PB95-963920
EPA/ROD/R03-95/210
March 1996

EPA Superfund Record of Decision:

Dover Air Force Base, Lindane Source Area of Area 6, DE 9/26/1995

RECORD OF DECISION
DECLARATION OF THE SELECTED INTERIM REMEDY

Site Name and Location

Lindane Source Area of Area 6, West Management Unit, Dover Air Force Base, Kent County, Delaware.

Statement of Basis and Purpose

This Record of Decision (ROD) presents the selected interim remedial action for Lindane Source Area, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. This decision prepared by the U.S. Air Force, the lead agency, as the owner/operator of the Base is based on the Administrative Record for the Site. Support was provided by the U.S. Environmental Protection Agency (EPA) Region III and the Delaware Department of Natural Resources and Environmental Control (DNREC).

The State of Delaware and the U.S. Environmental Protection Agency concur with the selected interim remedy. The information supporting this interim remedial action decision is contained in the information repository for the Administrative Record located at the Dover Public Library, Dover, Delaware.

Assessment of the Site

The Area 6 Remedial Investigation identified a lindane plume in groundwater that emanates from the Paint Washout Area (Site SS59). Soil and groundwater data indicate that the lindane source resides somewhere between two monitoring well points in this area. Groundwater concentrations of lindane increase from 0.042 μg/L to 27 μg/L between these points. Although a Risk Assessment was not specifically performed for groundwater in the Lindane Source Area, the contribution of lindane to the overall Area 6 risk from exposure to groundwater under a hypothetical future commercial/industrial land use scenario was 2×10^{-5}.

Actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the interim response action selected in this ROD, may present a current or potential threat to public health, welfare, or the environment.

Description of the Selected Interim Remedy

The selected interim remedy consists of excavation and removal of the lindane-contaminated soil source with offsite incineration treatment. The soil source of lindane will be further delineated during the Remedial Design. The lindane-contaminated soil will be handled as a U129 listed hazardous waste as defined under the Delaware Regulations Governing Hazardous Waste.

Statutory Determinations

The selected interim remedial action satisfies the remedial selection process requirements of CERCLA and the NCP. The selected interim remedy provides the best balance of trade-offs among the nine criteria required to be evaluated under CERCLA. The selected interim action provides protection of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the action, and is cost effective. This interim remedy utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. The Air Force understands that although this interim remedy may not achieve MCLs for certain contaminants, this interim action is only part of a total remedial action for the Base that will be protective of the public health and welfare and of the environment when completed (CERCLA 121d, 42 U.S.C. 9621.d).

19 SEP 1995	SEP 26 1995
CHARLES T. ROBERTSON, JR. Date	THOMAS C. VOLTAGGIO Date
Lieutenant General, USAF	Hazardous Waste Management
Air Mobility Command	Division Director
Chairperson, Environmental	Environmental Protection Agency
Protection Committee	Region III

RECORD OF DECISION
FOR THE INTERIM REMEDY OF
LINDANE SOURCE AREA OF AREA 6
WEST MANAGEMENT UNIT
DOVER AIR FORCE BASE, DOVER, DELAWARE

August 3, 1995

DECISION SUMMARY FOR THE RECORD OF DECISION
LINDANE SOURCE AREA OF AREA 6
WEST MANAGEMENT UNIT
DOVER AIR FORCE BASE

INTRODUCTION

Dover Air Force Base (DAFB) recently completed a Focused Feasibility Study (FFS) conducted to address chlorinated solvent and pesticide source area contamination in Area 6 of Dover Air Force Base (DAFB), Delaware as an interim response. The FFS was undertaken as part of the U.S. Air Force's Installation Restoration Program (IRP). The basis for the FFS was the Area 6 Remedial Investigation (RI) report dated July 1994, which characterized contamination and evaluated potential risks to public health and the environment. The interim FFS was performed as the first phase of Feasibility Studies to be conducted on sites in the West Management Unit, the management unit to which Area 6 belongs. The scope of the FFS was limited to the evaluation of alternatives for remediation of primary chlorinated solvent and pesticide source areas originating in the northern, upgradient portion of the Area 6 region of investigation. The final remediation of source areas, if necessary, and non-source area contamination in Area 6 posing human health or environmental risks will be addressed in the final Base-wide Feasibility Study (FS).

This Record of Decision (ROD) addresses the lindane source area, which is one of the source areas evaluated in the FFS. This ROD summarizes the FFS, describes the remedial alternatives that were evaluated, identifies the remedial alternative selected by DAFB, and explains the reasons for this selection. The U.S. Environmental Protection Agency (EPA) and the State of Delaware concur with the interim remedy selected in this ROD.

As an aid to the reader, a glossary of the technical terms used in this ROD is provided at the end of the summary.

PUBLIC PARTICIPATION

The Proposed Plan for this site was issued on June 16, 1995. The public comment period on the Plan was open through July 31, 1995. Documents comprising the Administrative Record for the site were available at the Dover Public Library.

SITE BACKGROUND

DAFB is located in Kent County, Delaware, 3.5 miles southeast of the city of Dover (Figure 1) and is bounded to the southwest by the St. Jones River. DAFB comprises approximately 4,000 acres of land, including annexes, easements, and leased property (Figure 2). The surrounding area is primarily cropland and wetlands.

DAFB began operation in December 1941. Since then, various military services have operated out of DAFB. The present host organization is the 436th Airlift Wing. Its mission is to provide global airlift capability, including transport of cargo, troops, equipment, and relief supplies.

