1.0 INTRODUCTION

1.1. PURPOSE, OBJECTIVES, AND DESCRIPTION

1.1.1. Purpose

1.1.1.1. The purpose of the Basewide Quality Assurance Project Plan (QAPP) is to present the quality assurance (QA) criteria, quality control (QC) criteria, and standard operating procedures (SOPs) for sampling and analysis during investigations, remediation/construction, and operation and maintenance activities conducted at Hill Air Force Base (AFB), Utah. The Basewide QAPP is intended for use by firms that are contracted directly by Hill AFB (prime contractors) to provide investigative, design, or construction services. This QAPP is intended for use as a companion document that can be incorporated either by reference or inclusion into Sampling and Analysis Plans (SAPs), remedial design/remedial action (RD/RA) work plans, or other project-specific plans that include analytical data collection.

1.1.2. Objectives

1.1.2.1. The primary objective of the Basewide QAPP is to standardize analytical data collection, reporting, and validation activities (to the extent practicable) to maximize data consistency and comparability between programs. A secondary objective of the document is to facilitate and expedite Hill AFB and regulatory review of new activities.

1.1.2.2. Hill AFB recognizes that this Basewide QAPP is neither comprehensive nor exhaustive and will not apply to non-standard or atypical methods of analysis. Information regarding analytical methodology or field procedures not included in this QAPP shall be included in project-specific work plans.

1.2 BASEWIDE QAPP DESCRIPTION

1.2.0.1. The Basewide QAPP was prepared in accordance with the United States Environmental Protection Agency (U.S. EPA) Requirements for Quality Assurance Project Plans for Environmental Data Operations (QA/R-5, October 1998) and EPA Guidance for Quality Assurance Project Plans (QA/G-5, February 1998) and includes each of the primary elements identified in this guidance. The Basewide QAPP was prepared to be applicable to the types of activities (investigation, treatability studies, remediation, etc.) that are most likely to occur at Hill AFB through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Resource Conservation and Recovery Act (RCRA), or Underground Storage Tank programs. Analytical methodology and field SOPs that will support the majority of the activities have also been included in the Basewide QAPP. The remainder of this section describes the activities, analytical methods, and field SOPs that are included in the Basewide QAPP, and provides guidance for incorporation of the Basewide QAPP into project-specific work plans.

1.2.0.2. The Basewide QAPP will be available in both hard copy and electronic formats. The electronic version will be available on the Internet or directly from Hill AFB in page document file (PDF) format. The Basewide QAPP will be reviewed as deemed necessary by Hill AFB. Minor revisions will be added as an addendum (Appendix M) to the Basewide QAPP Version 0.0. Major revisions (requiring rewrite of the document) will be issued on an as needed basis. The version number of the QAPP will be changed (increased by one) for each major revision.

1.2.0.3. Hill AFB shall use a document control system for distribution of the Basewide QAPP to ensure that the current version is in use. Controlled copies shall be provided to applicable Hill AFB Project Managers, regulatory agencies, and Prime Contractors. Whenever revisions are made or addenda are added to the Basewide QAPP, Hill AFB shall ensure that all parties holding a controlled copy of the Basewide QAPP receive the

updated materials. This system does not preclude making and using copies of the Basewide QAPP.

1.2.1. Activities

1.2.1.1. Preliminary Assessment/Site Investigation (PA/SI). The PA/SI is the initial site investigation that is conducted under CERCLA prior to the Remedial Investigation/Feasibility Study (RI/FS). Includes record searches, interviews, review of existing site data, and collection of preliminary site data.

1.2.1.2. Remedial Investigation/Feasibility Study. Conducted under CERCLA to assess the nature and extent of risks posed by uncontrolled waste sites for evaluation of potential remedial options. Includes remedial investigation, risk assessment, and feasibility study as described below:

- **Remedial Investigation.** Collection of data to characterize and assess the nature and extent of contamination associated with a hazardous waste site, including the characterization of investigation-derived waste (IDW).

- **Risk Assessment.** Characterization of the risks associated with hazardous waste sites; based on the results of the remedial investigation.

- **Feasibility Study (FS).** Development, evaluation, selection, and description of remedial action alternatives.

- **Treatability Studies.** Evaluation of the technical and economic feasibility of a new or potentially unproven new process or gathering of information for design of a full-scale application of a known system through bench or pilot-scale studies. Treatability studies can be performed as part of the FS process or after the remedial action is in place for troubleshooting, system optimization, and adjusting operation set points and parameters.

1.2.1.3. Technology Demonstration. Demonstration of an innovative or known technology to assess the technology's performance, reliability, and cost. Technology demonstrations are generally conducted at field scale to determine implementability, logistic, and long-term reliability factors of an action. They are employed when bench or pilot-scale studies may not be indicative of actual technology effectiveness or when scale-up factors are expected to be unreliable. Technology demonstrations are usually conducted prior to selection of a remedial action.

1.2.1.4. Predesign Data Collection. Soil, ground-water, surface water, geotechnical, source material (e.g., dense nonaqueous phase liquid [DNAPL] and light nonaqueous phase liquid [LNAPL]), air, sediment or hydrogeologic data that are collected following the RI/FS process to support final decision-making and to establish contaminant loading and process capacities during the remedial action design.

1.2.1.5. Precommissioning Monitoring. Sample collection and analysis to monitor pertinent site conditions prior to commissioning the remedial action. These data may be collected during or after the remedial design or during the installation of the remedial action, but generally represent the site condition immediately prior to start of the remedial action operation phase. Data uses include (but are not limited to):

- Developing baseline contaminant concentrations as a basis for evaluating future trends.
- Assessing site stability.
- Assessing current site conditions in relation to potential risk.
- Determining contaminant fate and transport.

- Implementing the remedial action.

- Startup data required upon installation of the remedial action to release the installation contractor from responsibility from a performance specification.

- System startup data required upon installation of the remedial action to certify completion of system construction.

1.2.1.6. Compliance Monitoring. Analytical data that are generally collected on a scheduled basis during system prove-out and regular operation to meet the intent of the design criteria as specified in the Record of Decision (ROD); Consent Decree, Statement of Work; or other governing permits. These data may include:

- Analytical data collected to support National Pollutant Discharge Elimination System (NPDES) discharge criteria.

- Analytical data collected to support landfill leachate monitoring criteria.

- Analytical data collected as a part of site investigations, in accordance with EPA and State guidance (e.g., Risked Based Corrective Action [RBCA] Tier I and II guidance).

- Analytical data collected to monitor solid waste treatment units (landfarming).

1.2.1.7. Performance Standard Verification. Analytical data collected on a scheduled basis to ensure compliance and consistency with the long-term project objectives as defined in the ROD, Consent Decree, Statement of Work; or other governing permits. These data are used to:

- Assess achievement of restoration cleanup goals

- Measure the efficiency or progress of the restoration.

1.2.1.8. Operations and Maintenance. Data collected during regular operations that are not necessarily required for regulatory compliance, but are needed for proper system operations. These data may include:

- System performance optimization data, such as analyses to verify the effectiveness of process set-points or chemical dosages.

- Troubleshooting data to mitigate an operational problem such as scaling or corrosion.

- Analyses to respond to changes in site or waste character that occur over time or with seasonal changes.

- Analyses to identify maintenance and rehabilitation needs (e.g., organic analyses in air or water to determine breakthrough and the need for carbon changeout).

- Data for determining disposal methods for operational wastes, (e.g., characterization of spent carbon, used filters, and process sludges).

- Other data required for ensuring consistent system performance.

1.2.1.9. Construction. Data that are collected as part of remedial alternative construction or installation, to ensure consistency with the construction plans, specifications, and overall construction QA plan. For example:

- Slurry composition data that would be collected during slurry wall construction to assess whether design specifications were met.

- Spoils samples for chemical analysis prior to disposal or use.
- Characterization to evaluate treatment of construction-derived wastewater.
- Geotechnical characterization to select materials and methods of construction.
- Other data to facilitate the construction QA/QC process.

1.2.1.10. Underground Storage Tank (UST) Investigations. Data collected as part of UST investigations and UST site closures.

1.2.1.11. RCRA Facility Investigations. Data collected as part of Phase I or Phase II site investigations and site closures.

