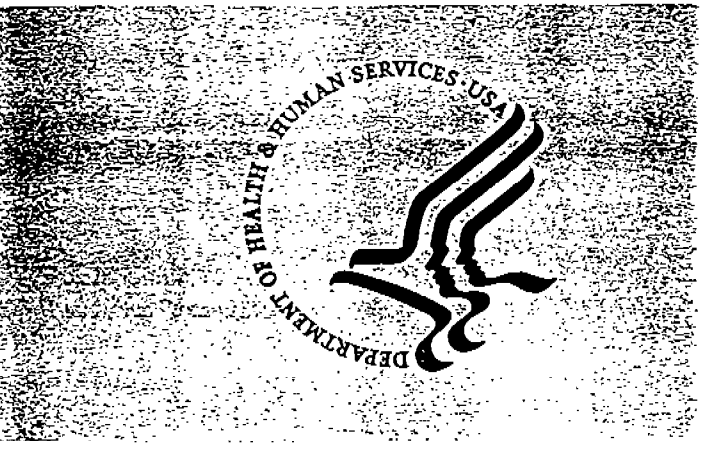
Public Health Assessment for

FTR 0028243

FORT RICHARDSON (U.S. ARMY)
FORT RICHARDSON, ANCHORAGE COUNTY, ALASKA
CERCLIS NO. AK6214522157
JULY 23, 1996

U.S. DEPARTMENT OF HEALTH & HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry



THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations 42 C.F.R. Part 90). In preparing this document ATSDR has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate.

In addition, this document has previously been provided to EPA and the affected states in an initial release, as required by CERCLA section 104 (i)(6)(H) for their information and review. The revised document was released for a 30 day public comment period. Subsequent to the public comment period, ATSDR addressed all public comments and revised or appended the document as appropriate. The public health assessment has now been reissued. This concludes the public health assessment process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

Additional copies of this report are available from:
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FORT RICHARDSON (US ARMY)

FORT RICHARDSON, ANCHORAGE COUNTY, ALASKA

CERCLIS NO. AK6214522157

PREPARED BY THE
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY
DIVISION OF HEALTH ASSESSMENT AND CONSULTATION

FOREWORD

The Agency for Toxic Substances and Disease Registry, ATSDR, is an agency of the U.S. Public Health Service. It was established by Congress in 1980 under the Comprehensive Environmental Response, Compensation, and Liability Act, also known as the *Superfund* law. This law set up a fund to identify and clean up our country's hazardous waste sites. The Environmental Protection Agency, EPA, and the individual states regulate the investigation and clean up of the sites.

Since 1986, ATSDR has been required by law to conduct a public health assessment at each of the sites on the EPA National Priorities List. The aim of these evaluations is to find out if people are being exposed to hazardous substances and, if so, whether that exposure is harmful and should be stopped or reduced. (The legal definition of a health assessment is included on the inside front cover.) If appropriate, ATSDR also conducts public health assessments when petitioned by concerned individuals. Public health assessments are carried out by environmental and health scientists from ATSDR and from the states with which ATSDR has cooperative agreements.

Exposure: As the first step in the evaluation, ATSDR scientists review environmental data to see how much contamination is at a site, where it is, and how people might come into contact with it. Generally, ATSDR does not collect its own environmental sampling data but reviews information provided by EPA, other government agencies, businesses, and the public. When there is not enough environmental information available, the report will indicate what further sampling data is needed.

Health Effects: If the review of the environmental data shows that people have or could come into contact with hazardous substances, ATSDR scientists then evaluate whether or not there will be any harmful effects from these exposures. The report focuses on public health, or the health impact on the community as a whole, rather than on individual risks. Again, ATSDR generally makes use of existing scientific information, which can include the results of medical, toxicologic and epidemiologic studies and the data collected in disease registries. The science of environmental health is still developing, and sometimes scientific information on the health effects of certain substances is not available. When this is so, the report will suggest what further research studies are needed.

Conclusions: The report presents conclusions about the level of health threat, if any, posed by a site and recommends ways to stop or reduce exposure in its public health action plan. ATSDR is primarily an advisory agency, so usually these reports

identify what actions are appropriate to be undertaken by EPA, other responsible parties, or the research or education divisions of ATSDR. However, if there is an urgent health threat, ATSDR can issue a public health advisory warning people of the danger. ATSDR can also authorize health education or pilot studies of health effects, full-scale epidemiology studies, disease registries, surveillance studies or research on specific hazardous substances.

Interactive Process: The health assessment is an interactive process. ATSDR solicits and evaluates information from numerous city, state and federal agencies, the companies responsible for cleaning up the site, and the community. It then shares its conclusions with them. Agencies are asked to respond to an early version of the report to make sure that the data they have provided is accurate and current. When informed of ATSDR's conclusions and recommendations, sometimes the agencies will begin to act on them before the final release of the report.

Community: ATSDR also needs to learn what people in the area know about the site and what concerns they may have about its impact on their health. Consequently, throughout the evaluation process, ATSDR actively gathers information and comments from the people who live or work near a site, including residents of the area, civic leaders, health professionals and community groups. To ensure that the report responds to the community's health concerns, an early version is also distributed to the public for their comments. All the comments received from the public are responded to in the final version of the report.

Comments: If, after reading this report, you have questions or comments, we encourage you to send them to us.

Letters should be addressed as follows:

Attention: Chief, Program Evaluation, Records, and Information Services Branch, Agency for Toxic Substances and Disease Registry, 1600 Clifton Road (E-56), Atlanta, GA 30333.