DAFB is the U.S. East Coast home terminal for the C-5 Galaxy aircraft. The Base also serves as the joint services port mortuary, designed to accept casualties in the event of war. The C-5 Galaxy, a cargo transport plane, is the largest aircraft in the USAF, and DAFB is one of a few military bases at which hangars and runways are designed to accommodate these planes.

The portion of DAFB addressed in this ROD is located within Area 6 of the West Management Unit. The West Management Unit is one of four Management Units into which the Base has been divided (Figure 3). Area 6 is the largest of five associated areas identified in the West Management Unit. The Area 6 region of investigation extends approximately 8,400 feet from its northern most point near the hardstand and Building 723 to its southern most point near the St. Jones River (Figure 4). The area north of U.S. Highway 113 contains the industrialized portion of the Area 6 region of investigation. The location addressed in this ROD falls within this industrialized portion of Area 6.

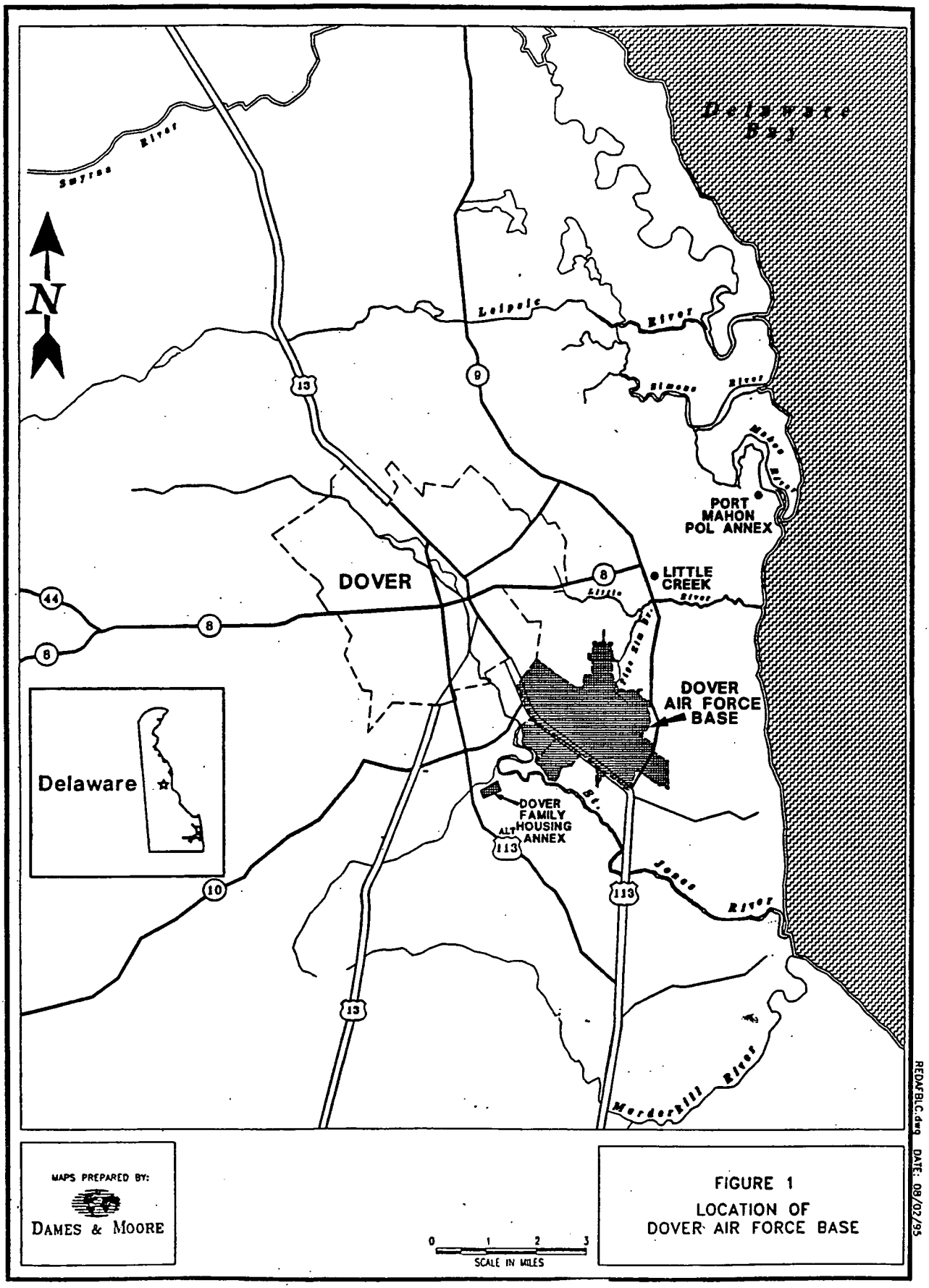

FIGURE 1
LOCATION OF
DOVER AIR FORCE BASE

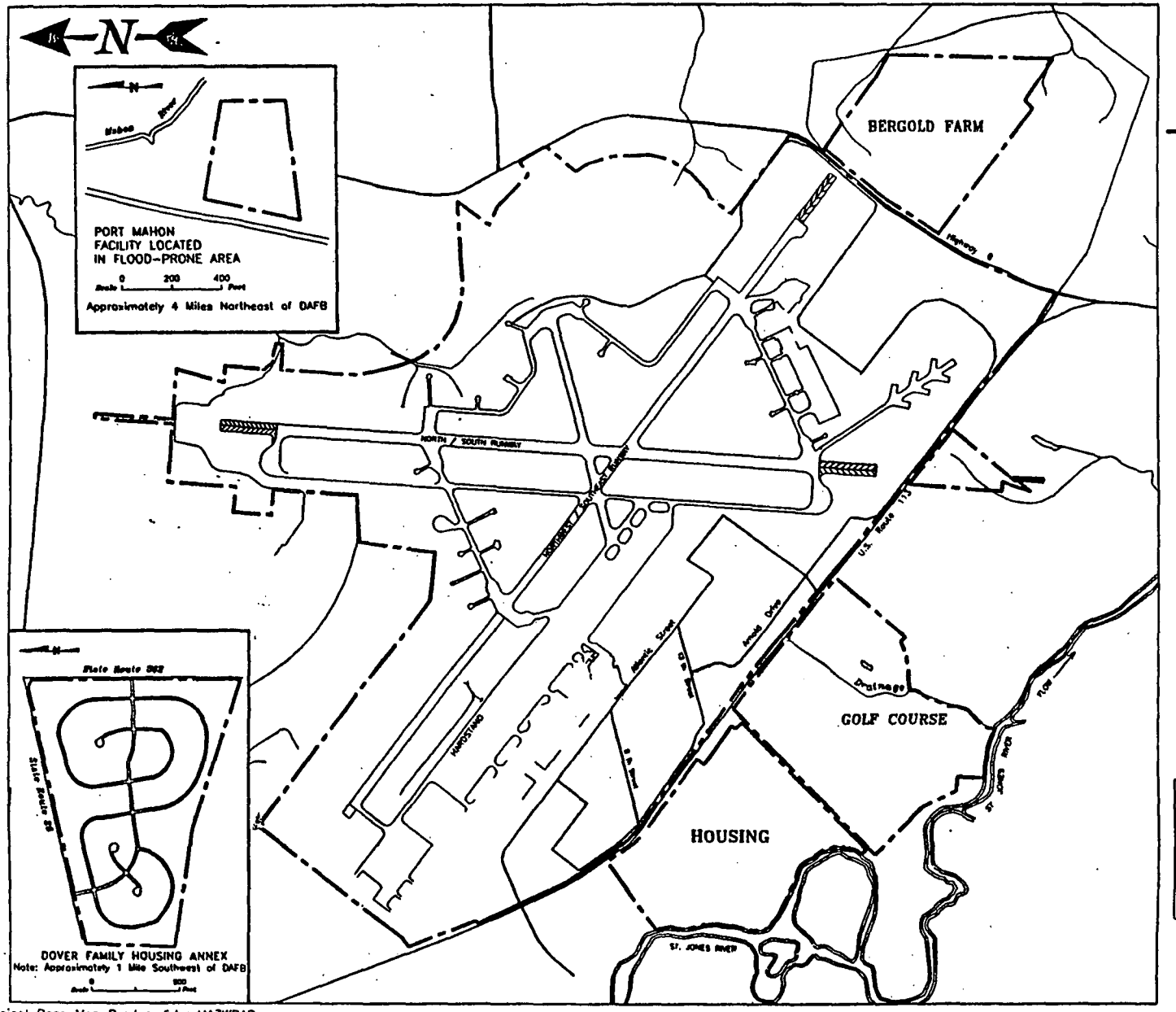

FIGURE 2
BASE BOUNDARIES
DOVER AIR FORCE
BASE

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Original Base Map Produced by HAZWRAP.