1.2.2. Analytical Methods

1.2.2.1. The analytical methods included in this QAPP are listed in Table 1-1, and include those methods that will support the activities described above and that are expected to be used with the most frequency at Hill AFB. All analytical procedures detailed in the Basewide QAPP are in accordance with applicable professional technical standards, the State of Utah Department of Environmental Quality, and the United States Environmental Protection Agency (U.S. EPA) Region VIII requirements.

1.2.2.2. The Basewide QAPP defines typical minimum requirements for specific data types, including the appropriate data package and associated level of QC and data validation required. As used by the analytical laboratory, the Basewide QAPP specifies analytical methodology, quality control acceptance and corrective action criteria, and data package requirements based on the analytical methods and current industry standards.

The analytical and data validation protocols described in this QAPP are from the following sources:

- EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986a; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

- EPA 100-400 Series - Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600R-93/100, August 1993a).

- EPA 200 Series - Methods for the Determination of Metals in Environmental Samples, (EPA/600/4-91-010, June 1991a; Supplement I, EPA/600/R-94/111, May 1994).

- EPA 600 Series - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (U.S. EPA, CFR Title 40, Part 136, Appendix A, July 1996).

- Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air (EPA/600/4-89/017, June 1988a).

- State of California, Department of Health Services Determination of Perchlorate by Ion Chromatography (Rev. No. 0, June 1997).

- U.S. EPA Contact Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review (U.S. EPA, 1994a).

1.2.3. Field SOPs

1.2.3.1. The following field SOPs are included in Appendix I of this QAPP:

- Site Access
- Field Equipment Calibration
- Equipment Decontamination
- Field Documentation
- Location and Sample Identification
- Site Restoration
- Location and Topographical Survey
- Investigation Derived Waste Management
- Soil Classification
- Asphalt and Concrete Coring and Cutting
- Soil Boring Drilling
- Trenching and Test Pits
- Monitoring Well Installation, Completion, and Development
- Monitoring Well/Piezometer Abandonment
- Sample Handling and Shipping
- VOC Soil Sampling
- Subsurface Soil Sampling
- Surface Soil Sampling
- Cone Penetrometer Testing
- Ground-Water Sampling for Chemical Analysis
- Surface Water Sampling
- Sediment Sampling
- Air Sampling
- Ground-Water Elevation Measurements
- Surface Water Flow Rate Measurements
- Surface Water Depth Measurement

- Slope Inclinometer Testing
- Aquifer Testing
- Respiration and In-Situ Permeability Tests.

The field SOPs were developed using guidance from Hill AFB and from other sources as defined in Section 4.0 of this QAPP and the SOP references (Appendix I).

1.2.4. Basewide QAPP Usage

1.2.4.1. The Basewide QAPP can be used by direct reference or by inclusion into the project-specific work plans. For example: To prepare a SAP for a specific project consisting of collection ground-water samples from 20 monitoring wells for volatile organic compound analysis, the project-specific SAP could be as simple as preparing a letter report that includes the project organization, the data quality objectives, and sampling and reporting schedules. The Basewide QAPP would be referenced in place of preparing detailed discussion regarding sample collection, shipment, handling, chain-of-custody, and analytical QA/QC procedures. An example of this type of work plan is presented in Appendix K.

1.2.4.2. Note that the Basewide QAPP does not define activity and site-specific data quality objectives (DQOs), but defines typical requirements for each data type. Project-specific DQOs are based on the intended end use of the data, which shall be determined during the initial planning phase of each activity following the DQO process described in QA/G-4 (September 1994). The project-specific DQOs shall be presented in the SAP, RD/RA, or other project work plans, with supporting rationale for exceptions to standard recommendations. The scientific method discussed in QA/G-5 (October 1998) calculation/estimation of the total study error, and data assessment discussed in QA/G-9 (January 1998) should be part of the project specific work plan.

1.2.4.3. Hill AFB has developed and maintains its own Geographical Information System (GIS)/database in which data are managed and stored. The QA/QC for this database follows the Air Force Center for Environmental Excellence Environmental Restoration Program Information Management System (ERPIMS) Version 4.0 Guidance which is included in Appendix J of the Basewide QAPP.

1.3 HISTORY AND ENVIRONMENTAL SETTING OF HILL AFB

1.3.1. History of Hill AFB

1.3.1.1. Hill AFB is located in northern Utah, approximately 25 miles north of Salt Lake City and five miles south of Ogden, as shown in Figure 1-1. Hill AFB occupies approximately 6,700 acres in Davis and Weber counties. The western boundary of the Base is formed by Interstate Highway 15, and the southern boundary is State Route 193. The northern and northeastern margins are bounded by the privately owned Davis-Weber irrigation canal, and the southeastern boundary borders a municipal incineration facility and open farmland adjacent to private residential homes.

1.3.1.2. The western portion of the area now occupied by Hill AFB was originally the Ogden Arsenal, which was activated in 1920 as an Army reserve depot. The arsenal occupied approximately 3,300 acres and comprised numerous buildings and storage magazines. The Ogden Arsenal stored ordnance for emergency use and unused ordnance from World War I. A small work force maintained operations from 1926 through 1935. During a storm in 1929, all but six of the storage magazines were blown down. The Ogden Arsenal was rebuilt and modernized from 1939 through 1942. At the onset of World War II, work at the arsenal included loading explosives into 100- to 2,000-pound bombs, and manufacture of artillery shells and small arms munitions. As the war effort increased, the arsenal manufactured ammunition and became a distribution center for motorized equipment, artillery, and general ordnance. In 1945, the manufacturing

operations ceased, and the arsenal was used as a storage and distribution depot for vehicles, artillery, small arms, parts, and supplies.

1.3.1.3. Construction of the Ogden Air Depot, the predecessor of Hill AFB, began in 1940. In 1941, four 7,500-foot runways were completed, and maintenance began on A-20 and Lockheed Hudson aircraft. During World War II, the primary operation at the air depot was aircraft rehabilitation, and the work force grew to over 20,000 personnel. During this time, the name of the Ogden Air Depot changed three times, to the Ogden Air Services Command, the Ogden Air Technical Service Command, and the Ogden Air Materiel Area. In 1948, it was renamed Hill AFB. Hill AFB was designated as the primary parts depot for the F-89 Scorpion aircraft in 1952, and in 1953 Hill AFB also assumed responsibility for F-89 modification. In 1955, the Ogden Arsenal was transferred from the U.S. Army to the U.S. Air Force. This nearly doubled the area of Hill AFB to its present size of approximately 6,700 acres and added approximately 600 buildings and structures to the Base.

1.3.1.4. To accommodate growth at Hill AFB, the facility was modernized, and a 13,500-foot long runway was completed in 1957. In 1959, Hill AFB was assigned assembly and managerial responsibility for the SM-80 Minuteman Intercontinental Ballistic Missile (ICBM). Hill AFB was designated as the System Support Manager for the F-4C tactical fighter in 1962. In 1965, Hill AFB received logistics and management responsibilities for the ICBM system, which included both the Minuteman and Titan missiles. In 1976, Hill AFB was designated the System and Maintenance Manager for the new F-16 multi-national fighter. At different times, Hill AFB has been assigned the maintenance of the F-84, F-101, and F-102 aircraft.

1.3.1.5. The civilian and military work force at Hill AFB has fluctuated from greater than 20,000 personnel during World War II to 10,000 to 15,000 personnel during the 1950s and 1960s. As of December 1996, the work force consisted of approximately 22,300 military and civilian personnel.

1.3.1.6. Currently, Hill AFB is home of the Ogden Air Logistics Center (OO-ALC), one of five air logistics centers that are part of the Air Force Materiel Command; two of these centers were recently selected for realignment and/or closure by the Department of Defense (DOD). The OO-ALC comprises four major groups (Product Directorates): the Directorate of Aircraft, Directorate of ICBMs, Directorate of Commodities, and Directorate of Technology and Industrial Support, and 10 support organizations, including the Directorate of Environmental Management. On July 1, 1992, the Air Force Logistics Command was merged with the Air Force Systems Command creating the Air Force Materiel Command.