Ft. Richardson, Alaska Public Health Assessment

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SUMMARY

In 1988 the U.S. Environmental Protection Agency (EPA) placed Fort Richardson on the hazardous waste compliance docket. In 1991 the Army entered into a Resource Conservation and Recovery Act (RCRA) Federal Facilities Compliance Agreement with EPA. A two-party agreement with the state of Alaska was signed in 1993. The base was proposed for the EPA National Priorities List in June 1993, and listed in June 1994. Fort Richardson, located adjacent to Anchorage, Alaska, currently encompasses an area of about 62,000 acres. For remedial activity purposes, four Operable Units (OUs) have been delineated. These OUs consist of a landfill, disposal areas and spills sites, fire-fighting training areas, tank storage areas and Eagle River Flats, an artillery firing range.

The principal public health exposure issue is the consumption of white phosphorous-contaminated waterfowl from Eagle River Flats. Although waterfowl contamination by white phosphorous has been documented, it is not likely that people would consume sufficient contaminated waterfowl to result in a public health hazard. Additionally, extensive remediation activities are underway to eliminate the white phosphorous from Eagle River Flats.

Institutional controls limit access to source areas, operable units and abandoned structures, have eliminated possible exposures to other sites of contamination and physical hazards within Fort Richardson. However, if land use changes, the likelihood of human exposure should be re-evaluated by the Army, the EPA, the state of Alaska, or ATSDR.

Ft. Richardson, Alaska Public Health Assessment

INTRODUCTION

The Agency for Toxic Substances and Disease Registry (ATSDR) was established under the mandate of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980. (Note: Appendix A provides a listing of abbreviations and acronyms used in this report.) This act, also known as the "Superfund" law, authorized the U.S. Environmental Protection Agency (EPA) to conduct clean-up activities at hazardous waste sites. EPA was directed to compile a list of sites considered hazardous to public health. This list is termed the National Priorities List (NPL). The 1986 Superfund Amendments and Reauthorization Act (SARA) directed ATSDR to perform a public health assessment for each NPL site. In 1990, federal facilities were included on the NPL.

Public health assessments (PHAs) are conducted by scientists from ATSDR (or from states with which ATSDR has cooperative agreements). The purpose of a PHA is to determine whether people have been (in the past) or are being exposed to (in contact with) hazardous substances and if so, whether that exposure is harmful and should be stopped or reduced. If exposures have occurred ATSDR uses the PHA to evaluate what actions are required to assist those who have been harmed.

In conducting the PHA, three types of information are used. A major source of information is the extensive environmental data collected for EPA. This information is examined to determine whether people in the community might be exposed to hazardous materials from the NPL facility. If people are being exposed to these chemicals, ATSDR will determine whether the exposure is at levels which might cause harm. A second source of information used in the PHA is community health concerns. ATSDR will collect health concerns of community members and determine whether health problems could be related to exposure to chemicals released from the NPL facility. If ATSDR finds that harmful exposures have occurred, health outcome data (information from local hospitals and other medical organizations) can be used to indicate that illnesses are occurring which could be linked to hazardous chemicals released from the NPL facility.

The PHA presents conclusions about whether exposures are occurring, *and* whether a health threat is presented. *In some cases*, it is possible to determine whether exposures occurred in the past. If it is found that a threat exists, recommendations are made to stop or reduce the threat to public health. ATSDR is an advisory agency. Its recommendations identify actions which EPA, the facility or local agencies can undertake. *If* exposures are occurring *at levels which could pose a threat* to public health, ATSDR can undertake health education activities or

certain additional followup studies. ATSDR can also identify types of information which might be needed to make public health decisions, if such information is lacking.

Exposure Evaluation Process

In order to evaluate the effect on public health of contaminants at NPL sites, the public health assessment focuses on examining whether people have been *exposed* to (in contact with) the contaminants. To this end, the two most important tasks in the public health assessment are;

1) *determining whether people have been exposed to hazardous materials from the NPL facility*, and,
2) *if exposure is possible or has occurred, determining whether the exposure is at a level that could be a threat to public health.*

In this PHA we will examine:

- **whether contamination exists** in the environment,
- **whether contamination is in places where people in the surrounding community might come in contact with the contaminants**, and
- if there is exposure, **whether there is enough contamination to affect the health of people** in the community.

To make the above decisions, each of the possible environmental pathways will be examined. The environmental pathway "media" that this PHA will examine are:

- the "**food chain**", such as waterfowl at Eagle River Flats);
- **soil**;
- **water**, including well water and surface water (creeks, ponds), and sediment; and
- **air**.

Another important factor is the way that people might contact the contaminant. By this we mean whether the chemical is:

- **inhaled**;
- **ingested** (eaten or drunk); or
- **absorbed through the skin**.

Not all chemicals are a hazard for each of these methods of contact. For example, most metals are not harmful, particularly in very low amounts, if the only contact is by way of the skin.

Figure One portrays the exposure evaluation process study we will make in this PHA.