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Lindane Source Area
ROD-4

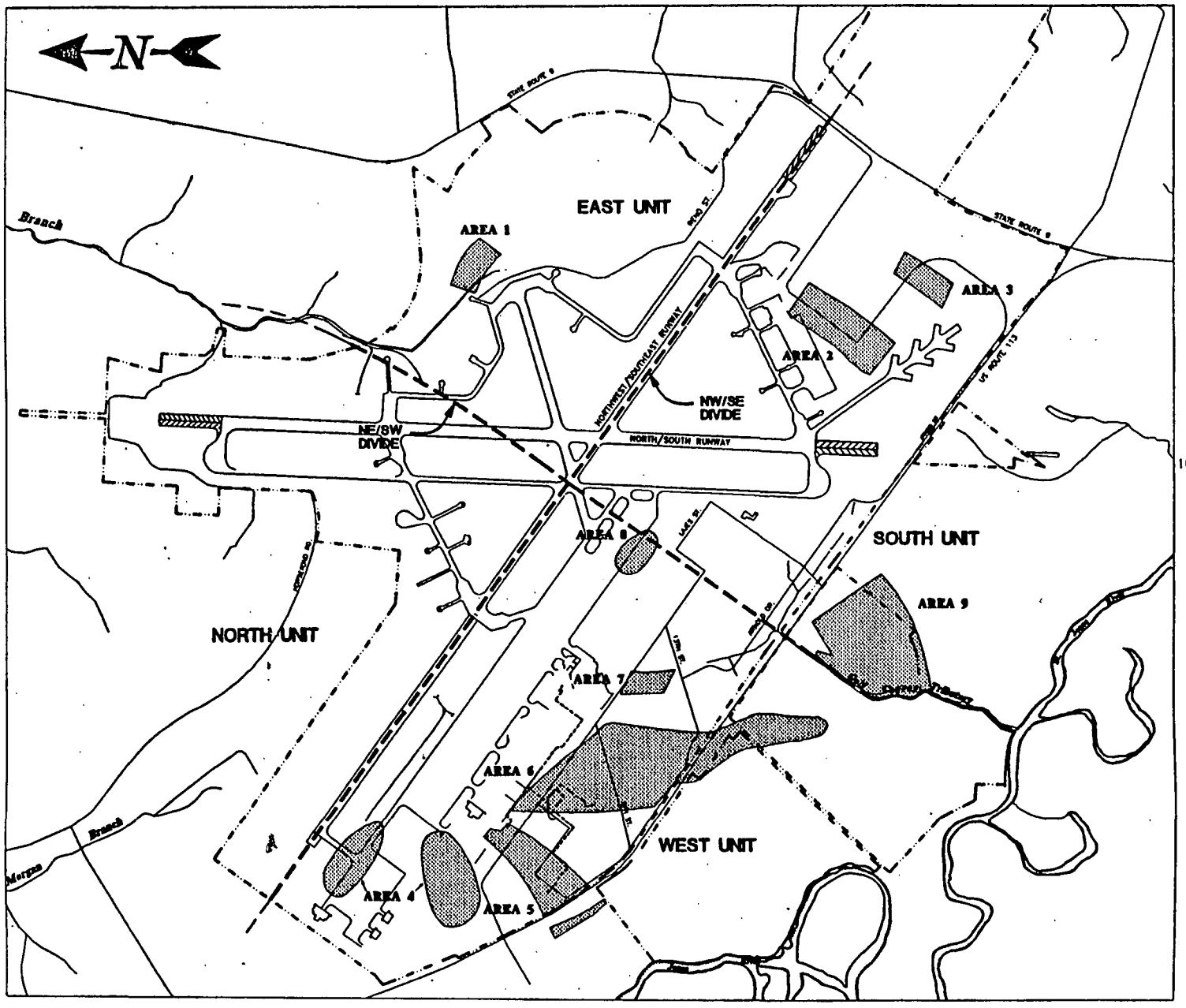

FIGURE 3
MANAGEMENT UNITS
AND AREAS
OF INVESTIGATION

Original base map produced by HAZWRAP.

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Lindane Source Area
ROD-5

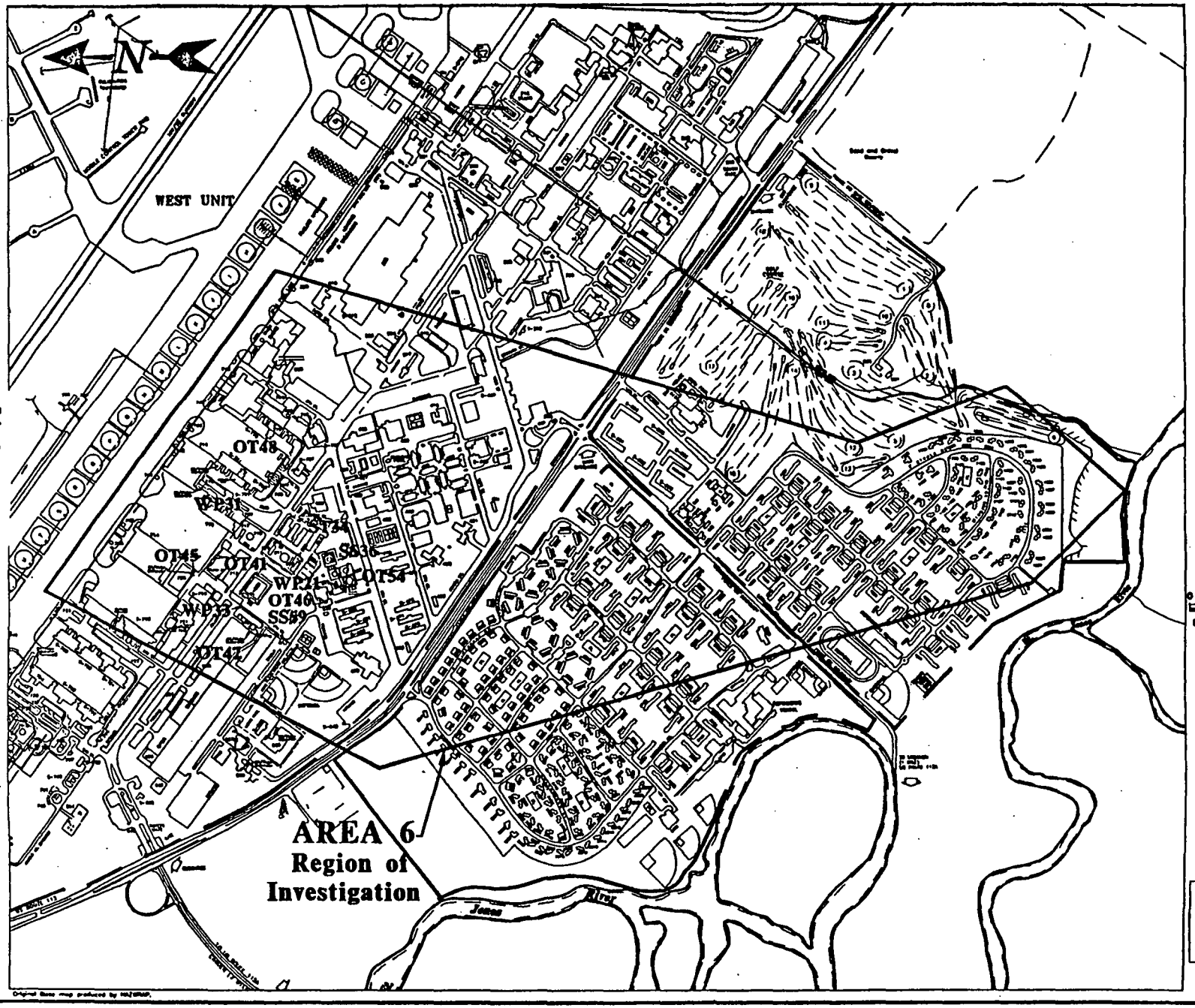

FIGURE 4
AREA 6
REGION OF
INVESTIGATION

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Lindane Source Area
ROD-6

DAFB is relatively flat, with elevations ranging from approximately 10 to 30 feet above mean sea level (MSL). The ground surface is covered almost entirely by buildings, concrete, and asphalt. Surface water runoff throughout the industrialized portion of Area 6 is controlled by an extensive storm drainage system. The storm drains direct most runoff to either Pipe Elm Branch or the golf course tributary to the St. Jones River.

