAP: 1994
23-JUN-1995 13:49	/N/OEW95C/G20/MAP/SUNMAP.DGN - SUNMAP_B,G,Y.CIT

SOURCE: DAVID EVANS & ASSOCIATES

NOT TO SCALE



LEGEND

- 1 GAS CHAMBER
- 2 CANTONMENT AREA
- 3 OBSTACLE COURSE
- 4 SANITARY FILL AREA
- 5 RIFLE RANGE
- 6 ANTI-TANK RANGE
- 7 MACHINE GUN RANGE
- 8 LANDSCAPE RANGE
- 9 FIELD TARGET RANGE AND SUB-MACHINE GUN RANGE
- 10 TRANSITION RANGE
- 11 ANTI-TANK DEMONSTRATION AREA
- 12 FORTIFICATION OBSTACLES

NOTE:
 FEATURES IN RED WERE TAKEN FROM 1943
 GENERAL LAYOUT MAP. ALL FEATURE LOCATIONS
 ARE APPROXIMATE.

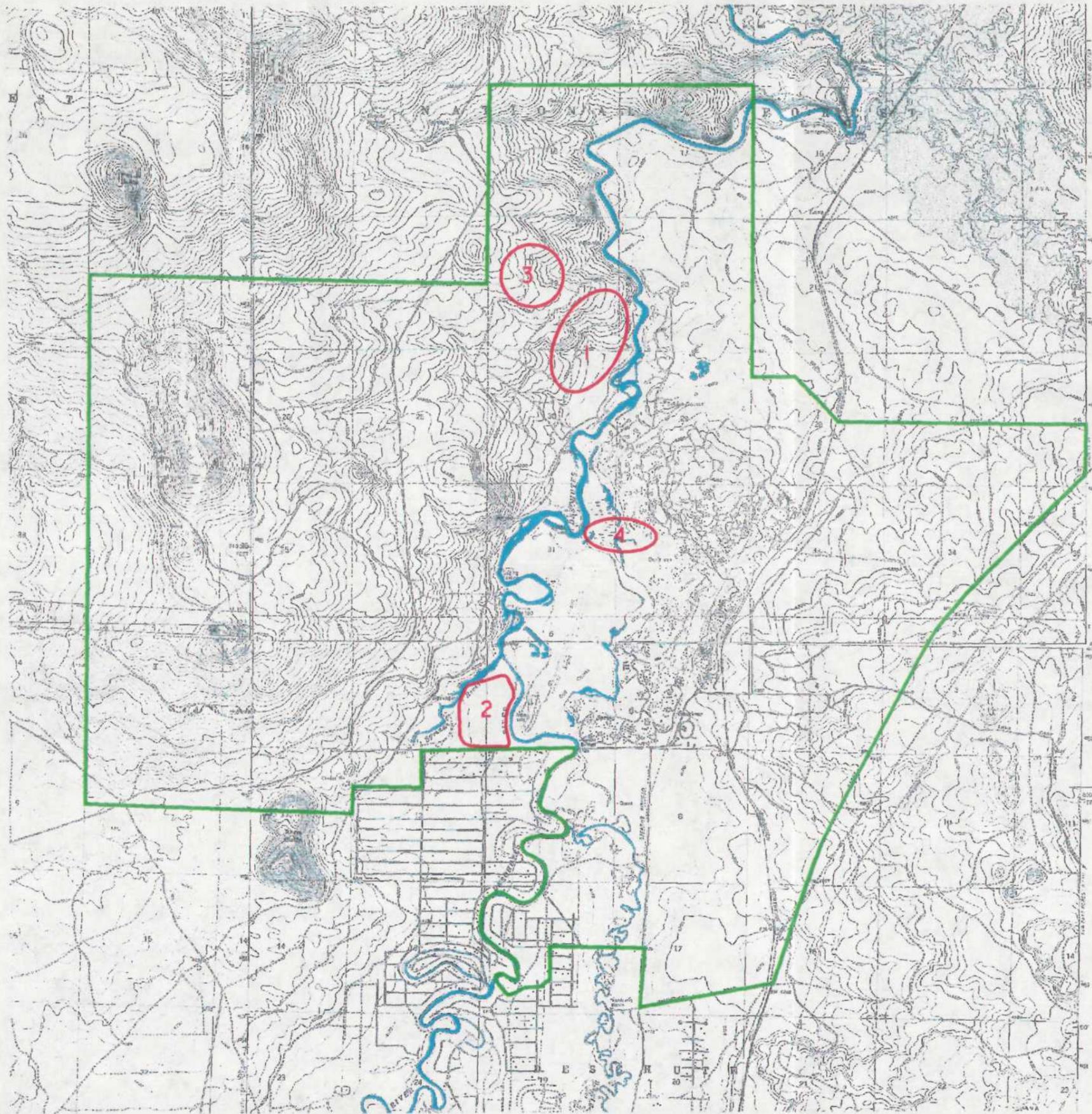
SOURCE:
 SUNRIVER REALTY (DAVID EVANS & ASSOC.)