BACKGROUND

Site Description

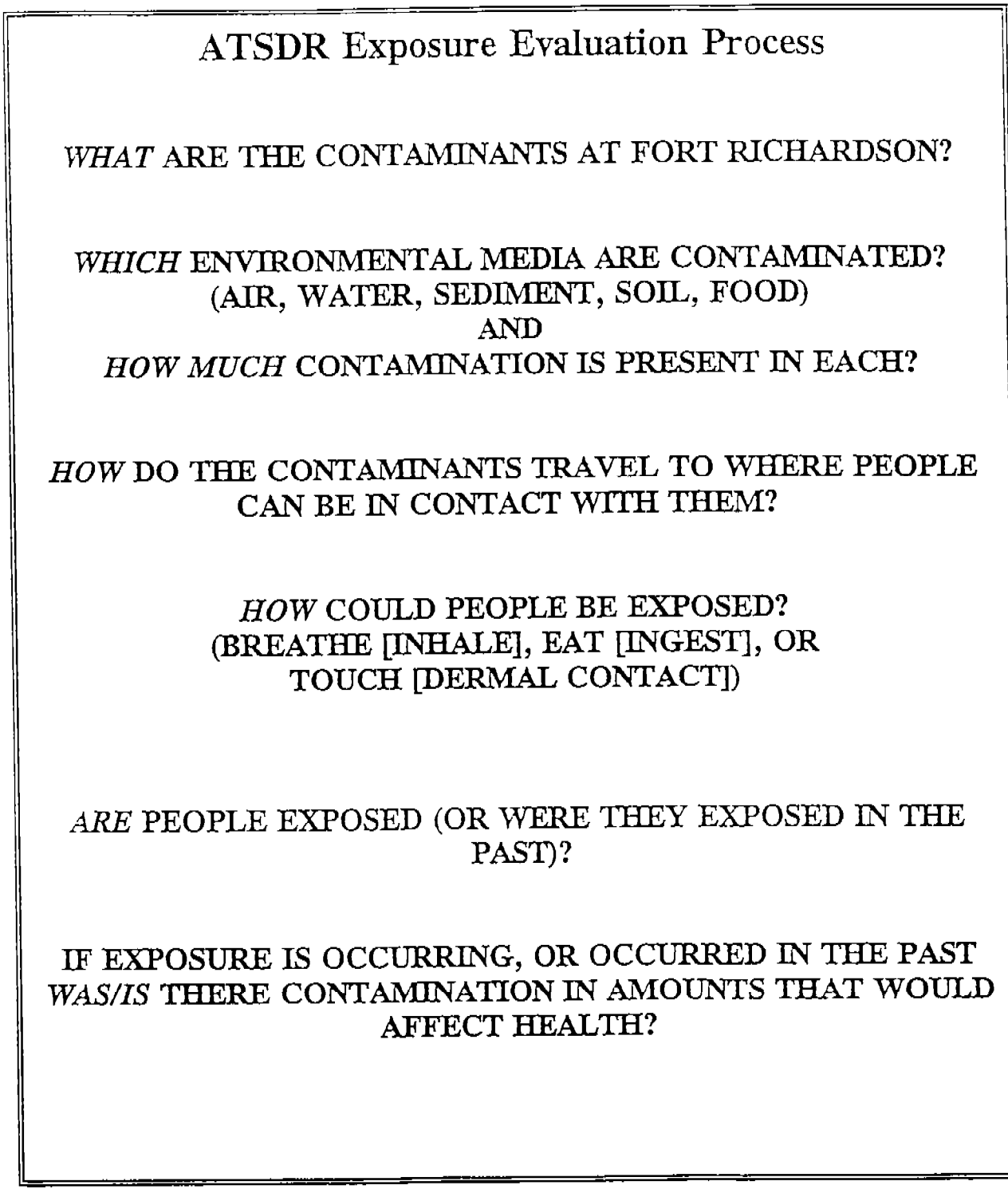
Fort Richardson, adjacent to Anchorage, Alaska, was established in 1940 (See Figure Two). The base encompasses an area of about 62,000 acres. The original purpose of the base was to serve as the command location for the Alaska Defense Forces to protect Alaska from foreign attack (2). In 1941, the ADF was redesignated the Alaskan Defense Command and was a staging and supply area during World War II. In 1950, Fort Richardson was divided between the Army and Air Force. The northern portion of the base was released to the Air Force to be redesignated Elmendorf Air Force Base. In 1988, Army forces in Alaska were reorganized as the 6th Infantry Division (Light) and assigned to U.S. Army Pacific Command (USARPAC) with half of the division stationed at Fort Richardson. The Division was inactivated in 1994 and forces were reorganized as the 1st Brigade, 6th Infantry Division (Light) under the command and control of U.S. Army Alaska headquartered at Fort Richardson (2).

Fort Richardson began investigating the management of hazardous waste in 1988. In 1988, the U.S. Environmental Protection Agency (EPA) placed Fort Richardson on the hazardous waste compliance docket. In 1991, the Army entered into a Resource Conservation and Recovery Act (RCRA) Federal Facilities Compliance Agreement with EPA. A two-party agreement with the state of Alaska was signed in 1993. The facility was proposed for listing in June 1993, and listed on the NPL in June 1994. Most hazardous waste on Fort Richardson is generated by maintenance operations in motor pools, aircraft hangers, installation industrial operations, or at sites where lead or asbestos were used in base structures (2).

For remedial activity purposes, Fort Richardson has delineated four Operable Units (OUs), These OUs consist of 19 source areas, including landfills, disposal areas or spill sites, fire fighting training areas, tank storage areas and Eagle River Flats . (See Figure Three.) Table One lists the sources and Operable Units.