The Columbia Formation is the shallowest water-bearing unit and holds the water table aquifer. The Columbia Formation typically consists of fine to coarse grained sand with varying amounts of silt, clay, and gravel. Discontinuous lenses of gravel, silt and clay are also common. Generally, the upper portion of the Columbia Formation is finer grained and contains more silt and clay lenses than the deeper portion. The water table is generally encountered at a depth of 10 to 12 feet below ground surface (bgs) in the northern portion of Area 6 and shallows to within a few feet of the surface in the Base housing area near the St. Jones River. The groundwater elevation or potentiometric surface of both the shallow and deep zones of the Columbia Aquifer range from approximately 13.5 feet MSL in the northern portion to less than 3 feet MSL near the St. Jones River. The thickness of the Columbia Formation in Area 6 ranges from 28 to 64 feet.

Unconformably underlying the Columbia Formation is the upper unit of the Calvert Formation, which generally consists of gray to dark gray firm, dense silt and clay, with thin laminations of silt and fine sand. This upper silt and clay unit ranges in thickness from 15 to 21 feet in the northern portion of Area 6. The hydraulic conductivity of this unit range from 6.83×10^{-3} to 1.53×19^{-3} ft/day (2.41×16^{-6} to 5.39×10^{-7} cm/sec), which are three to five orders of magnitude lower than the overlying Columbia Formation. These significantly lower hydraulic conductivities form a barrier to the vertical migration of constituents identified in the Columbia Aquifer. Underlying this confining unit is the upper sand unit of the Calvert Formation or the Frederica Aquifer. This aquifer averages 22 feet in thickness in the vicinity of DAFB. No constituents of concern were identified in the three Frederica monitoring wells

installed in Area 6. Additionally, no production wells are installed the Frederica Aquifer in the vicinity of DAFB.

Area 6 is defined by the association of chlorinated solvents in groundwater forming a plume in the Columbia Aquifer. The Area 6 RI identified a lindane groundwater plume (Figure 5) that emanates from the Paint Washout Area (Site SS59). Lindane is a nonvolatile pesticide compound. The lindane source is believed to reside in the subsurface soils of the open storage yard in the Paint Washout Area near well MW212S. Lindane concentrations in shallow groundwater are approximately three orders of magnitude higher in this well than in the nearest upgradient shallow well.

