

ATTACHMENT 1

**FACILITY DESCRIPTION
AND LOCATION**

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FACILITY DESCRIPTION AND LOCATION

1.0 Facility Description

1.1 General Description [R315-270-14(b)(1) and R315-270-23(a) and R315-270-32(a) and R315-270-33]

The Thermal Treatment Unit (TTU) is located in the eastern part of the Utah Test and Training range (UTTR)-North, adjacent to the western shore of the Great Salt Lake in Box Elder County (see Figure 1). It is centered on latitude 41° 07' 45.45" North, longitude 112° 07' 41.38" West, as depicted on the Strongs Knob, Utah, U.S. Geological Survey (USGS) Map. The TTU is operated for the Ogden Air Logistics Center (OO-ALC), Hill Air Force Base (HAFB), Utah, by the 75 Civil Engineer Group, 775 Civil Engineering Squadron, Explosive Ordnance Disposal (EOD) Flight, on behalf of the U.S. Air Force (USAF) and the U.S. Department of Defense (DOD). The TTU is assigned U.S. Environmental Protection Agency (EPA) ID No. UT0570090001.

1.1.1 Location Information [R315-270-14(b)(11)]

The TTU is located approximately 5 miles northeast of the UTTR-North range support facility called Oasis, which is situated 20 miles north of Utah Exit 62 on Interstate 80. Access to the TTU is provided by a Box Elder County Road, running from Interstate 80 northward to the Union Pacific Railroad work site at Lakeside. Figure 1 shows the location of the TTU and some of these landmarks.

1.1.2 Location Details

The TTU occupies a 2-square mile area in a gently southwestward-sloping valley. The TTU topography and geology, its proximity to a Box Elder County Road, the types of operations conducted, and the quantities of munitions treated were all taken into consideration in determining the size and shape of the TTU. The TTU is outlined on the aerial photograph shown in Figure 2.

The TTU contains four sites used for treating waste munitions¹ by open burning (OB) or open detonation (OD). Sites 1 and 4 are the rocket motor and bulk propellant OB pads. Site 2 consists of three smaller OB/OD pads for treating rocket motors as well as other waste munition items and a large pad used for detonation of large missile motors. Site 3 is the location of the former munitions burn pan where cartridge-actuated device (CAD) and propellant-actuated

¹ For the purposes of the UTTR-North TTU, waste munitions are defined to include all types of conventional ammunition products and their components, produced by or for DoD for national defense and security [including munitions produced by other parties under contract to or acting as an agent for DoD in the case of Government Owned/Contractor Operated (GOCO) operations]. Examples of munitions and munitions components treated at the TTU include propellants, explosives, pyrotechnics, incendiaries, warheads, cluster munitions and dispensers, and depth and demolition charges; and product examples, including rockets, guided and ballistic missiles, bombs, mines, grenades, mortar rounds, artillery and small arms ammunition, and torpedoes. The definition excludes wholly inert items and improvised explosive devices, for example, homemade bombs (which are non-military). The definition also excludes biological, chemical and nuclear weapons, their devices, and components.

device (PAD) items, flares, and small arms ammunition were treated by OB. The burn pan was decommissioned and partially closed in 2018. Figure 2 details the location of these sites.

2.0 TTU Design and Configuration [R315-264-601 and R315-270-23(a)]

The layout of the four TTU treatment sites is illustrated in Figure 2. They include the rocket motor and bulk propellant OB pads (Sites 1 and 4), the OB/OD staging and treatment pads (Site 2), and the miscellaneous munitions OB pan (Site 3). Perimeter fences, cliffs, and/or other mountainous terrain restrict public access. The area is undeveloped with no supporting utilities. The only man-made features are the four OB/OD sites and associated roadways, fences, and fire breaks. Figure 3 presents a series of photographs of each site and the main TTU entrance gate.

2.1 Site 1

Site 1, centered at 41° 08' 13.58" North latitude and 112° 53' 41.00" West longitude, was built in 1989 and is an OB pad used for thermal treatment of solid rocket propellants and whole rocket motors. OD does not take place at this location. The pad consists of a filled and raised area, with dimensions 300 ft north to south and 400 ft east to west. The surface of the OB pad consists of 8 to 12 in. of pit-run material, covered with 6 in. of 0.75 minus crushed gravel. Grounding rods are driven into the surface for each OB event as needed, isolating the propellant from electrostatic discharge (ESD).