1.3.1.7. Table 1-2 and Figure 1-2 present a summary of the historical operations conducted at Hill AFB and the types of hazardous materials and wastes that may have been associated with these activities. To support the past and present operations at Hill AFB, a variety of on-Base industrial operations have been established for aircraft, missile, vehicle, and railroad engine (Tooele Rail Shop) maintenance and repair (e.g., metal plating, degreasing, paint stripping, painting). These industrial operations used or generated numerous chemicals and wastes, including chlorinated and non-chlorinated solvents and degreasers, petroleum hydrocarbons, acids, bases, and metals. These chemicals and their associated waste products were historically disposed of at the Industrial Wastewater Treatment Plant (IWTP), in chemical disposal pits, or in landfills on the Base or at other Air Force facilities.

1.3.2. Regulatory History

1.3.2.1. CERCLA established a national program for responding to releases of hazardous substances into the environment; this program is commonly referred to as Superfund. In anticipation of CERCLA, the DOD developed the Installation Restoration Program (IRP) for response to potential releases of toxic or hazardous substances at DOD facilities. Like the United States Environmental Protection Agency (EPA) Superfund

Program, the IRP follows the procedures of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Hill AFB was already engaged in the IRP Program when it was placed on the National Priorities List (NPL) in July of 1987. Cleanup of DOD facilities is paid for by the Air Force Environmental Restoration Account (ERA), which is DOD's version of Superfund.

1.3.2.2. The Superfund Amendments and Reauthorization Act **(**SARA), which was enacted in 1986, requires that federal facilities follow NCP guidelines. The NCP was amended in 1990 (see 40 CFR 300 et seq.) to implement CERCLA under SARA. In addition, SARA requires greater EPA involvement and oversight of Federal Facility Cleanups. A Federal Facility Agreement (FFA) between Hill AFB, the EPA, and the Utah Department of Health (now the Utah Department of Environmental Quality [UDEQ]) was signed in April 1991. The purpose of the agreement was to establish a framework and schedule for developing, implementing, and monitoring appropriate remedial actions at Hill AFB in accordance with the NCP. The FFA also guides the RD/RA process.

1.3.2.3. Active facilities at Hill AFB and the Utah Test and Training Range (UTTR) are regulated under a RCRA Part B permit. Currently, several locations (including some active facilities) at Hill AFB, UTTR, and Wendover Air Force Auxiliary Field (WAFAF) have undergone a series of Preliminary Assessments (PAs) that have identified 232 areas of concern (AOCs). The regulatory approaches for addressing many of these AOCs have not yet been determined. For some locations, the regulatory mechanism shall be chosen based upon pending changes to the State of Utah RCRA ordnance disposal regulations. When investigations of these AOCs are complete and the pending RCRA regulations are finalized, each AOC will either be: (1) added to the RCRA Part B Permit, (2) handled according to the CERCLA process, or (3) recommended as requiring no further action. Regardless of the regulatory mechanism chosen, Hill AFB will ensure that all regulations and policies are followed.

1.3.3. Environmental Setting

1.3.3.1. This section contains an overview of the physical setting in which Hill AFB is located. Included are brief discussions of the geographic setting; geology; hydrogeology; hydrology; and the climate, demography, and ecology of the Base.

1.3.3.2. Geographic Setting. Hill AFB is located immediately west of the Wasatch Mountains on the former Weber River delta. It is included in the East Shore hydrogeologic region of northern Utah, which consists of the eastern portion of the Lake Bonneville Basin. The Wasatch Fault, which separates the Basin and Range Province from the Middle Rocky Mountain Province, is a few miles east of the Base. Landforms in the Basin and Range are generally characterized by north trending block-faulted mountains and intermontane basins flanked by alluvial fans and outwash slopes. The geomorphology and geology in the East Shore area were shaped by Lake Bonneville during the late Pleistocene. Lake Bonneville receded during flooding and drainage through the Snake River approximately 14,500 years ago; the lake has continued to recede due to climatic change, leaving the present-day Great Salt Lake.

1.3.3.3. Hill AFB occupies approximately 6,700 acres on a former delta deposited by the Weber River as it flowed into Lake Bonneville. The delta surface has slight to moderate relief with elevations ranging from approximately 4,600 feet above sea level along the western boundary of Hill AFB to 5,045 feet above sea level along the eastern boundary. In contrast, the Wasatch Mountains, about four miles to the east, rise abruptly to an elevation of over 9,500 feet. The Great Salt Lake, about 12 miles west of Hill AFB, is presently at an elevation of 4,203 feet above sea level.

1.3.3.4. Local Geology. The surficial geology of the East Shore area was mapped by Feth and others (1966) as unconsolidated deposits of gravel, sand, silt, and clay. These deposits are grouped into the Alpine and Provo formations, deposited during the Alpine and Provo stages of Lake Bonneville. The Provo Formation, which overlies the Alpine, consists of gravel and sand, the Alpine Formation is characterized by gravel,

sand, clay, and silt with interbedded layers of fine sand and clay. The most distinctive feature of the Alpine Formation is a slabby salmon pink to reddish brown well-consolidated clay. The Provo Formation is generally 10 to 30 feet thick in the vicinity of Hill AFB, whereas sections of the Alpine Formation are 101 to 135 feet thick (Feth and others, 1966; USGS, 1988).

1.3.3.5. Differentiation between the Alpine and Provo formations in the vicinity of Hill AFB can be difficult due to wave action on the surface of the delta as the elevation of Lake Bonneville fluctuated. The surface sediments were eroded and redeposited, which produced an uneven erosional contact between the two formations. While the contact is not well defined, subsurface investigations at many Hill AFB locations have revealed coarser sandy silt and gravel deposits overlying silty clays and fine sands. These findings are consistent with the interpretations of Feth and others (1966) and the USGS (1988).

1.3.3.6. Hydrogeology. The East Shore hydrogeologic region of northern Utah is divided into several subdistricts based on hydrogeologic characteristics. Hill AFB is included in the Weber Delta subdistrict, which occupies about 140 square miles and is bounded by the Wasatch Mountains and the Great Salt Lake to the east and west, respectively. The northern and southern boundaries were determined based on changes in well yields. Although the Weber Delta subdistrict is underlain predominantly by fine-grained materials, large well yields have been observed. Despite variability in the quality of ground water in the subdistrict, the water quality is generally good with low total dissolved solids and calcium to calcium-magnesium bicarbonate water types.

1.3.3.7. Usable quantities of ground water can be obtained from three primary aquifers in the Weber Delta subdistrict. The first is an unnamed, deep unconfined aquifer along the mountain front that is characterized by coarse-grained sediments. Sediments become finer and more stratified with distance from the mountains, where two deep, confined aquifers exist. These two aquifers, the Sunset and Delta, are considered the principal aquifers of the East Shore area. They occur at depths of approximately 250 to 400 feet and 500 to 700 feet below the ground surface, respectively. Shallow ground water also

occurs in flood plain deposits along stream channels, in isolated perched aquifers, and regionally in the valley lowlands within a few feet of the ground surface.

1.3.3.8. Ground water in the Weber Delta subdistrict generally flows from recharge areas along the front of the Wasatch Range toward the west and southwest to discharge areas along the Great Salt Lake. Recharge to the shallow aquifers occurs by seepage from the Weber River, streams, and canals; and by infiltration of precipitation and excess irrigation water. Recharge to the shallow aquifers also results from upward ground-water flow from underlying water-bearing units. Recharge to deeper, confined aquifers occurs through subsurface flow through fractures and joints in the consolidated rocks of the Wasatch Range and from under-flow from the deep unconfined aquifer near the mountain front. Most discharge from the principal aquifers is to wells, springs, and the shallow aquifers near the Great Salt Lake. Ground water in the shallow aquifers is discharged to drains, streams, and springs, and to the atmosphere through evapotranspiration.

1.3.3.9. Hydrology and Climate. The natural drainage patterns of Hill AFB have been altered over the years as the Base has developed. Surface water runoff is diverted into a series of ponds near the Base boundaries. The ponds retain the runoff until it evaporates or infiltrates into the ground. During heavy precipitation events, the retention ponds have overflowed into nearby storm sewers and natural drainages. The Davis-Weber canal runs around the east, north, and west sides of the Base and is used to transport and store irrigation water from April to October each year. The Davis-Weber canal is privately owned and is not used to transport water to or from Hill AFB.