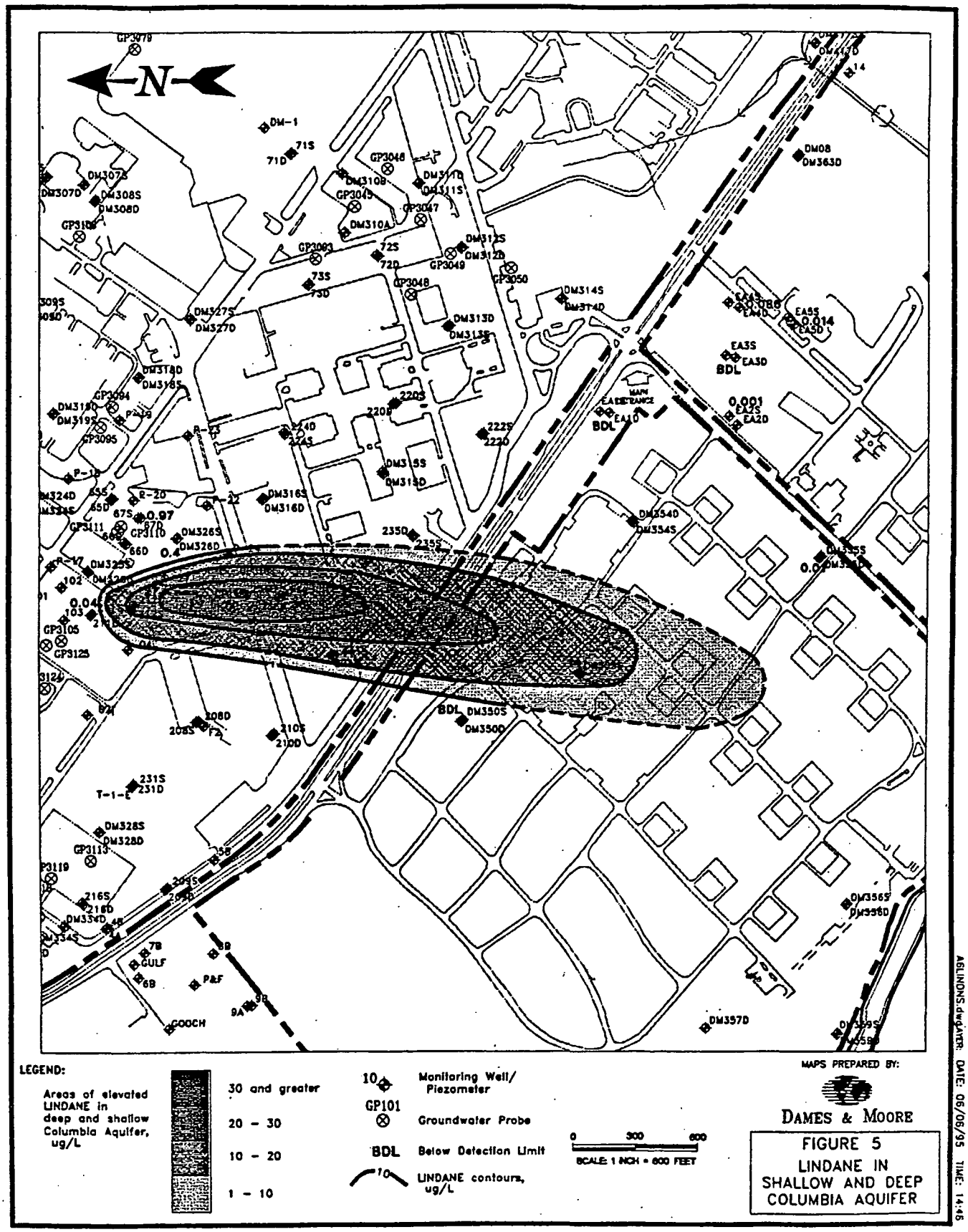
SOURCE AREA CHARACTERISTICS

The following section describes the physical and chemical characteristics of the lindane source area, which is addressed in this Record of Decision.

Soil and groundwater data indicate that a lindane source area resides in the Paint Washout Area (Site SS59), located in the eastern portion of the open storage yard near 5th Street. A map of the Paint Washout Area vicinity summarizing the available lindane data in soil and groundwater is presented in Figure 6. As shown in the figure, the concentration of lindane in the groundwater between wells 211S and 212S increases from 0.042 μg/L to 27 μg/L between these points. Thus, the groundwater data indicates that the soil-based lindane source resides in the vicinity of well 212S. For cost estimating purposes only, the assumed dimensions of the lindane source area are 20 feet by 20 feet by 1 foot thick, covered by 1 foot of soil. The remedial design will define the exact dimensions of the lindane source area.

SUMMARY OF SITE RISKS

The full Risk Assessment (RA) for Area 6 can be found in the final Area 6 RI report dated July 1994. The purpose of the RA is to determine whether exposure to site-related contaminants could adversely affect human health and the environment. The focus of the baseline RA is on the possible human health and environmental