2.2 Site 2

Both OB/OD operations occur at Site 2. The site was built in 1990 and consists of three separate, graveled pads with undeveloped areas immediately to the west of each pad where thermal treatment operations are conducted, and a large un-graveled pad used for detonation of large rocket motors. A series of gravel roads connect the pads and provide site access. The smaller pads are numbered 1, 2, and 3, from north to south. Pad 1 has approximate dimensions of 100 by 100 ft. Pad 2 is the smallest, with dimensions of about 75 by 75 ft. Pad 3 is the largest, with approximate dimensions of 150 ft north to south by 200 ft east to west. Pad 1 is centered at 41° 07' 58.05" North latitude and 112° 53' 37.03" West longitude; Pad 2 is centered at 41° 07' 55.48" North latitude and 112° 53' 35.01" West longitude; and Pad 3 is centered at 41° 07' 51.35" North latitude and 112° 53' 3.18" West longitude. The large detonation pad is centered at 41° 07' 52.19" North latitude and 112° 53' 46.09" West longitude.

All of the smaller pads consist of 8 to 12 in. of pit-run material, covered with 6 in. of 0.75 minus crushed gravel. Site 2 pads are used for staging OB/OD operations only, providing a stable surface for off-loading conventional high explosives and large missile sections. The surficial soils in the operational areas consist of fine sandy silt with some clay. Grounding rods are driven into the soil at the operational location for each OB event, as required. Craters created by OD operations are filled in by the Oasis Civil Engineers within two weeks of the event. Craters and grading actions significantly reduce the off-pad soil compaction, so the pads are used alternately, allowing natural settling processes to restore the site. This allows safe movement of the heavy transport vehicles from Site 2 pads to the adjacent areas. Pad 3 serves for OB treatment of rocket motors as well as the preferred pad for OD of items that fragment or require specific site preparation, such as the creation of berms.

2.3 Site 3

Site 3 is the location of the former miscellaneous munitions burn pan that was decommissioned and partially closed in 2018. Information about the partial closure and historical use of the burn pan is found in Attachment 8, Appendix A.

2.4 Site 4

Site 4, centered at 41°06'54" North latitude and 112°54'8" West longitude, was built in 2008 and is an OB pad used for thermal treatment of solid rocket propellants and whole rocket motors. OD does not take place at this location. The pad consists of a filled and raised area, with dimensions of 385 ft north to south and 325 ft east to west. The surface of the OB pad consists of 8 inches or more of pit-run material, covered with 6 in. of 0.75 minus crushed gravel. Grounding rods are driven into the surface for each OB event as needed, isolating the propellant from electrostatic discharge (ESD).

3.0 Environmental Setting [R315-270-23(b)]

3.1 Physiography/Topography

The UTTR-North TTU lies in the Great Salt Lake Desert in the eastern portion of the Basin and Range physiographic province. It is characterized by north-south trending desert mountain ranges separated by alluvium-filled valleys. Much of this area consists of salt flats (mud flats), with extensive Tertiary and Quaternary alluvial, aeolian, and lacustrine valley fill deposits.

The Great Salt Lake Desert is a hydrologically closed basin that is the lowest point for many drainage systems in northwestern Utah. As a result, the static groundwater level is generally shallow on the mud flats, often at the surface. Because of the high clay content, most of the surface soils severely restrict percolation, holding precipitation at the surface during wet periods. Pools sometimes form in the depressions among the stabilized dunes.

The TTU is located in a broad, gently sloping valley in the Lakeside Mountains, which opens to the southwest. The Lakeside Mountains are highly faulted and composed of Paleozoic limestone and dolomite with minor amounts of sandstone, quartzite, and shale. The valley fill is typically Lake Bonneville deposits of clay and silty clays in mud flats, fine silty sand and clayey silt in dunes, and silty sand-gravelly alluvium on the mountain sides. The valley where the TTU is located is bordered on the east by a low pass known as Sedal Pass, to the west by a Box Elder County Road, to the north by a steep mountainside, and to the south by an open area. The elevation of the TTU ranges from approximately 4,640 ft above mean sea level (MSL) at the southwest corner to over 5,100 ft above MSL on the northern boundary. Sedal Pass is a saddle between two portions of the Lakeside Mountains, which rise to over 5,800 ft above MSL. The land surface slopes downward at about 4 to 6% on both sides of Sedal Pass.

The topography surrounding the TTU is shown in Figure 2. Other than the Great Salt Lake, there are no perennial streams or permanent surface water bodies in the vicinity of the TTU. Precipitation is usually short-lived and generates only small quantities of water in this arid environment, although brief, intense thunderstorms can occur. Larger storms cause local ponding in surface depressions, but the ponds normally last only a few days due to the consistently high evaporation rates.