The primary environmental contaminants at Fort Richardson are white phosphorous from artillery rounds, asbestos, and volatile organic compounds (VOCs, usually solvents and cleaners), polychlorinated Biphenyls (PCBs), fuel products, polycyclic aromatic hydrocarbons (PAHs, commonly used in wood preservatives and also given off in automobile or truck exhaust or during

Figure One -- Exposure Evaluation Process



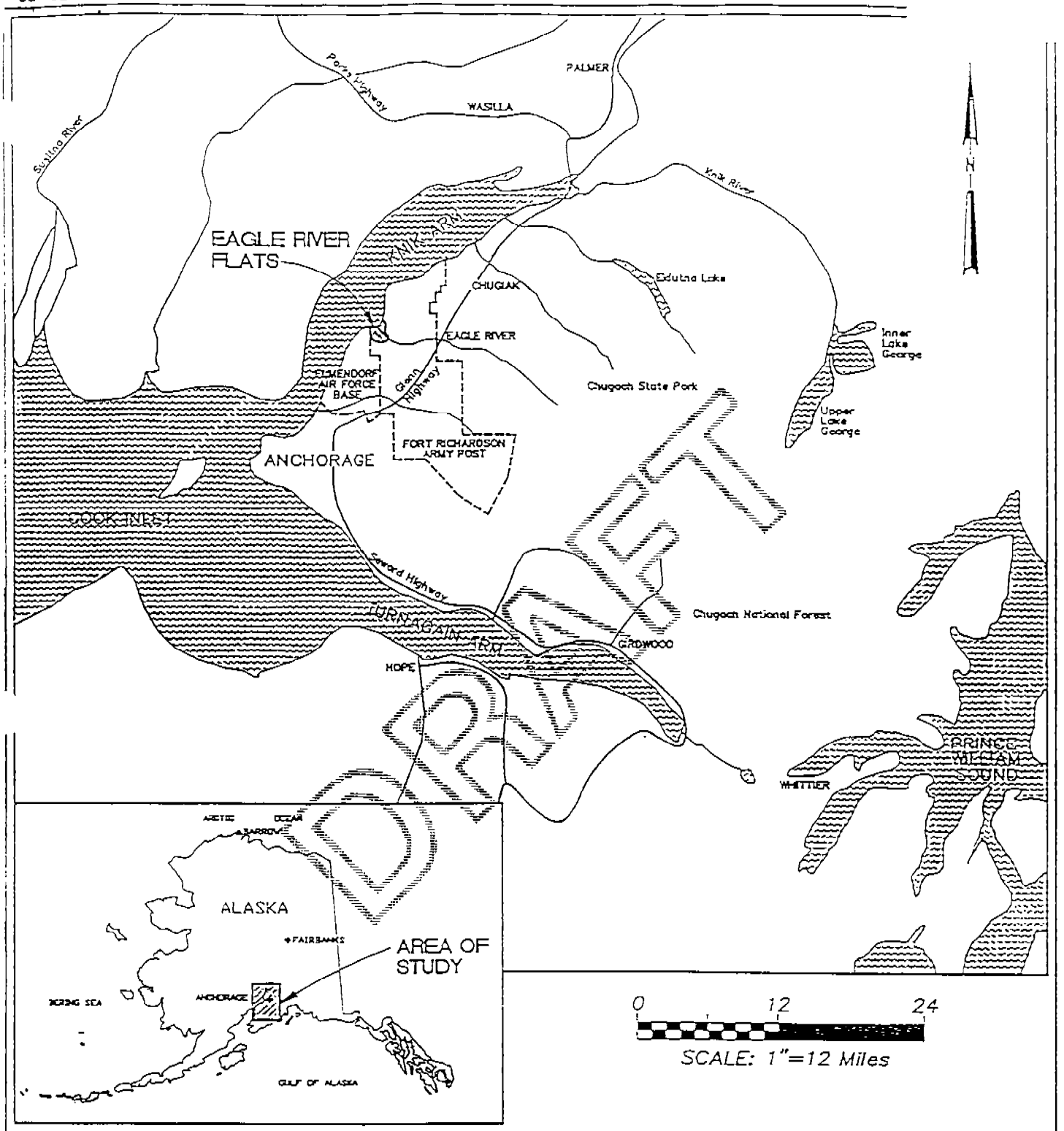
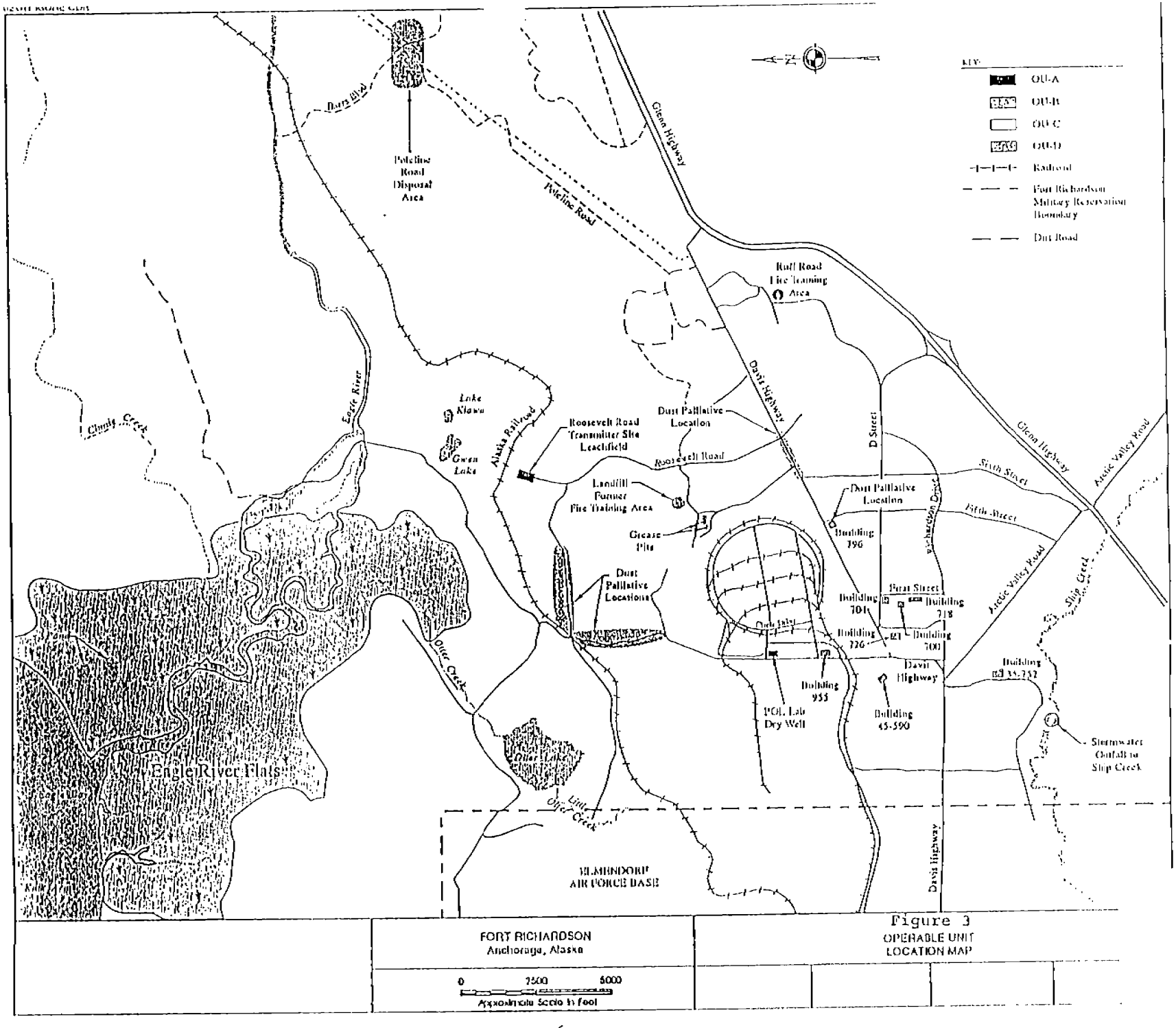