1.3.3.10. The climate in the vicinity of Hill AFB is temperate and semi-arid. Mean monthly temperatures are lowest in January, with an average maximum temperature about 31.8 degrees Fahrenheit (°F) and an average minimum temperature of 21.7° F. The highest temperatures occur during July when maximum temperatures average about 82.5° F and the minimum average is 63.9° F. The frost-free growing season is from May through September. The average annual precipitation recorded during the period 1978 to 1990 at a gauging station located in Riverdale (one-half mile

northeast of the Base) was 19.8 inches. The majority of precipitation falls from October though May. May is usually the wettest month, and June and July are the driest months. Average annual evaporation is approximately 45 inches of water per year. Winds at Hill AFB are predominantly from the east and south at generally less than 10 miles per hour.

1.3.3.11. Population. The Hill AFB area is part of the Wasatch Front, which is generally defined by Weber, Davis, Morgan, Salt Lake, Utah, and Tooele counties. The Wasatch Front comprises the geographic area along the west slope of the Wasatch Mountains. The Wasatch Front has seen rapid population growth in recent years; during the period from 1970 to 1995, the combined population of Weber, Davis, Morgan, Salt Lake, and Tooele counties grew from an estimated 710,000 to 1.24 million, an increase of 75 percent. The estimated 1995 combined population of Davis and Weber counties was 392,000, an increase of 76 percent over 1970. Communities adjacent to the Base (Clearfield, Layton, Sunset, Clinton, Roy, South Weber and Riverdale) collectively have a population of about 185,000.

13.3.12. Housing and commercial development have increased with population growth in areas adjacent to Hill AFB. The period between 1970 and 1985 saw a 69 percent increase in the number of housing units in Weber and Davis counties, resulting in a total of 102,000 units by 1985.

1.3.3.13. Employment. Total employment along the Wasatch Front area has generally kept pace with the population growth. During the period of 1970-1995, total employment in the region grew from an estimated 264,000 to 475,000 jobs. Weber and Davis counties showed a combined 60 percent increase in jobs during this 15-year period. Government (federal, state, and local) is the largest single employer in these counties (as well as the State of Utah overall), comprising 53 and 27 percent of employment in Davis and Weber counties, respectively, and 22 percent of state-wide employment. The economic base of these counties is heavily dependent on federal employment, and Hill AFB is a major employer. Other large employers, such as Eimco, Kennecott Utah Copper Division, and

Alliant Techsystems now employ several hundred people in the area, but the majority of the region's non-government employment is in small or medium industry and businesses.

1.3.3.14. Land Use. Surrounding land use is varied, and includes uses as diverse as agriculture and heavy industry. In general, areas to the west of the Base are highly developed with a high population density, while the areas east of the Base contain large open and agricultural tracts. Lands to the north, northeast, and south have intermediate levels of development, with residential and business/light industry distributed among open tracts of land.

1.3.3.15. Flora. Hill AFB is located in a geographic region that would typically support a mountain-brush type native plant community. Dominant vegetation in this plant community includes scrub oak (*Quercus gambelii*), big sagebrush (*Artemesia tridentata*), rabbit brush (*Chrysothamus* sp.), and western wheatgrass (*Agropyron smithii*). However, much of Hill AFB has been developed, and the area is populated by introduced species. Only a small remnant of the native plant community occurs at the northern portion of the Base. Other micro-environments also occur at Hill AFB. One such environment is the storm-water retention basins that support vegetation associated with wetlands including sedge grasses (*Carex* sp.), sandbar willow (*Salix exigua*), and cattails (*Typha latifolia*) (Hill AFB, 1989). Although Hill AFB supports a broad variety of plant life, currently no threatened or endangered plant species have been identified. The *Natural Resource Management Plan for Hill Air Force Base, Utah* provides a complete listing of the flora found on the Base (Hill AFB, 1989).

13.3.16. Fauna. The wildlife found at Hill AFB are common to mountain-brush habitat and the western United States. Wildlife is most frequently found in the relatively undisturbed northern area of the Base. Wildlife in this area consists of a variety of large and small mammals, birds, amphibians and reptiles. Common residents include: mule deer (*Odocoileus hemionus*), fox (*Vulpes vulpes*), coyotes (*Canis latrans*), mice (*Peromyscus* sp.), shrews (*Sorex* sp.), weasels (*Mustela frenata*), cottontail (*Sylvilagus*

nuttalli) and jack rabbits (*Lepus* sp.), lizards, pheasants (*Phasianus colchicus*), meadow larks (*Sturnella neglecta*), horned larks (*Eremophilia alpestris*), magpies (*Pica pica*), and killdeers (*Charadrius vociferus*). Wildlife species found in the wetlands include mallard ducks (*Anas platyrhynchos*) and great blue herons (*Ardea herodias*). Two endangered species, the American bald eagle (*Haliaeetus leucocephalus*) and the peregrine falcon (*Falco peregrinus*), may use Hill AFB. Bald eagles from the northern latitudes winter along streams and lakes throughout Utah and have been observed at the Weber River just north of the Base. Peregrine falcons have been reintroduced in the marshes along the Great Salt Lake and also could be occasional visitors to the area. Aside from these two species, no threatened or endangered species have been identified at Hill AFB.

1.4. SITE SUMMARY

1.4.1. Operable Unit Designations

1.4.1.1. As part of the regulatory process, nine operable units (OUs) have been designated at Hill AFB. These operable units are shown in Figure 1-3, and are defined as follows:

OU 1 - Consists of Landfills 3 and 4 (LF01 and LF03), Chemical Disposal Pits 1 and 2 (WP02), Fire Training Areas 1 and 2 (FT09 and FT81), Waste Oil/Phenol Pit (WP80) and the Golf Course (OT14) (located on the east side of the Base)

OU 2 - Chemical Disposal Pit 3 (WP07) and Perimeter Road (SS21) (located on the east side of the Base)

OU 3 - Sodium Hydroxide Tank Site (ST04), IWTP Sludge Drying Beds (WP06), Berman Pond (WP05), Buildings 511 and 514 (ST18), Pond 1

(SD34), and Pond 3 (SD23), (a soils-only OU located on the southern part of the Base in the industrial complex.)

OU 4 - Landfills 1 and 2 (LF11 and LF12), Spoils Pit (OT20) North Gate Dump Site (OT41), and Munitions Dump (OT42) (located on the northeast side of the Base)

OU 5 - US Army Tooele Rail Shop (SS17) and Bamberger Pond (SD16; located on the west side of the Base)

OU 6 - Building 1915 (SD22) and the Asphalt Pad and MAMS-2 Areas (OT22; located on the north end of the Base)

OU 7 - Buildings 220 (ST31) and 225 (SS27 and SS32) (a soils only OU located in the industrial complex)

OU 8 - Ground water beneath the industrial complex (southern end of the Base) and Layton Area off-Base (OT33)

OU 9 - All contaminated source areas identified in the North and South Area PA/SIs for future evaluation.

1.4.1.2. The OUs have been designated on a geographical basis, comprising hazardous waste sites in close proximity to one another. Operable Units 1, 2, 4, 5, 6, and 9 contain source areas and associated ground-water contaminant plumes (ground water is not part of the OU 9 south area). Operable Units 3 and 7 contain source area soils and associated surface water and sediment (no ground water); and Operable Unit 8 addresses only the contaminated ground water beneath the industrial complex and Layton areas. Although as defined Operable Units, 3, 7, 8, and 9 are media specific, this does not preclude cross-media investigations at these sites.

1.4.2. UST Sites

1.4.2.1. Forty-seven IRP sites associated with USTs have been identified on the Base and its associated facilities. The UST sites are being addressed under the Utah UST program through the Utah Department of Environmental Quality (UDEQ) Division of Environment Response and Remediation (UDERR) or the Utah Ground-Water Protection Program (UGWP) through the Utah Division of Water Quality (UDWQ). Forty-three of the USTs are located on Hill AFB, two are at the UTTR, and two are at the Little Mountain facility. The locations of the on-Base USTs are shown on Figure 1-4. Thirty-seven of these sites have been closed and 10 sites remain open. Of the remaining 10 open sites, six are currently being assessed for closure under the State of Utah RBCA by the end Fiscal Year 97, using either the RBCA Tier I or Tier II models.