Lindane Source Area
ROD-9

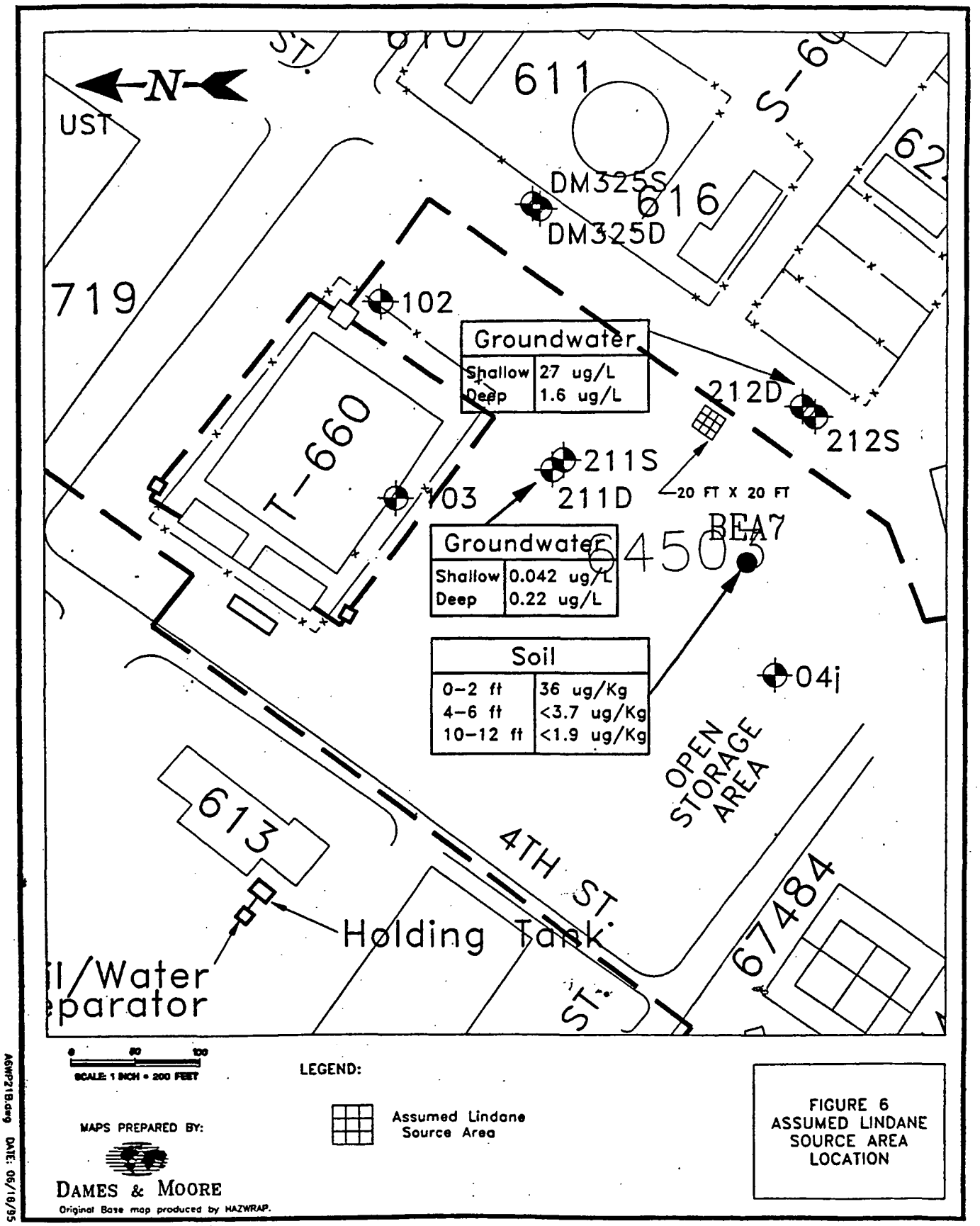


FIGURE 6
ASSUMED LINDANE SOURCE AREA LOCATION

effects that could occur under current or potential future use conditions in the event that the contamination is not remediated. The risk is expressed as lifetime excess cancer risk (LECR) for carcinogens, and hazard quotient (HQ) for noncarcinogens. For example, an LECR of 1×10^{-6} represents one additional case of cancer in one million exposed population, whereas a hazard quotient above one presents a likelihood of noncarcinogenic health effects in exposed populations.

The baseline RA focused on potential pathways by which maintenance and construction workers could be exposed to contaminated materials in Area 6. The workers' exposure to groundwater and soil have been evaluated under a regular maintenance scenario; a future construction scenario; and a hypothetical future groundwater use from the Columbia Aquifer under a commercial/industrial scenario. Although a specific Lindane Source Area RA has not been performed, the calculated risk contribution from the hypothetical future exposure to lindane-contaminated groundwater in Area 6 was 2×10^{-5}. In addition to the overall Area 6 risk, lindane concentrations in the Lindane Source Area have been compared to the risk-based screening concentrations (RBSCs) developed for commercial/industrial scenario at DAFB to identify if it presents a risk-based concern.

The future use of groundwater from the Columbia Aquifer by Base personnel is quite unlikely and hypothetical. This hypothetical future groundwater use assumes that groundwater from the Columbia Aquifer will be used for drinking and showering purposes by Base personnel under a commercial/industrial scenario. The RBSCs were compared with maximum detected concentration of lindane in the Lindane Source Area. The maximum detected lindane concentration of 27 μg/L in Lindane Source Area groundwater is higher than its RBSC of 0.22 μg/L.

The maximum concentration of lindane detected in soil was compared to its RBSC developed for exposure to soil under a commercial/industrial scenario. The maximum detected lindane concentration of 36 μg/kg is substantially lower than its RBSC of 2,200 μg/kg.

The groundwater and soil data suggest that there is a soil-based source of lindane, and the possibility exists for exposure of workers to hazardous substances in soil during excavation activities. Source areas identified during excavation will require worker protection in accordance with health and safety protocols. All workers performing excavation work at DAFB will be health and safety trained for work at CERCLA sites.

Based on the direction of groundwater flow, the Area 6 plume extends in a southerly direction towards the St. Jones River. There are no surface water discharge points within Area 6 between the Lindane Source Area and the river. Presently, the Area 6 plume is confined within the Base property, and has not reached the St. Jones River.

Actual or threatened releases of hazardous substances from this Site, if not addressed by the selected alternative or one of the other active measures considered, may present a current or potential threat to public health, welfare, or the environment.

REMEDIAL ACTION OBJECTIVE

For the lindane source area, an action-specific interim RAO of removing the soil source of lindane has been established, though no specific lindane concentration limits have been set. A lindane action level will be established during the Remedial Design that will minimize further degradation of groundwater quality through leaching. The action level will be determined through the use of an appropriate leaching model and collection of site data. Remediation of the plume itself is not addressed in this ROD.

The issues of final cleanup levels and attainment of ARARs will be addressed in the Final Basewide Record of Decision. The remedial action selected for this ROD is only part of the remedial action which will be selected in a Final Basewide ROD.

SUMMARY OF ALTERNATIVES

Engineering technologies applicable to remediating the contaminated media were screened according to their effectiveness and implementability. Only one

technology was determined to be applicable and it was developed into the action remedial alternatives. The two remedial alternatives evaluated are presented below.

- Alternative 1--No Action.
- Alternative 2--Offsite Incineration of Lindane-Contaminated Soil.

The two remedial alternatives that were evaluated in detail are described below. In addition, the capital, annual operation and maintenance (O&M), and present worth costs of both alternatives are provided.

Alternative 1

	Lindane Source Area
Capital Cost	$000
Annual O&M Cost	$000
Present Worth	$000

The no action alternative is evaluated in order to establish a baseline for comparison against other alternatives. Under this alternative, no efforts are undertaken to remove the lindane-contaminated soil source of the lindane groundwater plume.

Alternative 2

	Lindane Source Area
Capital Cost	$140,000
Annual O&M Cost	$000
Present Worth	$140,000

Alternative 2 consists of excavation and removal of the lindane-contaminated soil source with offsite incineration treatment.

The soil source of lindane contamination will be further delineated during the remedial design. The lindane contaminated soil is interpreted as a U129 listed hazardous waste under the implementing regulations of the Resource Conservation and Recovery Act (RCRA), and as such is subject to land disposal restrictions. Therefore, lindane-contaminated soil exceeding action levels will be excavated and sent to an offsite RCRA-permitted facility for incineration and disposal. This treatment method will reduce residual lindane concentrations in the treated soil to below the treatment level required for disposal of the soil.

The action-specific RAO of removing the soil-based source of lindane will be achieved within one year. The present worth cost of this alternative is $140,000.