3.2 Climate

The TTU lies in a middle latitude steppe or semi-desert region characterized by hot, dry summers, cool springs and autumns, moderately cold winters, and a general lack of precipitation. As in most mountainous arid environments, precipitation varies widely, increasing with elevation. Annual precipitation over the UTTR-North generally averages about 6 in. (Doelling 1980), with most coming in the form of spring and autumn thunderstorms. Annual rainfall recorded at the TTU weather station for 2011 was 7.7 inches.

Note: Except as noted below, the following meteorological data were obtained from weather observations at Michael Field, Dugway Proving Ground (DPG), Utah, approximately 62 miles south-southeast of the TTU.

Temperatures vary widely annually and diurnally. Averages range monthly from 27°F (-3°C) in January to 78°F (26°C) in July. Midsummer daytime temperatures generally reach 90°F (32°C) and midwinter overnight temperatures are generally below freezing [National Oceanographic and Atmospheric Administration (NOAA) 1993]. Temperatures recorded at the TTU weather station can range from 0° F to 100° F. Average relative humidity is 35% in the summer and 65% in the winter. Early morning fog and haze is common in the winter due to thermocline development and the relatively high vapor pressure of the Great Salt Lake.

Because of the surrounding topography, the wind at the TTU is tunneled through the gap in the ridge and varies consistently between either a northeasterly or southwesterly flow. This flow is largely a function of the Great Salt Lake where a lake effect easterly wind will often dominate the synoptic scale westerly wind. The 2011 average daily wind features are shown in Figure 5 in the form of a Wind Rose diagram.

Evaporation rates are high throughout the year, with the Great Salt Lake averaging 66 in. a year. Water balance calculations completed during an evaluation of other UTTR-North facilities (CH2M HILL 1988) indicate that the potential evapotranspiration for the site as calculated by the Thornthwaite Method is approximately 30 in./year; the consistently low precipitation and high evaporation allow little if any percolation into subsurface soils. Table 1 summarizes precipitation and evaporation data typical of Utah's West Desert.

3.3 Geologic and Hydrogeologic Conditions [R315-270-23(b)]

3.3.1 Geologic Setting

The TTU is located in the northern portion of Sink Valley. The Lakeside Mountains border this valley to the east and the Grassy Mountains border the valley to the west. The land forms are typical of the Basin and Range physiographic province, which is characterized by generally north-south trending mountain ranges separated by relatively broad alluvium-filled valleys. The mountain ranges are composed of sequences of mainly carbonate rock. The valleys are generally filled with unconsolidated and partially consolidated sediments of alluvial and lacustrine origin.

The topography of the valley floor is strongly influenced by ancient Lake Bonneville, which completely inundated the area, except for the tallest peaks in the Lakeside Mountains, approximately 15,000 years ago (Currey 1984). The valley is filled with erosional debris washed from the surrounding mountains. Several small intermittent runnels cross the TTU and converge

near the southwest corner. They drain toward the southwest in the central portion of Sink Valley in shallow dry washes that contain flowing water only during infrequent storm events. The northern portion of Sink Valley contains no surface water bodies or surface water outlets.

In the vicinity of the TTU, bedrock in the Lakeside Mountains is assigned to the Great Blue Limestone and Humbug formations. Great Blue Limestone outcrops in areas immediately north and southeast of the TTU area. The Great Blue Limestone is described as a thick-bedded to massive, dark gray limestone containing occasional beds of sandstone, shale, and fossiliferous limestone (Doelling 1980).

3.3.2 Site Geology

The geology beneath the TTU was investigated through two on-site monitoring well borings (TTU-1 & TTU-2). Both boreholes penetrated a significant thickness of alluvial valley fill material. One boring encountered a thick sequence of weathered rhyolitic tuff at a depth of approximately 400 ft, while a second boring remained in valley fill sediments to its total depth of 609 ft (JMM 1990b). In general, two geological units comprise the valley fill sediments. Gravelly deposits are found at the ground surface at elevations above 4,800 ft in the TTU area. These were described as gravel with minor sand, silt, and clay (Doelling 1980). Below the 4,800 ft elevation the surficial soils in the TTU area consist of fine sandy silt with some clay. This finer-grained unit is thought to have been deposited by Lake Bonneville and is described as chiefly clay with silty deposits (Doelling 1980). The gravelly unit is approximately 400 ft thick beneath Sedal Pass, overlaying a volcanic tuff at least 310 ft thick. Beneath the central portion of the TTU there is approximately 20 ft of the silty clay unit overlaying clayey gravels. At this location, the valley fill sediments extend to a depth greater than 610 ft.