Figure 2
EAGLE RIVER FLATS
LOCATION MAP

SOURCE: MOA, 1993



FORT RICHARDSON
Anchorage, Alaska

Figure 3
OPERABLE UNIT
LOCATION MAP

Table 1 -- Sources and Operable Units at Fort Richardson

Site #	OU	Building/Location	Site Function	Potential Contaminants
W020	A	986	POL Laboratory Drywell	POL, solvents, acids, alcohol, various laboratory reagents
W010	A	67630	Roosevelt Road Transmitter Site Leachfield	PCBs in transformer oils
W040	A	Former Landfill #9 (Ruff Road)	Ruff Road Former Fire Training Area	COnstruction rubble, fuel, solvents
N087	B	UC602992	Poleline Road Disposal Area	solvents, smoke canisters, chemical warfare training material
W006	C	Eagle River Flats	Eagle River Flats Impact Area	munitions residue, white phosphorous, unexploded ordnance
W025	C	Vicinity of ERF	Open Burn/Open Demolition Area	munitions residue, ordnance, ash
W009	D	700	Former Drum/PCB Storage Area	PCBs, waste paint, HCl, methyl ethyl ketone, mineral spirits
R053	D	704	Former Roads and Grounds Drum Storage & Waste Accumulation Area	POL, waste paint, fuel, solvent, asbestos
W016	D	726	Former Laundry and Drycleaning USTs	Perchloroethylene
R059	D	796	DOI Maintenance Area, Former Battery Acid Disposal Site	Neutralized battery acid, heavy metals
R060	D	955	Used Oil Transfer Area	Used oil/fuel
W023	D	35752	PCB Site/UST (Antenna Bldg)	PCBs, POL
W002	D	45590	Motor Pool	Waste Oil, lubricants, antifreeze, acid, solvents
W028	D	FRA RDs	Dust Palliative	Waste Oil, solvents

Table 1 -- Sources and Operable Units at Fort Richardson				
N090	D	UC538948	Circle Road Drum Site	POL
W015	D	FRA Landfill	Landfill Former Fire Training Area	Oil, solvents, hydraulic fluids, fuels
R072	D	FRA Landfill	Grease Pit #1	POL, oil/water separator sediment, fuel tank water, ethyl glycol
R073	D	FRA Landfill	Grease Pit #2	POL, oil/water separator sediment, fuel tank water, ethyl glycol
R075	D	FRA	Storm Drainage Outfall to Ship Creek	Oil, fuel, solvents

NOTE: At least four source areas from OU D will undergo a Remedial Investigation while the others will possibly require either "No Further Action" or action under a non-CERCLA program (9).

burning activities), and metals (2).

Contaminated environmental media include onsite soil, surface water and associated sediment, and groundwater. There are no verified completed human exposure pathways. Although public access to the facility is not prohibited, the facility is not readily accessible around much of its perimeter. Outlying source areas are located in remote and inaccessible areas. Onsite OUs are fenced, paved-over or otherwise secured.

Demographics

Fort Richardson is located within the municipality of Anchorage. The population of Anchorage is about 250,000, with a total of about 82,000 households (1). The community of Eagle River (population about 25,000) lies to the east of Fort Richardson. The post cantonment area serves about 2,200 military personnel and 3,200 family members. An additional 1,500 civilian personnel are employed onsite (2).

Land Use and Natural Resources

As stated above, Fort Richardson is located within the municipality of Anchorage in south-central Alaska. The Anchorage area is a roughly triangular lowland, lying between Turnagain Arm and Knik Arm (See Figure Two). Immediately to the east, the Chugach Mountains rise abruptly from this lowland to an elevation of about 5,300 feet (3).

The base is bounded to the west by Anchorage and Elmendorf Air Base, by Eagle River and Knik Arm to the north. To the east and south the base is bounded by the undeveloped and mountainous Chugach State Park (See Figure Two).