1.4.3. The Utah Test and Training Range

1.4.3.1. The UTTR is located in northwestern Utah and eastern Nevada, approximately 70 miles west of Salt Lake City, in the Great Salt Lake Desert. The UTTR is used for munitions storage, testing, and training. It is characterized by high-elevation desert, sand dunes, steep mountains that rise from the desert floor, and rolling hills at the foot of mountain ranges. The North Range occupies 366,539 acres, and the South Range occupies 565,476 acres and includes the Wendover Air Force Auxiliary Field. The UTTR is mostly surrounded by public land that is virtually undeveloped. Currently the UTTR is in the early phases of investigation. The North Area Preliminary Assessment has been completed and 98 AOCs identified. A Site Investigation is in progress at the North Area. The South Area Preliminary Assessment has been completed and a Site Investigation is scheduled to start during the summer of 1999. Data from the North and South Area investigations will include only a limited assessment of the nature and extent of contamination and risk to human health and the environment. A regulatory

oversight mechanism has not been determined at this time for the UTTR North and South Areas.

1.4.4. Wendover Air Force Auxiliary Field

1.4.4.1. Wendover Air Force Auxiliary Field is located just east of Wendover, Nevada in the southern portion of UTTR. The site was used for maintenance and landfill activities, which were active from the 1940's through 1982. No significant sources of contamination or areas where ground water was contaminated above levels requiring corrective actions were identified at this Site based on investigations conducted in 1994. Hill AFB has instituted a long-term program to monitor ground-water conditions to insure that any future changes are not overlooked. This approach is being coordinated with both the UDEQ and Nevada Division of Environmental Protection. A Preliminary Assessment and Site Investigation is being conducted at the Wendover Air Force Auxiliary Field.

1.4.5. Little Mountain Test Annex

1.4.5.1. Little Mountain Test Annex (LMTA) is located on the eastern side of the Great Salt Lake in northern Utah about 45 miles northwest of Salt Lake City, Utah. The IRP sites at LMTA include two formerly used sludge drying beds, an above-ground fuel storage tank farm, a fire training area, and an UST. The tank farm and fire training areas have been investigated and closed in accordance with the UDEQ criteria. Additional investigation is planned for the sludge drying beds in late 1998. The UST site has been closed after application of bioventing. Some residual fuel has been left in place with the concurrence of State agencies. An area used for the disposal of low level radioactive debris (magnesium-thorium scrap metal from aircraft operation) was investigated in 1993 and was determined to require no further action.

1.5 DOCUMENT ORGANIZATION

1.5.0.1. The remainder of this document is organized as follows:

- Section 2.0 Project Organization and Responsibility
- Section 3.0 Quality Assurance Objectives for Measurement Data
- Section 4.0 Sampling Procedures
- Section 5.0 Sample Custody
- Section 6.0 Calibration Procedures and Frequency
- Section 7.0 Analytical Procedures
- Section 8.0 Internal Quality Control Checks
- Section 9.0 Data Reduction, Validation, Reporting, and Management
- Section 10.0 Performance Systems Audits
- Section 11.0 Preventative Maintenance Procedures
- Section 12.0 Data Validation Procedures
- Section 13.0 Corrective Actions
- Section 14.0 Quality Assurance Reports
- Appendices A through M.

1.5.0.2. Section 2.0 identifies the elements required for defining project organization and identifies the information that shall be included in Hill AFB project-specific work plans.

1.5.0.3. Section 3.0 describes the analytical data types that shall be used for Hill AFB projects and defines how project specific data quality objectives should be developed. Also included in this section is a description of data quality and measurement and the types of quality control samples required for Hill AFB projects.

1.5.0.4. Section 4.0 presents a brief description of the sample collection procedures that shall be followed for Hill AFB projects. Detailed descriptions of sampling procedures are presented in Appendix I.

1.5.0.5. Section 5.0 presents a brief summary of the field chain-of-custody and sampling and handling procedures that shall be followed for Hill AFB projects. Detailed procedures are provided in Appendix I. Detailed laboratory chain-of-custody procedures and procedures for maintaining project files that shall be followed for Hill AFB projects are also included in Section 5.0.

1.5.0.6. Section 6.0 describes field and laboratory instrument calibration procedures that shall be used for Hill AFB projects. A brief description of field equipment or instrument calibration is presented in this section, detailed field equipment calibration procedures are presented in Appendix I. Detailed descriptions of laboratory instrument calibration procedures and standard preparation that shall be followed for Hill AFB projects are included in this section.

1.5.0.7. Section 7.0 defines the methods that are included in this QAPP. Also included in this section are definitions of method detection limits, practical quantitation limits, and of how data shall be reported for Hill AFB projects.

1.5.0.8. Section 8.0 presents the procedures that shall be followed for performing internal quality control checks for both field measurements and laboratory analysis for Hill AFB projects.

1.5.0.9. Section 9.0 describes the procedures that shall be followed for validation and reporting of both field and laboratory analytical data for Hill AFB projects. Laboratory data qualification is defined in this section. Also included in this section are the requirements for managing and archiving data for Hill AFB projects.

1.5.0.10. Section 10.0 defines the procedures that shall be followed for performance and system audits for Hill AFB projects.

1.5.0.11. Section 11.0 describes the procedures that shall be followed both in the field and at the laboratory for equipment or instrument maintenance, documentation of maintenance, and management of spare parts for Hill AFB projects.

1.5.0.12. Section 12.0 presents the procedures that shall be followed by the prime contractors for conducting validation of both field and analytical data for Hill AFB projects.

1.5.0.13. Section 13.0 defines the procedures that will be followed for implementing corrective actions for both field and laboratory problems for Hill AFB projects.

1.5.0.14. Section 14.0 describes the information that is required in the project-specific work plans regarding data quality reports.

1.5.0.15. Appendices A through H present the minimum calibration and corrective action criteria, quality control limit criteria, and practical quantitation limits for Hill AFB projects. This information is limited to those analytical methods included in this QAPP.

1.5.0.16. Appendix I includes the field SOPs that shall be followed for Hill AFB projects.

1.5.0.17. Appendix J provides the guidance that shall be followed for generating ERPIMS deliverables for Hill AFB.

1.5.0.18. Appendix K includes an example of how to prepare a SAP using the Basewide QAPP as a reference.

1.5.0.19. Appendix L presents the minimum data levels required based on the end use of the data for each activity type included in this QAPP.

1.5.0.20. Appendix M will include minor revisions to the Basewide QAPP.

TABLE 1-1

ANALYTICAL METHODS INCLUDED IN THE BASEWIDE QAPP

Method[(a)]	Description	Instrumentation
Aqueous and Solid Sample Organic Methods of Analysis		
SW-846 8015B	Non-Halogenated Organics by Gas Chromatography; Gas Range and Diesel Range	Gas Chromatography
SW-846 8021B	Purgable Halogenated and Aromatic Volatile Organic Compounds	Gas Chromatography
EPA 601	Purgable Halocarbons (Aqueous samples only)	Gas Chromatography
EPA 602	Purgable Aromatic Hydrocarbons (Aqueous samples only)	Gas Chromatography
SW-846 8260B	Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy	Gas Chromatography/Mass Spectrometry
EPA 624	Purgable Aromatic Hydrocarbons and Halocarbons (Aqueous analysis only)	Gas Chromatography/Mass Spectrometry
SW-846 8270C	Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectroscopy	Gas Chromatography/Mass Spectrometry
EPA 625	Base, Neutral, and Acid Extractable Compounds (Aqueous samples only)	Gas Chromatography/Mass Spectrometry
SW-846 8151A	Organochlorine Herbicides and Pentachlorophenol	Gas Chromatography
SW-846 8081A	Chlorinated Pesticides (updated version of SW-846 8080)	Gas Chromatography
EPA 608	Chlorinated Insecticides and Polychlorinated Biphenyls (Aqueous samples only)	Gas Chromatography
SW-846 8082	Polychlorinated biphenyls	Gas Chromatography
SW-846 8310	Polynuclear Aromatic Hydrocarbons	High Performance Liquid Chromatography
SW-846 8330	Explosives	High Performance Liquid Chromatography
SW-846 8280A	Dioxins and Furans High Resolution Gas Chromatography and Low Resolution	Gas Chromatography/Mass Spectrometry
SW-846 8290	Dioxins and Furans High Resolution Gas Chromatography and High Resolution	Gas Chromatography/Mass Spectrometry
Aqueous and Solid Sample Metals Methods of Analysis		
SW-846 7000 Series	Metals Graphite Furnace Atomic Absorption	Atomic Adsorption
EPA 200.9	Metals Graphite Furnace Atomic Absorption	Atomic Adsorption
SW-846 6010A/B	All Metals Inductively Coupled Plasma (except mercury)	Inductively Coupled Plasma
EPA 200.7	All Metals Inductively Coupled Plasma (except mercury)	Inductively Coupled Plasma
SW-846 6010A Trace	All Metals (except mercury) Inductively Coupled Plasma: usually used only for those metals whose	Inductively Coupled Plasma Trace
SW-846 6020	All Metals (except mercury) Inductively Coupled Plasma: usually used only for those metals whose	Inductively Coupled Plasma/Mass
SW-846 7470A/7471A EPA 245.1/245.5	Mercury cold-vapor atomic absorption	Atomic absorption; cold-vapor generator
EPA 200.8	All Metals (except mercury) Inductively Coupled Plasma: usually used only for those metals whose detection limits from standard ICP exceed project-specific requirements (i.e., arsenic, lead, selenium)	Inductively Coupled Plasma/Mass Spectroscopy