The thickness of valley fill sediments was estimated to be approximately 740 ft in the vicinity of Landfill 5 (CH2M HILL 1988). Borings in the vicinity of Landfill 5 penetrated valley fill sediments consisting of gravelly sands, silt, and clays to depths approximately 450 ft below ground surface (bgs).

Cementation in the sediments was identified in the clayey gravel unit. Many of the well boring cutting fragments appeared to have a carbonate cement rind on the surfaces. Cementation was identified at depths below 15 ft near Sedal Pass and at depths greater than 200 ft near the center of the TTU.

3.4 Regional Groundwater Conditions

The regional groundwater conditions for the Sink Valley Hydrogeologic Basin are described in general terms in a hydrogeologic investigation by Price (1970). This investigation describes the north end of Sink Valley as a separate, independent groundwater basin called the North Valley Subdistrict. Additional hydrogeologic information is contained in a Closure/Post-Closure Plan from the installation of six Monitoring Wells at Landfill 5 (CH2M HILL 1988). The locations of these wells are presented in Figure 2.

The principal aquifer within the North Valley Subdistrict is composed of silty sand and gravel deposits in the older (deeper) valley fill. Groundwater in the valley fill occurs under both water table (unconfined) and artesian (confined) conditions. Groundwater quality in the principal

aquifer ranges from 2,000 to 5,000 mg/L of total dissolved solids (TDS). This makes the water supply unsuitable for human consumption without treatment. Groundwater drawn from wells at Oasis (located approximately 5 miles to the southwest of the TTU) is treated by reverse osmosis before it is suitable for human use.

Groundwater quality in the vicinity of Landfill 5 decreases toward the center of the valley. TDS concentrations in excess of 3,000 mg/L were found in wells toward the center of the North Valley Subdistrict, with better quality water found nearer to the mountains and at shallow depths (CH2M HILL 1988). This agrees with Price (1970), which suggests that the concentration of TDS generally increases with depth in the Sink Valley basins.

Recharge to the groundwater systems in the North Valley Subdistrict is slight. One percent of the precipitation that falls in the Sink Valley area contributes to the groundwater system (Doelling 1980). This is attributed to the following:

- The average annual precipitation is generally low throughout the basin.
- The potential for evapotranspiration is high.
- The fine sandy silt and clay lake bed deposits that lie below the 4,800 ft elevation exhibit low-permeability characteristics, tending to inhibit infiltration into the groundwater system.

The recharge that occurs enters the groundwater system along the margins of the adjacent Lakeside Mountains where coarser-grained sediments are present. Precipitation falling on the surrounding mountains probably infiltrates through fractures in the rock and through the coarser-grained sediments at the valley margins.

3.5 Groundwater Conditions Beneath the TTU

While drilling the monitoring well at Sedal Pass (TTU-1), groundwater under water table conditions was encountered at a depth of approximately 650 ft bgs (4205 ft above MSL). Groundwater beneath the central portion of the TTU area (TTU-2) was found in artesian conditions at approximately 504 ft bgs. Approximately 27 ft of artesian head difference was noted from where water was first produced during drilling to where the static water level rose in the completed TTU-2 well. The water level in this well corresponds to an elevation of approximately 4,215 ft above MSL. The elevation of groundwater in monitoring wells in the vicinity of Landfill 5, west of the TTU, were found to vary significantly depending on the well's location and placement of the well's screen. CH2M HILL determined that the shallow aquifer lies at a depth of approximately 419 ft below land surface at Landfill 5. In some wells groundwater occurs under artesian conditions with up to 40 ft of head.

Groundwater flow typically parallels the topography, and groundwater beneath the TTU would be assumed to flow from recharge areas along the flanks of the mountains toward the center of the valley. However, analysis of the groundwater level data appears to contradict this assumption. Historically, groundwater levels measured at TTU-1 are between 5 and 10 feet lower than the groundwater elevation measured in TTU-2. This significant difference between Monitoring Wells TTU-1 and TTU-2 may suggest differences in aquifers (perched versus bedrock). Based on the available data regarding water level elevations, the direction of groundwater flow in the uppermost water bearing zones under the TTU cannot be determined.

3.6 Adjacent Land Use [R315-270-14(b)(19)(iv)]

Since the TTU is contained within the UTTR-North boundaries, all adjacent lands are dedicated to military training and weapons testing. The north and east boundaries are closest to the TTU, at a distance of a little more than 3 miles each. The land immediately surrounding the UTTR-North is predominantly public domain, either administered by the Bureau of Land Management (BLM) or the State of Utah. Portions of it are used for livestock grazing. HAFB maintains a road that passes through the UTTR-North adjacent to the west boundary of the TTU.