Ship Creek, the primary water source for the municipality of Anchorage and surrounding area, runs through Fort Richardson, flowing east to west. The water bodies and wilderness areas, where they are accessible, are used for recreational purposes.

Fort Richardson and its surroundings are an ecologically diverse area, ranging from marine environments, marshes and wetlands, to forest, alpine and glacial zones. The wildlife inhabiting the areas is equally diverse and abundant, ranging from marine mammals, salmon and other game fish, numerous waterfowl, raptors and nongame birds, to small mammals such as mink, fox, beaver and numerous small rodents, and large mammals such as bear, moose, Dall sheep and wolves. It is not the purpose of, nor is it possible in this synopsis to adequately detail the range of ecosystems and wildlife of the area.

ENVIRONMENTAL CONTAMINATION AND ENVIRONMENTAL EXPOSURE PATHWAYS

Introduction

This section examines the pathways for exposure to contamination at Fort Richardson. We will examine each of the media (foodchain, soil, water, sediment, air) to determine whether contamination is present, and if people in the community are exposed to (or in contact with) the contamination. If people are exposed to contamination in any of the media, we will evaluate whether there is enough contamination to pose a threat to people in the community. This analysis will follow the pattern depicted in Figure One, and will systematically evaluate each of the media.

Evaluation of Possible Biota/Foodchain Exposure Pathways

General Information

The principal issue at Fort Richardson concerning possible foodchain contamination is waterfowl contamination at Eagle River Flats (ERF). ERF is the impact area for heavy artillery and mortars on Fort Richardson. Three general types of munitions have been fired into ERF. These are high explosives (HE), illumination, and smoke (3). Of these, the principal concern for contamination of waterfowl appears to be the smoke munitions. The two most common agents used by the army are white phosphorous (WP) and hexachloroethane-zinc mixture (HC). About 17,000 pounds of WP were fired into ERF from 1950 to 1990. Use of WP at ERF was discontinued in 1990 (3).

WP is the primary contaminant detected in waterfowl at ERF. The contamination was documented in 1990 when Army personnel and contractors determined that an annual waterfowl die-off at ERF was caused by ingestion of WP particles (4).

When WP munitions are detonated, minute particles of WP are dispersed over a large area. The particles react spontaneously with air, forming smoke clouds. Sediment contamination at ERF was caused when unoxidized particles of WP settled into the muddy sediments at ERF. Ducks and other bottom-feeding animals ingest these particles during feeding. It is the consumption of these contaminated waterfowl that is the human exposure pathway at ERF, although it is not likely to constitute a public health hazard.

Eagle River Flats is an active firing range, therefore, access is prohibited t unauthorized personnel, including hunters. Currently extensive remediation activities are underway at Eagle River flats to remove the white phosphorous. However, the concern was raised about movement of contaminated waterfowl to other areas where they might then be collected by hunters (4). To date, there have been no reported public health problems that could be related to consumption of WP-contaminated waterfowl. However, the following toxicologica information is provided to evaluate the possibility of adverse public health effects of consumption of WP-contaminated birds.

Toxicological Evaluation of Consumption of WP-contaminated Waterfowl

After ingestion by birds, WP is distributed in numerous organs, including the

skin and fatty tissue (5). The study cited in reference (5) noted that the concentration in birds was directly related to the amounts that had been recently consumed, and does not appear to remain in these tissues for longer than three days. In other words, WP does not bioaccumulate or remain in the birds for longer than this period of time.

Army studies suggest that a lethal dose to "small" waterfowl would be in the range of 1.5 to 3.9 mg/kg (milligrams per kilograms (3). This would therefore be the range for the upper limit on the amount of WP present in the systems of waterfowl that would survive to leave ERF. (A 1991 study found concentrations of WP as high as 3,501 ppm (3,501 mg/kg) in the gizzards of dead waterfowl at ERF.) Although it is possible for the duck to consume this large amount of WP, it is unlikely that it would have survived to leave ERF. Another study found live waterfowl with concentrations of up to 2,700 ppb (2.7 mg/kg) in various tissue (6). This study appears to agree with the estimated range for fatal dose to waterfowl as determined in (3).

During environmental evaluations, the gizzards of about 300 birds, collected by hunters offsite, were examined. No significant concentration of WP was found (3). This supports that accumulation does not occur in amounts large enough to present a problem for consumption of birds collected offsite.

Information on human health effects of ingesting WP is based on the consumption of amounts that are relatively much greater (for example: amounts of about one teaspoon of WP) than would be consumed by eating contaminated waterfowl or other affected food animals. Non-cancer effects of consumption of these larger amounts of WP include stomach cramps, or kidney, heart or liver damage. There is no information available to suggest that WP is carcinogenic (6). WP does not accumulate in the body, being eliminated after several days, so that it does not cause problems via accumulation over time.

Little information exists on the possible adverse effects of chronic (long-term) or acute (short-term) exposure via ingestion of minute amounts (such as those that might be found in ducks at ERF) of WP. An indication of the levels of WP that could be ingested *without* significant negative health effects can be found in studies of treatment for rickets performed in 1918 and 1930. These studies are cited in the ATSDR Toxicological Profile for Phosphorous (6). Children were treated for up to 26 months with doses ranging up to 0.158 mg/kg/day without reported significant negative health effects. Because of the nature of these studies, the maximum amount that could be ingested with no negative effects was not determined. However, the level of 0.158 mg/kg/day can be taken as a *very* conservative lower limit, since no negative effects were observed. Assuming a "theoretical" 16 kg child as an example, a total of 2.58 mg/day (milligram per day) of WP would equal the level of 0.158 mg/kg/day. In other words, 2.58 mg/day could be consumed without significant negative health effects. Again, *assuming* that a maximum dose of 3.9 mg/kg would kill the waterfowl (recognizing that WP does not stay in the system for longer than three days, and recognizing that death of the bird results fairly rapidly after ingestion of a lethal dose, so that higher levels are unlikely in birds collected offsite), 3.9 mg/kg would be the maximum body burden expected in a

aterfowl capable of leaving Eagle River Flats to be collected by hunters.