TABLE 1-1

**ANALYTICAL METHODS INCLUDED IN THE BASEWIDE QAPP
(CONTINUED)**

Method[(a)]	Description	Instrumentation
Aqueous Sample Anions and Water Quality Parameters Methods of Analysis		
SW-846 7196A	Hexavalent-Chromium	Colorometric
EPA 300.0	Chloride, Fluoride, Sulfate, Nitrate/Nitrite	Ion Chromatography
EPA 300.0 MOD	Pechlorate	Ion Chromatography
EPA 340.2	Fluoride	Ion Selective Electrode
EPA 353.2	Nitrate/Nitrite	Colorimetric
EPA 376.2	Sulfide	Colorimetric
EPA 310.1	Alkalinity	Titrimetric
EPA 160.1	Total Dissolved Solids	Gravimetric
EPA 160.2	Total Suspended Solids	Gravimetric
SW-846 9060	Total Organic Carbon	Combustion/Oxidation
EPA 415.1/.2	Total Organic Carbon	Combustion/Oxidation
Air Sample Analysis		
TO-3, TO-14	Ethane and Methane	Gas Chromatography
TO-13	Polynuclear Aromatic Hydrocarbons (Semi-Volatile Organic Compounds)	Gas Chromatography/Mass Spectrometry
TO-14	Volatile Organic Compounds	Gas Chromatography/Mass Spectrometry
Field Screen Analysis		
SW-846 6200	Proposed determination of Elemental Concentrations in Soil and Sediment Field Portable X-ray Fluorescence Spectrometer	X-ray Fluorescence Spectroscopy
SW-846 4020	Screening for Polychlorinated Biphenyls	Immunoassay
SW-846 4030	TNT Explosives in Soil	Immunoassay
SW-846 4051	Hexahydro-1, 3, 5 Trinitro-1, 3, 5 Triazine (ROX) in Soil	Immunoassay
SW-846 8515	Colorimetric Screening Method for Trinitroluene (TNT) in soil	Colorometric

(a) EPA Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW-846), (U.S. EPA Third Edition, September 1986; Final Update I, July 1992; Final Update IIA, August 1993; Final Update II, September 1994; Final Update IIB, January 1995; Final Update III, December 1996).

EPA 100-400 Series - Methods for the Determination of Inorganic Substances in Environmental Samples (EPA/600R-93/100, August 1993).

EPA 200 Series - Methods for the Determination of Metals in Environmental Samples (EPA/600/4-91-010, June 1991; Supplement I, EPA/600/R-94/111, May 1994).

EPA 600 Series - Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater (U.S. EPA, CFR Title 40, Part 136, Appendix A, July 1996).

Compendium of Methods for Determination of Toxic Organic Compounds in Ambient Air (EPA/600/4-89/017, June 1988).

State of California Department of Health Services Determination of Perchlorate by Ion Chromatography (Rev. No. 0, June 1997).

TABLE 1-2

HISTORY OF BASE OPERATIONS FOR HILL AIR FORCE BASE

Period	Types of Operations	Weapons System	Hazardous Substance Activities
Pre-1920	Agriculture and rangeland	None	None
1920 - 1941	Ordnance storage(a)	Unused ordnance from WWI and ordnance for emergency use	Ordnance/explosives storage and handling
1941 - 1945	Munitions and ammunition manufacturing, motorized equipment, artillery, and general ordnance distribution(b)	100- to 2,000-lb bombs, artillery shells, small arms munitions; artillery	Loading explosives into munitions, ordnance/explosives storage and handling Manufacturing (solvents, hydrocarbons, metals, explosives)
	Engine testing, repair, and overhaul; general aircraft assembly, repair, modification, and storage; fuel storage; warehouse storage; chemical laboratory; materiel shipping and receiving(b)	B-27s, B-24s, P-47s	Metal working (metals, solvents); painting and stripping (paints, solvents, metals); chemical handling (various chemicals) Materials storage/warehousing† Fuel storage (petroleum hydrocarbons) * Munitions/explosives storage
1945 - 1955	Storage and distribution for Depot vehicles, artillery, small arms, parts, miscellaneous supplies, as well as ordnance handling and storage(a)	Artillery, armored vehicles	Munitions/explosives handling and storage Vehicle and equipment maintenance and storage (solvents, metals, fuels) Fuel storage
	Storage and reclamation/demolition of surplus WWII aircraft; general equipment disposal and redistribution; aircraft maintenance, repair, and re-fitting (prop and jet aircraft); parts storage; vehicle maintenance and repair; ordnance storage(b)(c)	P-80A, B-26, P-61, C-46, B-29, F-89, F-84, F-101, F-94, F-84G, XV-1	Vehicle and aircraft maintenance (metals, solvents, fuels); machine shops (solvents, metals); metal plating (metals, acids) Materials storage/warehousing † Fuel storage (petroleum hydrocarbons) *

Acronyms defined on last page of this table.