NOT TO SCALE

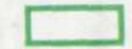
RP-4

**CAMP ABBOT
 DESCHUTES COUNTY, OREGON
 DERP-FUDS# F100R004102
 CURRENT MAP WITH
 RANGE OVERLAY**

PROJ. DATE: JUN 1995	DATE OF MAP: AUG 1993
19-JUN-1995 09:47	/N/OEW95C/G20/MAP/OVERLAY.DGN & SUNRIVER.CIT



LEGEND



SITE BOUNDARY



FEATURE LOCATIONS

1. CLIFFS NORTHWEST OF THE SUNRIVER AIRPORT
ACROSS FROM CARDINAL LANDING BRIDGE
2. FORMER GRENADE RANGE
3. SUSPECTED DEMOLITION/ASSAULT RANGE
4. LANDFILL



RP-5

CAMP ABBOT
 DESCHUTES COUNTY, OREGON
 DERP-FUDS# F100R004102
 FINDINGS

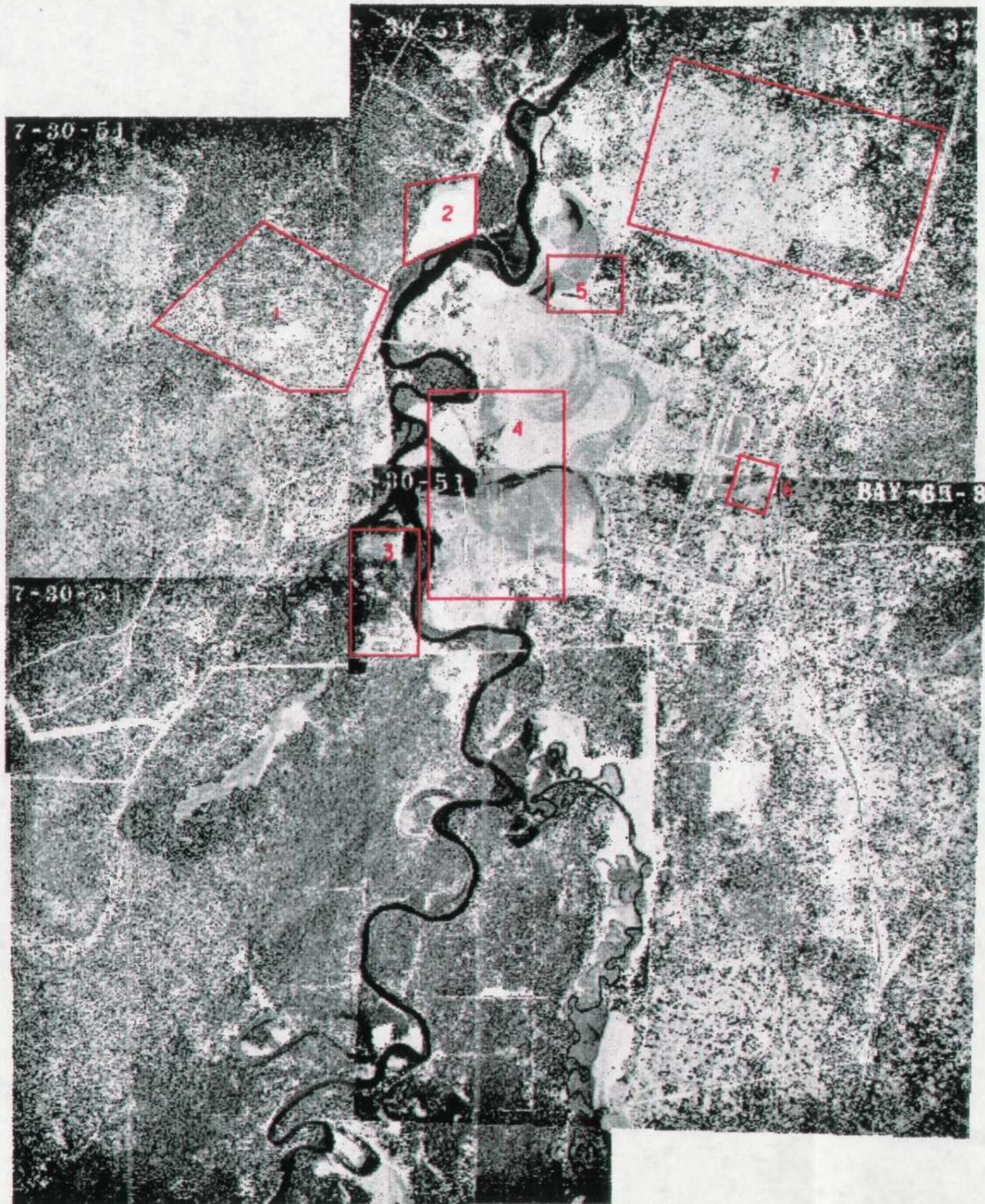
NOT TO SCALE

PROJ. DATE: JUNE 1995

DATE OF QUAD: X

12-JUL-1995 13:55

/I/0EW95C/G22/QUAD/ANNSBUTT.DGN, COMPOSIT.CIT



FEATURE NO.	FEATURE DESCRIPTION
1.	FIELD FIRING / TRANSITION RANGE