Without additional information on the manner that WP would concentrate in the organs of the waterfowl, the conservative assumption is made that it is evenly distributed throughout the edible portions of the bird.Using these assumptions, a 16 kg child could consume about 0.66 kg of WP-contaminated waterfowl *per day* without significant negative health effect.

The result for adults would be similar, with a proportional increase in the amount consumed required to account for the greater body-weight. *Based on these assumptions*, a 70 kg adult could consume about 2.88 kg of WP-contaminatec waterfowl without significant adverse health effect. Also, the lower the amount of WP present in the birds, the larger amount of contaminated tissue that would have to be consumed for harmful effects to occur.

Finally, although high concentrations have been found in gizzards of dead ducks collected on ERF, it must be noted that the gizzard, if consumed, comprises a very small portion of the "edible" tissue. A very large number of gizzards contaminated at this high level would have to be eaten to equal the amount of "whole duck" used in this scenario.

It must be stressed that these are very conservative assumptions and are therefore to be regarded as very protective of public health. It is therefore **unlikely that significant human health hazard is presented by WP contamination of waterfowl at Eagle River Flats.**

Evaluation of Possible Soil Exposure Pathways

Each of the OUs contain appreciable amounts of soil contamination. The contaminants include petroleum and fuel products, solvents, metals, PAHs, and PCBs (2). However, there does not appear to be a significant opportunity for exposure to the public to these areas with soil contamination. OUs and source within the main cantonment area are generally secured from public access. The OUs and source areas outside the main cantonment are also secured. Additionally, these outlying areas are remote from the public and generally inaccessible. Further, areas determined to contain significant contamination will be remediated under the regulatory oversight of the state of Alaska and EPA, so that contamination will be reduced and present even less occasion for human contact. As a result, **soil contamination at Fort Richardson is not a public health hazard.**

Evaluation of Possible Water Exposure Pathways

People can be exposed to contaminated water by drinking it, bathing or swimmir in it, or in rare cases, breathing steam vapor (for instance, in a hot shower) There are two main water pathways to consider. These pathways are:

- **groundwater**, that is, water from wells, either private wells or

public water supply wells,

- surface water, that is, ponds, lakes, creeks, and the sediment on the bottom and along the edges of these water bodies.

Groundwater

As is the case with soil contaminants, there are a number of locations within the OUs that have underlying contaminated groundwater. The suite of contaminants is similar to that found in soils. Based on information in the Installation Action Plan (2) and preliminary results of the remedial investigation activities, contaminant plumes are relatively small and are localized to the vicinity of the sources. As such, the plumes do not extend outside the boundaries of the base and do not threaten off-post water wells (8). **These groundwater contaminant plumes do not currently represent a threat to public water supplies.** ATSDR will review RI data on groundwater contamination, as it becomes available, to update the exposure evaluation.

Surface Water

The principal location where surface water contamination might be a concern is Eagle River Flats (2,4). The presence of explosive ordnance residues and white phosphorous in large quantities have resulted in contamination of the waters of this marsh area. However, these waters are not used for domestic water supplies. Also, the potential for dermal contact with contamination is very limited onsite, since the access to the area is prohibited. **Therefore, surface water contamination is not a public health hazard at Fort Richardson.**

Evaluation of Possible Sediment Exposure Pathways

As is the case with surface water, the primary location where contamination of sediment is an issue would be Eagle River Flats (2,4). And, as is the case with surface water, the potential for human exposure is extremely limited. **Therefore, sediment contamination, with the current conditions, is not a public health hazard at Fort Richardson.**

Evaluation of Possible Air Exposure Pathways

The industrial and operational activities which have occurred and which are occurring at Fort Richardson are not the types which would result in significant air contamination. There is no indication that these activities have resulted in any public health hazards. **Therefore, air contamination is not a public health hazard at Fort Richardson.**

Evaluation of Possible Exposure to Physical and Other Hazards

... and Source Areas

The source areas for contamination are generally isolated from public contact, by fencing, signs, or paving. Additionally, the sources of contamination and OUs in outlying areas are insulated from public contact by their location in inaccessible areas of the post. Examples of these isolated areas include the Pole Line Road and Roosevelt Road sites.

Eagle River Flats

As an active artillery range, Eagle River Flats is not open to public access. However, as ERF is an active artillery range, access to this area is prohibited. The area is well posted and off-limits to all unauthorized personnel.

Abandoned and Derelict Structures

A group of facilities that require particular attention are the abandoned structures throughout the post. These include buildings within the main cantonment, and facilities in more remote areas, such as the former Nike installations on Summit Mountain. A number of these structures have been found to contain asbestos in addition to the expected physical hazards of an abandoned building. During the 1994 site visit fencing at the remote Nike ...cation was observed to be in a state of disrepair. Although public access t... ...ese areas is unlikely due to the remote location within the interior of Fort Richardson, these structures require continued attention in the maintenance of institutional controls.

Physical Hazard Summary

As long as continued attention is given to the maintenance of institutional controls, physical hazards at Fort Richardson do not represent public health threats.

QUALITY ASSURANCE AND QUALITY CONTROL

In preparing this Public Health Assessment, ATSDR relies on the information provided in the referenced documents. The Agency assumes that adequate quality assurance and quality control measures were followed with regard to chain-of-custody, laboratory procedures, and data reporting. The validity of the analyses and the conclusions drawn in this document are determined by the availability and reliability of the referenced information.