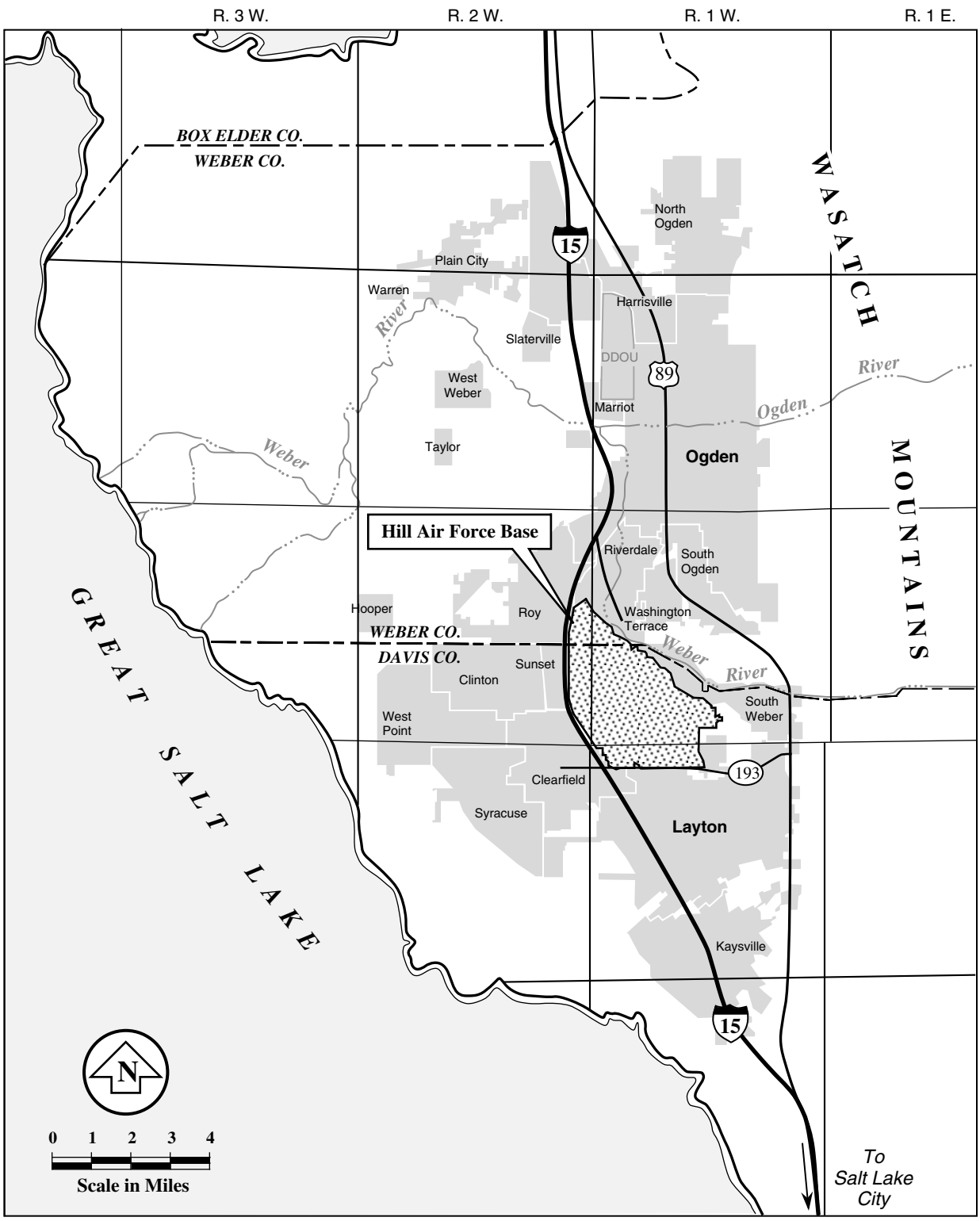
TABLE 1-2

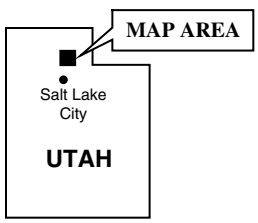
**HISTORY OF BASE OPERATIONS FOR HILL AIR FORCE BASE
(CONTINUED)**

Period	Types of Operations	Weapons System	Hazardous Substance Activities
1945 - 1955 (cont)			Munitions/explosives handling and storage
1955 - 1965	Aircraft maintenance, repair, and refitting; parts storage; equipment storage and distribution; ammunition storage and handling; ICBM maintenance, assembly, and storage(c)	Minuteman ICBM, F-4C Tactical Fighter, X-3, IM-99 Bomarc Missile, F-101, F-89, B-17, F-102, F-84, F-110	Machine shops (solvents, metals), metal plating (metals, acids), painting/stripping (paints, solvents, metals)
			Material storage/warehousing †
			Fuel storage *
			Munitions/explosives handling and storage (includes missile system after 1958)
1965 to Present	Aircraft and ICBM system and maintenance manager; aircraft maintenance and overhaul; equipment storage; ammunition storage and handling, vehicle maintenance(c)	Minuteman ICBM; F-16, F-84, F-101, F-102, F-4	Machine shops, metal plating, paint stripping, painting operations (solvents, degreasers, metals, paint); industrial waste treatment plant (IWTP)
			Material storage/warehousing †
			Fuel storage *
			Munitions/explosives/missile handling and storage

(a) Ogden Arsenal/Ogden Ordnance Depot (U.S. Army)
(b) Ogden Air Depot/Hill Field Area (prior to 1948)
(c) Hill Air Force Base (after February, 1948)

* Fuel storage includes underground tank sites, which are too numerous to show individually on Figure 1-2.
† Areas shown as "material storage/warehousing" may have contained hazardous materials.
WWI World War I
WWII World War II
ICBM Intercontinental Ballistic Missile