3.7 Location Standards

3.7.1 Seismic Considerations [R315-270-14(b)(11)(i) and (ii), R315-264-18(a), and R315-264-1106]

The TTU is located within Box Elder County, in which compliance with the seismic standards of Utah Admin. Code R315-270-14(b)(11)(i) must be demonstrated. There are no known faults present within the TTU, having had a displacement in Holocene time. Likewise, there are no lineations within 3,000 ft of the TTU that suggest the presence of a fault having had displacement in Holocene time (Hecker 1993).

3.7.2 Floodplains [R315-270-14(b)(11)(iii) and R315-264-18(b)]

There are no Federal Insurance Administration maps available covering the TTU. The facility lies outside of the 100-year floodplain based on the following:

- There is no history of flooding in the TTU area.
- The overall drainage gradient for the entire TTU facility is about 4%. The topography is generally smooth and uniform, allowing for no chance of pooling or ponding of flood waters.
- The TTU facilities (Sites 1, 2, 3 and 4) are located in the highest portion of the TTU, which minimizes the area of catchment above the facilities.
- The dry washes that exist are located downgradient from the TTU facilities.
- The TTU facilities are located about 500 to 600 ft higher than the Great Salt Lake.
- There are no on-site barriers or low spots to impede run-off. No significant vesiculation exists that could retain flood waters.
- The entire area is arid and receives less than 6 in. of precipitation per year. The 100-year, 24-hour precipitation event is less than 2.4 in. (Miller 1973).

Surrounding mapped areas are not within the 100-year floodplain.

3.8 Access Controls and Traffic [R315-3-5R315-270-14(b)(10)]

Access to the TTU is by a Box Elder County Road. This road links Interstate 80 on the south to the Lakeside Union Pacific Railroad maintenance complex on the north. This road is paved from the Interstate to the Oasis complex cutoff and improved gravel from there to Lakeside. It has an approximate gross load capacity of 150,000 lb. Access roads from the Box Elder County Road to

the TTU Sites are dirt and gravel. They were constructed with a minimum of 8 in. pit-run road base and 4 in. of 0.75 minus crushed gravel as a cap. This makes a total of 12 in. of compacted road material. The only exception to this is at Site 1 where the road material of 0.75 minus is 6 inches deep.

Three and four-strand wire fences, cliffs, and mountainous terrain provide access control to the TTU. There are seven locked gates surrounding the TTU. The main gate is in the southwest corner and opens onto the Box Elder County Road.

Approximately 80 government or contractor owned or leased vehicles access the TTU each month. Waste munitions are transported to the TTU in a variety of vehicles, the M-35A2 2 ½-ton truck and standard 40-ft long semi-type trailers being the most common carriers. Box Elder County Road and access roads are infrequently used and not subject to congestion or delays. Traffic movement is easily controlled with manned barriers when required.

Security Police stationed at the Oasis compound patrol the UTTR-North, including the TTU on a 24-hour basis. During OB or OD operations at the TTU, in which there is a potential for fragmentation to reach the Box Elder County Road, Security Police or 75 CEG personnel stop all traffic. Additionally, physical barriers and warning signs are placed on roads leading to the TTU.

3.9 Vegetation [R315-270-23(c)]

The overall dominant vegetation in much of Tooele and Box Elder Counties is the desert scrub/salt brush type (BLM 1989). Widely spaced shrubs, totaling approximately 10% ground cover, and sparse grasses represent this community (Cronquist 1972). Dominant shrubs in and around the TTU consist of stunted sagebrush, shadscale, cheatgrass, and other plants and grasses typical of the Great Basin Desert Region. Some rabbit brush and greasewood may be present along the intermittent stream channel that crosses the TTU. The only trees in the vicinity are a few widely scattered junipers in the adjacent Lakeside Mountains (Price 1970).

3.10 Wildlife [R315-270-23(c)]

The TTU facility is located within the year-long range of the Puddle Valley pronghorn antelope herd (BLM 1989). This herd ranges throughout the Sink Valley and surrounding mountains from Interstate 80 north to Lakeside and from the Great Salt Lake west to the salt flats. Because the TTU facility occupies a small portion of the herd's overall range in the Puddle Valley, it has no impact on the health of the herd.