EVALUATION OF ALTERNATIVES

The selected alternative for remediating the contamination in the Lindane Source Area is Alternative 2. Based on current information, this alternative provides the best balance of trade-offs among the alternatives with respect to the nine criteria that are required to be evaluated under CERCLA. This section profiles the performance of the selected alternative against the nine criteria and explains how it compares to the other alternative under consideration.

Overall Protection of Human Health and the Environment

The overall protectiveness criterion is a composite of other evaluation criteria, especially short-term effectiveness, long-term effectiveness, and compliance with ARARs. Alternative 1 (no action) is not considered effective because the soil source of lindane contamination will remain in place. Alternative 2 (lindane removal) will meet the RAO and is considered effective.

Compliance With ARARs

There are no ARAR considerations associated with Alternative 1 (no action). Alternative 2 (lindane removal) consists of the excavation and removal of the soil-based source of lindane. This soil will be managed as U129 listed hazardous waste. The excavation, handling, transportation, treatment, and ultimate disposal actions for

this soil will comply with RCRA requirements. The Delaware regulations implementing RCRA in the state are the Delaware Regulations Governing Hazardous Waste (DRGHW). Lindane is listed as a hazardous waste under DRGHW 261.33. The storage of hazardous waste in piles is addressed under DRGHW 264. The transportation of hazardous waste is addressed under DRGHW Part 263. Finally, land disposal restrictions are addressed under DRGHW Part 268.

Long-Term Effectiveness and Permanence

The long-term effectiveness and permanence criterion primarily considers the magnitude of residual risk that would remain after the implementation of an alternative, and the adequacy and reliability of the controls instituted. Under Alternative 1 (no action), the lindane-contaminated soil source will be left in place. Hence, the long-term protectiveness of this alternative cannot be demonstrated.

Alternative 2 (lindane removal) provides for the removal and treatment of the lindane-contaminated soil source material. This represents a permanent remedy that will halt further leaching of lindane into groundwater.

Reduction of Toxicity, Mobility, and Volume

No reduction of toxicity, mobility, or volume will be achieved from the implementation of Alternative 1. Alternative 2 consists of the removal and offsite incineration of the lindane-contaminated soil, which will reduce the toxicity of the treated soil. In addition, it will reduce the source of lindane contamination that may leach into groundwater.

Short-Term Effectiveness

Alternative 1 (no action) includes no remedial actions. Therefore, there will be no short-term impacts on community or worker health or the environment from construction activities. However, Alternative 1 will not eliminate the soil-based source of lindane.

Alternative 2 will result in the rapid removal of the soil-based source of lindane. The exposure by construction workers to lindane-contaminated soil and dust

will be minimized through the use of appropriate protective clothing and equipment. No impacts to the community are anticipated.

Implementability

Three main factors are considered under this criterion: technical feasibility, administrative feasibility, and availability of services and materials. Both alternatives are administratively feasible and the required services and materials are readily available. Hence, the comparison will focus on the technical feasibility of the alternatives.

Alternative 1 (no action) have no technical feasibility considerations. The technical feasibility considerations associated with Alternative 2 (lindane removal) are minimal. The qualified excavation and transportation contractors required to perform the work are readily available. In addition, there is ample offsite incineration capacity available to perform the required thermal destruction.

Cost

No direct costs are associated with the implementation of Alternative 1 (no action). The capital costs of Alternative 2 (lindane removal) is $140,000. There are no O&M costs associated with either alternative.

State Acceptance

The State of Delaware concurs with the selected interim remedy for the lindane source area.

Community Acceptance

No public comments were received on the proposed interim remedy.

CONCLUSION

Based on the evaluation of the alternatives using the nine criteria, Alternative 2 (lindane removal) is preferred. Alternative 2 is protective of human health and the environment, complies with all ARARs, and represents a permanent remedy that will protect groundwater quality.

The selected alternative utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. This interim action will not negatively impact the ability to implement a final action if required. The final remedy will be selected in the final Base-wide ROD.

Actual or threatened releases of hazardous substances from this Site, if not addressed by the selected alternative, may present a current or potential threat to public health, welfare, or the environment.

GLOSSARY AND ACRONYMS

Aquifer - A geologic formation capable of yielding water to wells and springs.

ARARs - Applicable or Relevant and Appropriate Requirements. Criteria set forth by federal and state statute and regulations that must be considered in the evaluation of remedial alternatives.

Capital Cost - Cost incurred for the construction and startup of a facility.

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act. Federal law creating the Superfund program.

DAFB - Dover Air Force Base.

EPA - Environmental Protection Agency.

FS - Feasibility Study.

FFS - Focused Feasibility Study.

Groundwater - Subsurface water residing in a zone of saturation.

HQ - Hazard Quotient. An indicator of the noncarcinogenic health risk associated with exposure to a chemical.

Incineration - The process of burning a material so that only ashes remain.

Leach - The solubilization and transport of constituents in soil through the percolation of surface water to groundwater.

LECR - Lifetime Excess Cancer Risk. The probability of the carcinogenic health risk associated with exposure to chemicals of concern.

O&M Cost - Annual cost incurred for operation and maintenance of a facility.

Plume - A recognizable distribution of constituents in groundwater.

Potentiometric Surface - An imaginary surface that represents the static head of groundwater and is defined by the level to which water will rise.

RAO - Remedial Action Objective. Cleanup goal established for the remediation.

RBSC - Risk-Based Screening Concentration. A chemical-specific concentration used to preliminarily assess whether exposure to the chemical poses a potential health risk.

RCRA - Resource Conservation and Recovery Act.

ROD - Record of Decision. A legal document issued by the lead governmental agency selecting the remedy to be implemented at a CERCLA site.