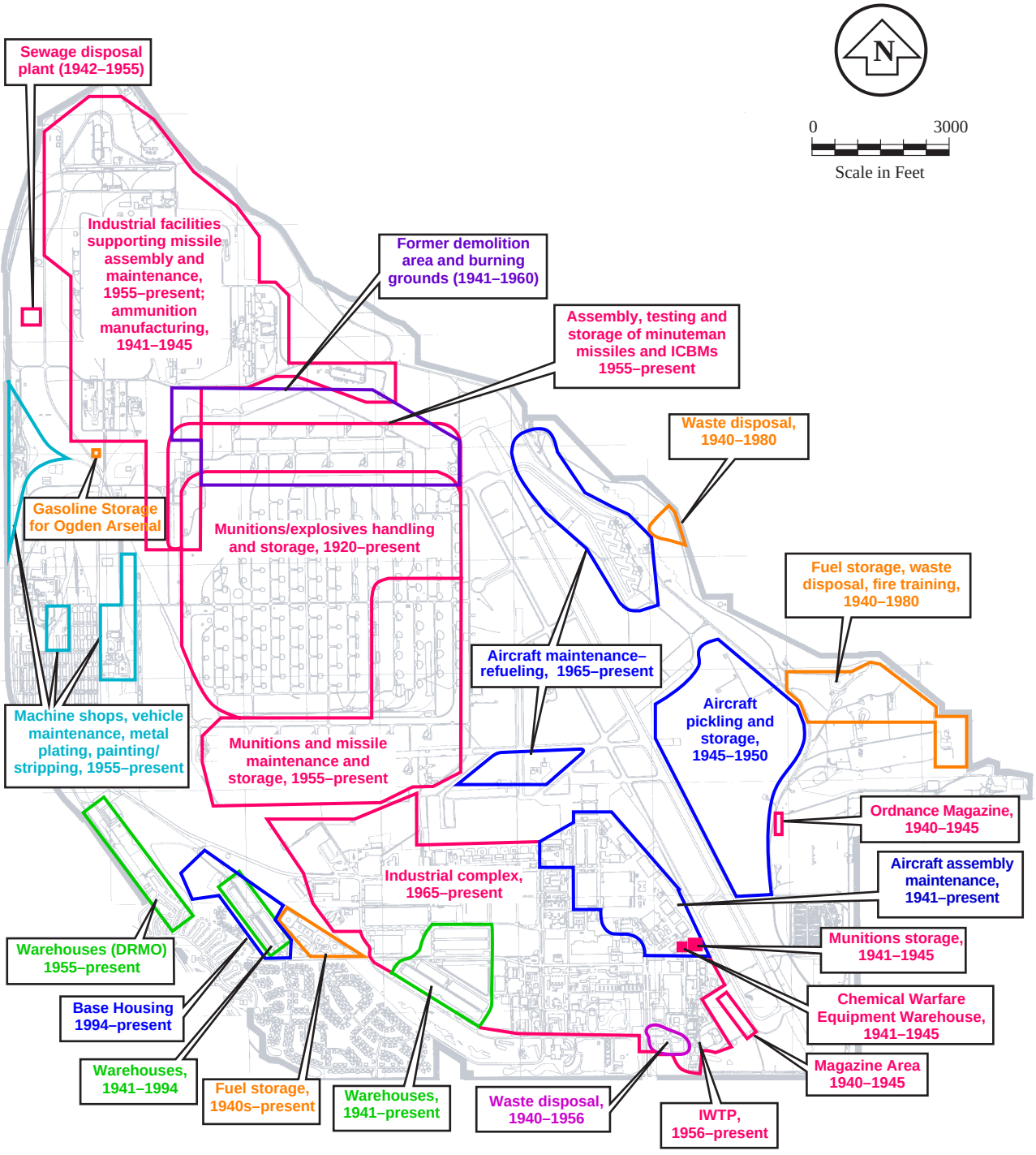


HILL AIR FORCE BASE, UTAH

VICINITY MAP

FIGURE 1-1

PROJECT NO. 1166076.14180102 7/26/99, Revision 0.0



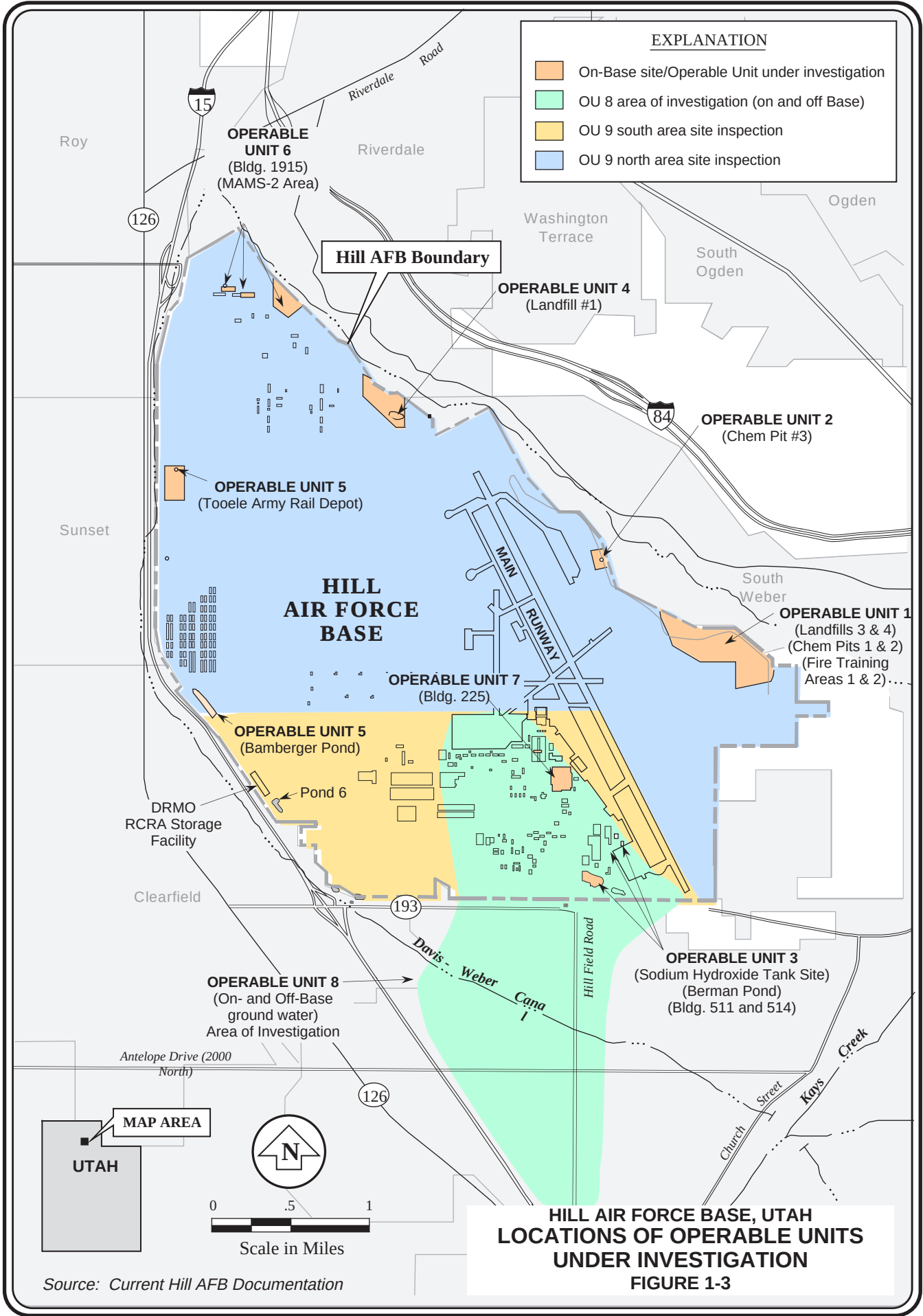
Source: Base map from Hill Air Force Base Comprehensive Plan; Plan Overview, 1989.

HILL AIR FORCE BASE, UTAH

CURRENT AND HISTORICAL HAZARDOUS SUBSTANCE ACTIVITIES

FIGURE 1-2

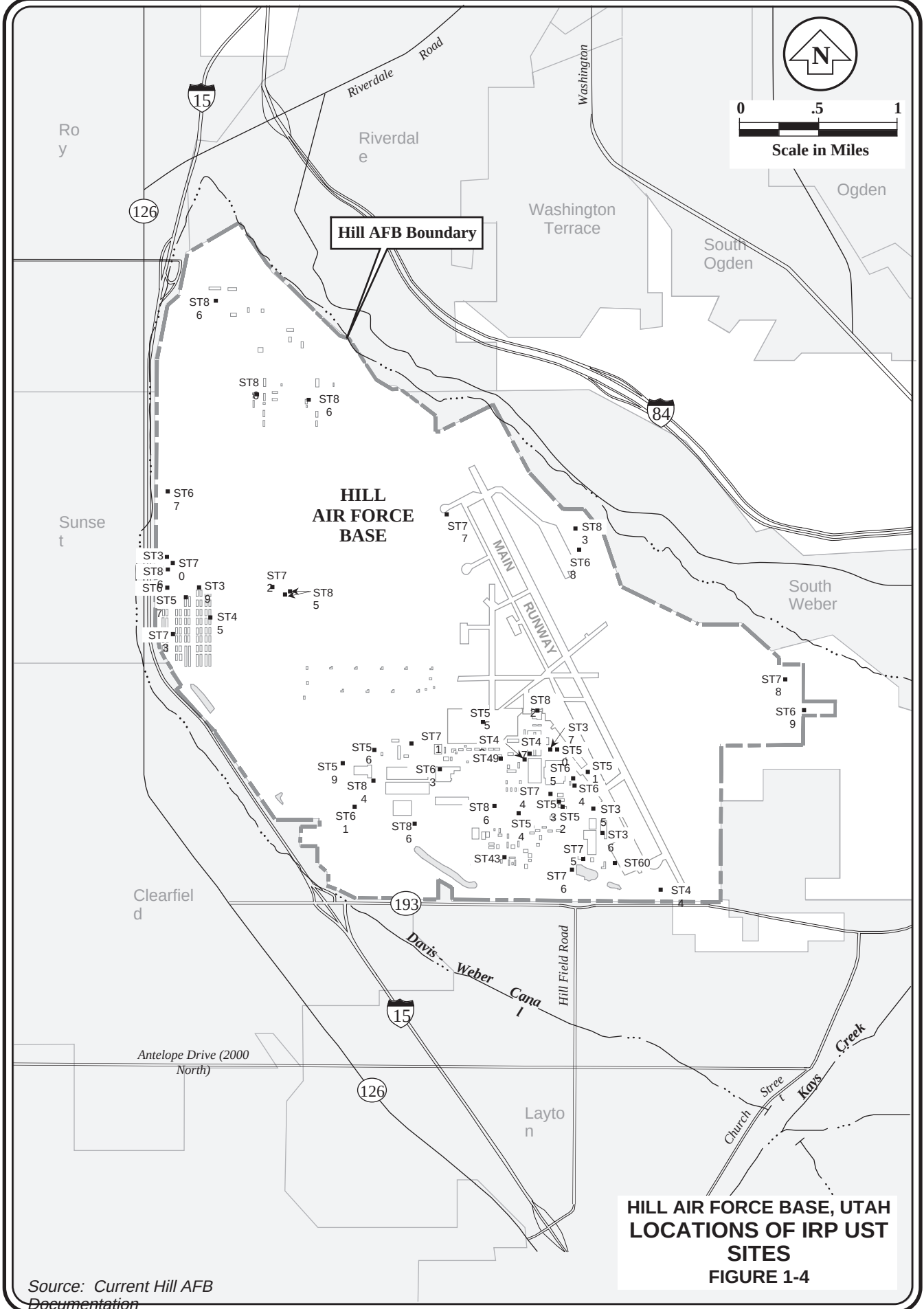
PROJECT NO. 1166076.14180102 7/26/99, Revision 0.0



Source: Current Hill AFB Documentation

HILL AIR FORCE BASE, UTAH
LOCATIONS OF OPERABLE UNITS UNDER INVESTIGATION
FIGURE 1-3

PROJECT NO. 1166076.14180102 7/26/99, Revision 0.0



HILL AIR FORCE BASE, UTAH
LOCATIONS OF IRP UST SITES
FIGURE 1-4

Source: Current Hill AFB Documentation

PROJECT NO. 1166076.14180102 7/26/99, Revision 0.0