Other wildlife species located in and around the TTU area include the mule deer, black-tailed jackrabbit, mountain cottontail, desert cottontail, and pigmy cottontail. Predatory animals that are found throughout the Great Basin area, and could be present at the TTU, include the kit fox, coyote, and cougar (Weder 1997). A variety of birds, reptiles, and insects are also supported by habitats found in the vicinity of the TTU. Some species that may occur include the townsend's ground squirrel, Ords kangaroo rat, desert wood rat, western harvest mouse, side-blotched lizard, gopher snake, brewer sparrow, mourning doves, and horned lark (BLM 1989). In addition to these resident animals, several raptors are also commonly found in the area. These include the golden eagle, prairie falcon, turkey vulture, red-tailed hawk, ferruginous hawk, and burrowing owl (Weder 1997). There are no resident federally listed threatened or endangered species at the

UTTR-North TTU (Lawrence 2012). Additionally, 75 CEG/CEIE maintains a complete inventory of UTTR natural resources.

4.0 References

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TABLE 1
 Summary of Precipitation and Evaporation Data

Precipitation^a for Dugway, Utah, 1948-1992^b (inches)													
	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Max. 24 hour	0.79	0.84	2.84	0.95	0.96	1.15	1.11	1.01	1.17	1.02	0.95	0.71	2.84
Maximum	1.54	1.58	4.86	1.95	2.96	2.46	1.89	1.89	3.16	2.00	1.48	2.33	15.07
Mean	0.48	0.55	0.73	0.80	0.70	0.76	0.35	0.51	0.44	0.50	0.51	0.60	6.86
Minimum	T ^c	0.010	T	0.08	0.04	0.00	T	T	0.00	0.00	T	T	3.27

Pan Evaporation^a at Saltair, Utah, 1956 to 1964^d (inches)							
Year	May	June	July	August	September	October	Total for May-October^e
1956	8.31 ^f	12.93 ^f	15.52	13.78	9.77	5.83 ^f	66.14
1957	8.07	11.75	14.62	14.16	9.14	4.78	62.52
1958	11.49	14.39	15.38	13.28	9.93	6.37	70.84
1959	8.71	12.95	14.12	12.94	8.09	4.94	61.75
1960	10.34	13.65	16.16	13.11	9.76	5.29	68.31
1961	11.07	14.94	14.89	13.04	8.48	5.41 ^f	67.83
1962	9.10	12.44	13.93	14.33	9.70	8.83 ^f	68.33
1963	9.84	10.17	16.90	13.88	8.10	6.61	65.50
1964	9.12	9.58	15.85	13.10	9.97	5.36	62.98
1965	8.73 ^f	10.51	14.46	11.54	7.18	4.77	57.19
1966	12.03	18.13	17.35	13.54	9.49	4.61	75.15
						Average	66.05

^aAll evaporation data were adapted from Price (1970) and precipitation data from the International Station Meteorological Climate Study Summary.

^bDugway, Utah is approximately 62 miles south of the TTU.