2.	POTENTIAL ORDNANCE STORAGE AREA
3.	GRENADE COURTS
4.	RANGE COMPLEX
5.	LANDFILL
6.	CHEMICAL TRAINING AREA
7.	ANTI TANK / DEMOLITION / FORTIFICATIONS AREA



NOT TO SCALE

RP-6

**CAMP ABBOT
DESCHUTES COUNTY, OREGON
DERP-FUDS# F100R004102
1951 AERIAL PHOTO**

PROJ. DATE: JUN 1995	DATE OF PHOTO: 1951
27-JUL-1995 14:47	/N/OEW95C/G20/PHOTO/ABB51.DGN-ABBS1B,C,D,E.EXT



FEATURE NO.	FEATURE DESCRIPTION
1.	FIELD FIRING / TRANSITION RANGE
2.	POTENTIAL ORDNANCE STORAGE AREA
3.	GRENADE COURTS
4.	RANGE COMPLEX
5.	LANDFILL
6.	CHEMICAL TRAINING AREA
7.	ANTI TANK / DEMOLITION / FORTIFICATIONS AREA



RP-7

CAMP ABBOT
 DESCHUTES COUNTY, OREGON
 DERP-FUDS# F100R004102
 1968 AERIAL PHOTO

NOT TO SCALE

PROJ. DATE: JUN 1995 DATE OF PHOTO: 1968
 28-JUL-1995 09:49 /N/CEW95C/G20/PHOTO/ABB68.DGN, SAV - ABB68A,B,D,E.EXT