The majority of the environmental data presented in this public health assessment is from the Remedial Investigation (RI) preliminary data. Generally, the methodology used in the RI activity is appropriate for characterizing contamination at Fort Richardson. Additional information collection is planned during completion of RI activities. This information will be evaluated by ATSDR. Conclusions and Recommendations of this PHA will be modified if appropriate and necessary.

COMMUNITY HEALTH CONCERNS

The issue of public health concerns was investigated by ATSDR through meetings, correspondence, telephone conversations and information from Fort Richardson, EPA, state and local agency files. Specific community public health concerns have been identified in regard to white phosphorous (WP) contamination of waterfowl at Eagle River Flats. Draft versions of this document were provided to the Fort Richardson, the EPA, state regulatory agencies and were provided to the public repositories. All comments and suggested revisions were incorporated in this final version.

In response to the concern over the potential for public health hazard from consuming of WP-contaminated waterfowl, an evaluation has been made of the possibility for harm. It does not appear that significant levels of WP are found in waterfowl offsite to present a public health hazard.

CONCLUSIONS

1. The primary issue regarding public exposure to hazardous chemicals at Fort Richardson is that of white phosphorous-contaminated waterfowl from Eagle River Flats. Studies of waterfowl collected in the vicinity have not detected the presence of white phosphorous. Therefore, this exposure pathway is considered to be *No Apparent Public Health Hazard.*

2. Physical hazards such as derelict structures and open pits exist at Fort Richardson. However, institutional controls are in place to prevent public access. Therefore, this exposure pathway is considered to be *No Apparent Public Health Hazard.*

3. Asbestos has been found in abandoned structures at Fort Richardson. Access to these structures is limited by institutional controls. Therefore, this is considered to be *No Apparent Public Health Hazard.*

RECOMMENDATIONS

The Comprehensive Environmental Response Compensation, and Liability Act (CERCLA; also known as Superfund) as amended, requires ATSDR to conduct needed follow-up health actions in communities living near hazardous waste sites. To identify appropriate actions, ATSDR created the Health Activities Recommendation Panel (HARP). HARP has evaluated the data and information contained in the Fort Richardson Public Health Assessment for appropriate public health actions. Based on the information available, this site poses no apparent public health risk. If additional information becomes available that may indicate a public health risk, this information will be evaluated the HARP. HARP determined that health education and health studies follow-up actions are not warranted. As discussed above, there do not appear to have been exposures in the past which resulted in public health problems, and there are no current exposures.

1. Fort Richardson should continue to monitor institutional controls at contamination sites and at abandoned facilities to ensure that public access is eliminated. Institutional controls should remain in effect until the potential for public health hazard is eliminated.

2. ATSDR will evaluate future remedial investigation data to update our exposure evaluation.

PUBLIC HEALTH ACTIONS

The public health action plan (PHAP) for Fort Richardson, Alaska NPL site contains a description of actions to be taken by ATSDR and/or other governmental agencies at and in the vicinity of the site subsequent to the completion of this public health assessment. The purpose of PHAP is to ensure that this public health assessment not only identifies public health hazards, but provides a plan of action designed to mitigate and prevent adverse human health effects would result from any exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR to followup on this plan. The public health actions to be implemented are as follows:

Actions Planned

1. ATSDR will evaluate future remedial investigation data to assure that an accurate exposure evaluation has been made.

2. The Army should continue to maintain institutional controls to restrict the possibility of access to OUs that might present physical hazards.

3. ATSDR will review the remedial activities at Fort Richardson, to evaluate the proposed remediations in relation to protection of public health. ATSDR comments, and recommendations, as appropriate, will be provided to EPA, the Army and State of Alaska.

ATSDR will reevaluate and modify the Public Health Action Plan as needed. New relevant data, or the results of implementing the above proposed actions may determine the need for additional actions at this site.

ERENCES

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2. U.S. Army Alaska, 1995, Installation Action Plan for Fort Richardson, Alaska, February 1995.

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4. U.S. Army Corps of Engineers, Toxic and Hazardous Materials Agency, 1992, Final Remedial Investigation Report: White Phosphorous Contamination of Salt Marsh Sediments at Eagle River Flats, Alaska, March 1992.

5. Nam, S-I, BD Roebuck, and ME Walsh, 1994, Uptake and Loss of White Phosphorus in American Kestrels, Environmental Toxicology and Chemistry, Vol 13, no. 4.

6. ATSDR, 1994, Draft Toxicological Profile for White Phosphorous and White Phosphorous Smoke, June 1994.

ATSDR, 1995, HAZDAT Hazardous Chemicals Comparison Value Database.

8. ATSDR, 1995, Record of Communication, Major Kevin Gardner, Fort Richardson Public Works, Interagency Memorandum, June 6, 1995.

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APPENDIX A
Acronyms and Abbreviations

ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
EPA	U.S. Environmental Protection Agency
ERF	Eagle River Flats
HC	hexachloroethane
HE	High Explosives
mg	milligram
mg/day	milligram per day
mg/kg/day	milligram pre kilogram per day
NPL	National Priorities List
OUs	Operable Units
PAHs	Polycyclic Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyls
PHA(s)	Public health assessments
POL	Petroleum, oil, lubricants
ppb	parts per billion
ppm	part per million
RfD	(oral) reference dose
RI	Remedial Investigation
SARA	1986 Superfund Amendments and Reauthorization Act
USARCRREL	U.S. Army Cold Regions Research and Engineering Laboratory
USARAK	U.S. Army Alaska
USARPAC	U.S. Army Pacific Command
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
WP	white phosphorous