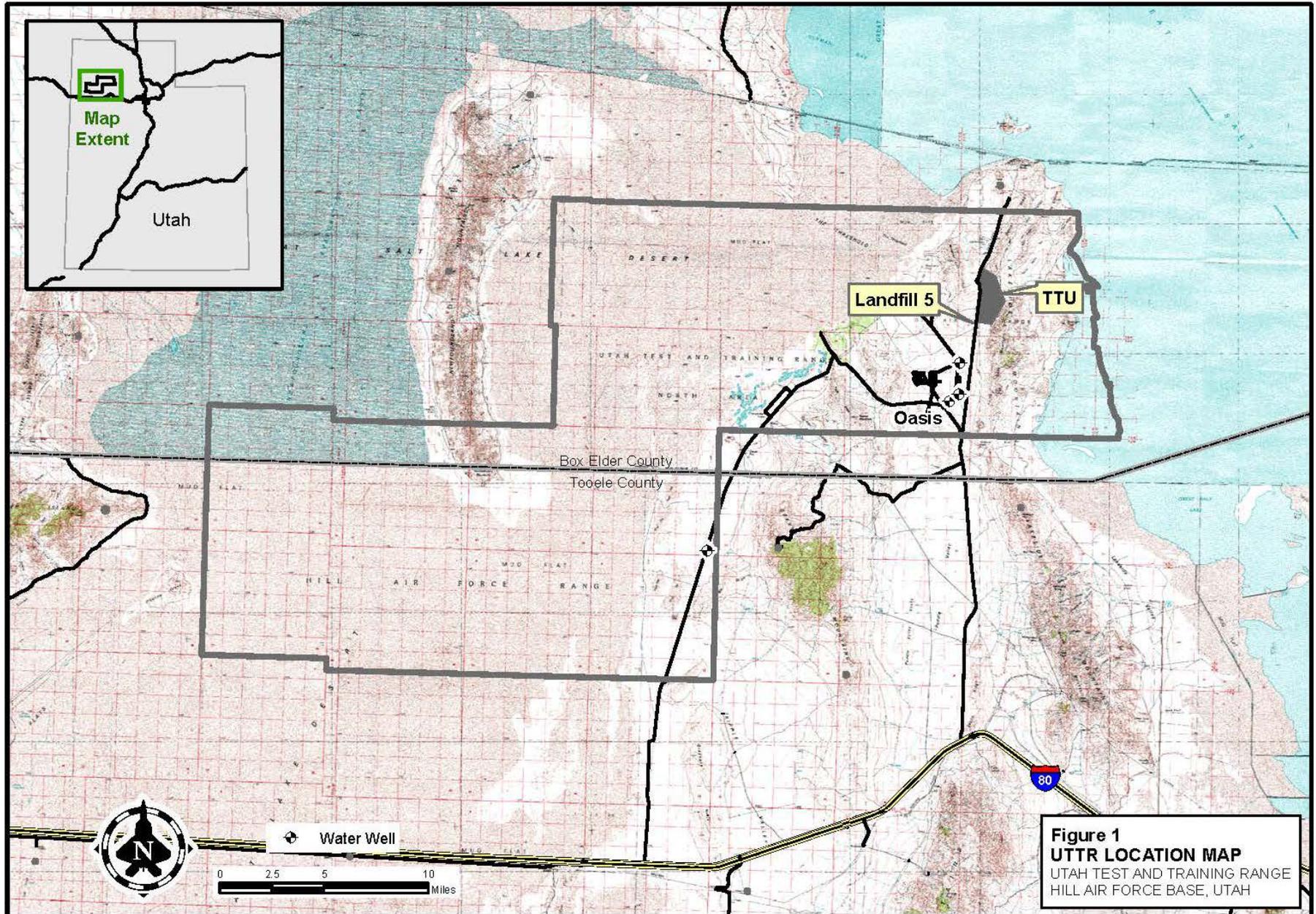
^cT indicates Trace.

^dSaltair, Utah is approximately 45 miles southeast of the TTU, located on the south shore of the Great Salt Lake.

^eMay-October evaporation is estimated to be 80% of annual; therefore, average annual pan evaporation is about 83 in. Estimated evaporation from a free water surface is 70% of pan evaporation, or about 58 in.

^fPartial monthly report adjusted to a full month.

1-12



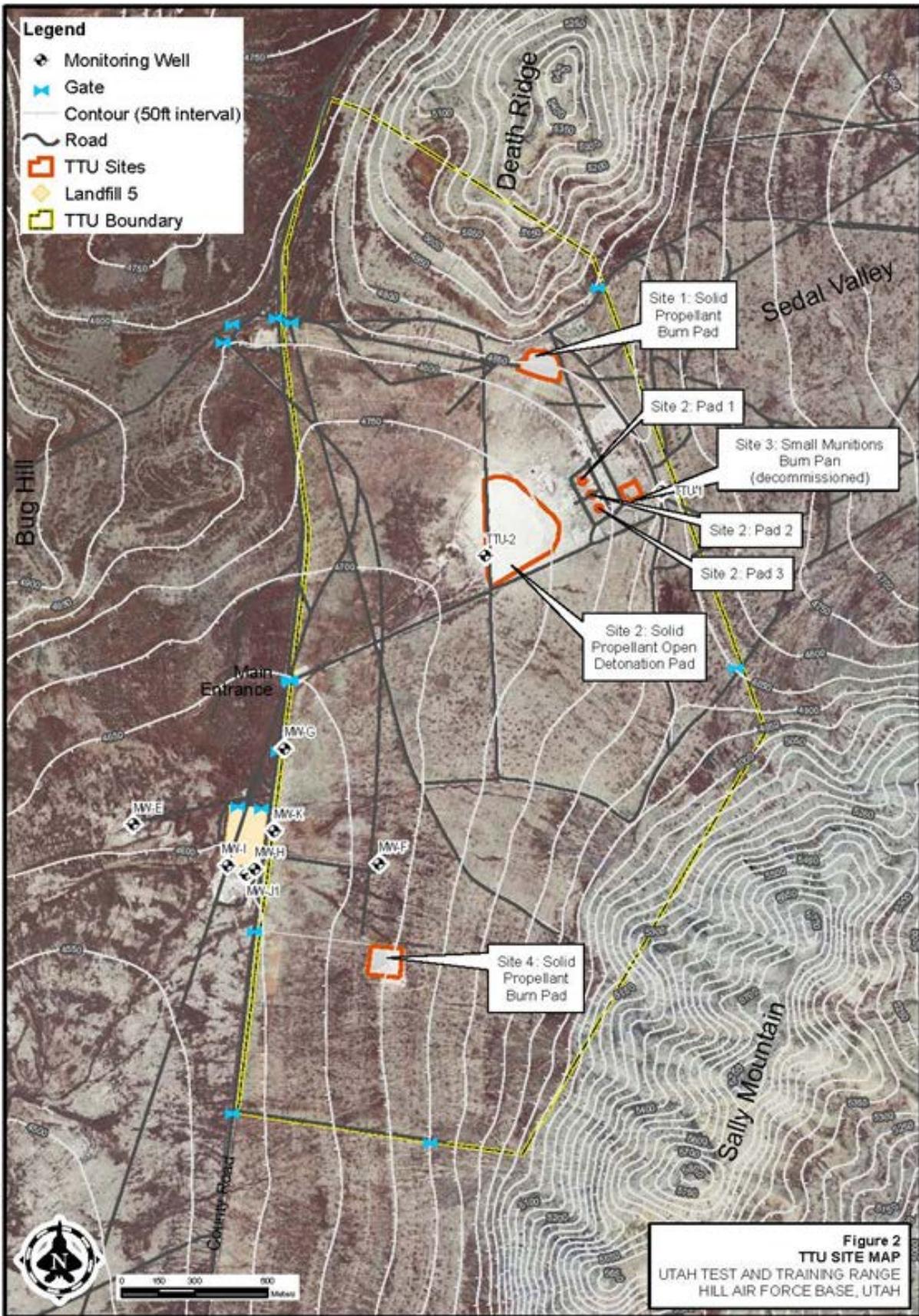




Figure 3. TTU Photos (Front gate and Sites 1 and 2)

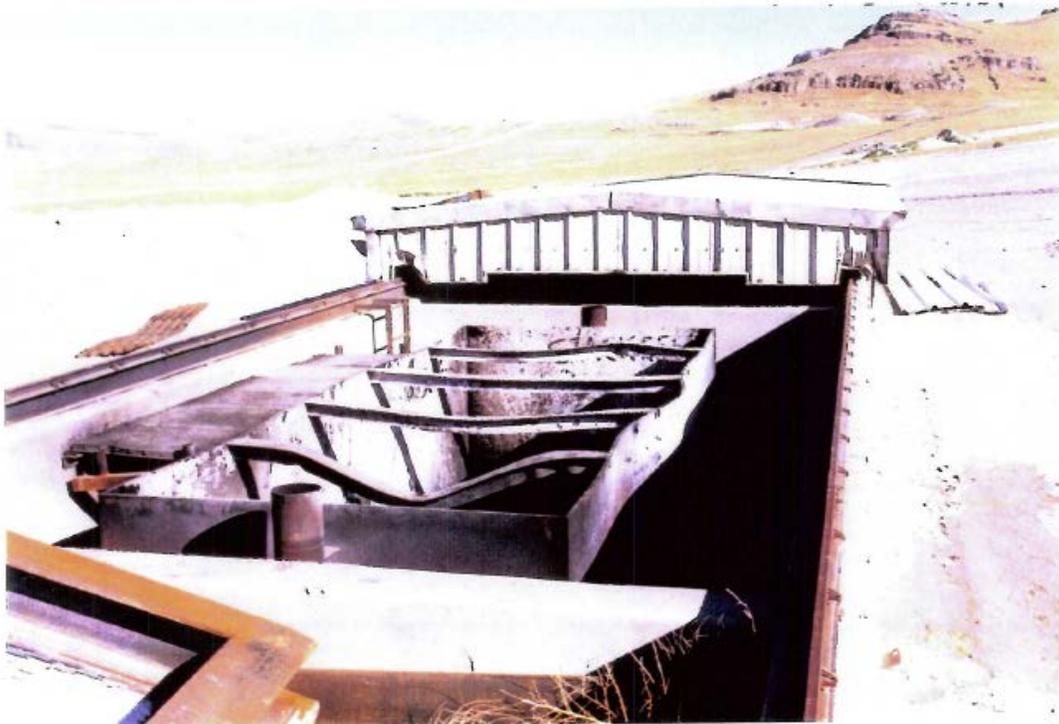


Figure 3 Continued. TTU Photos (Site 4 and former burn pan [Site 3])

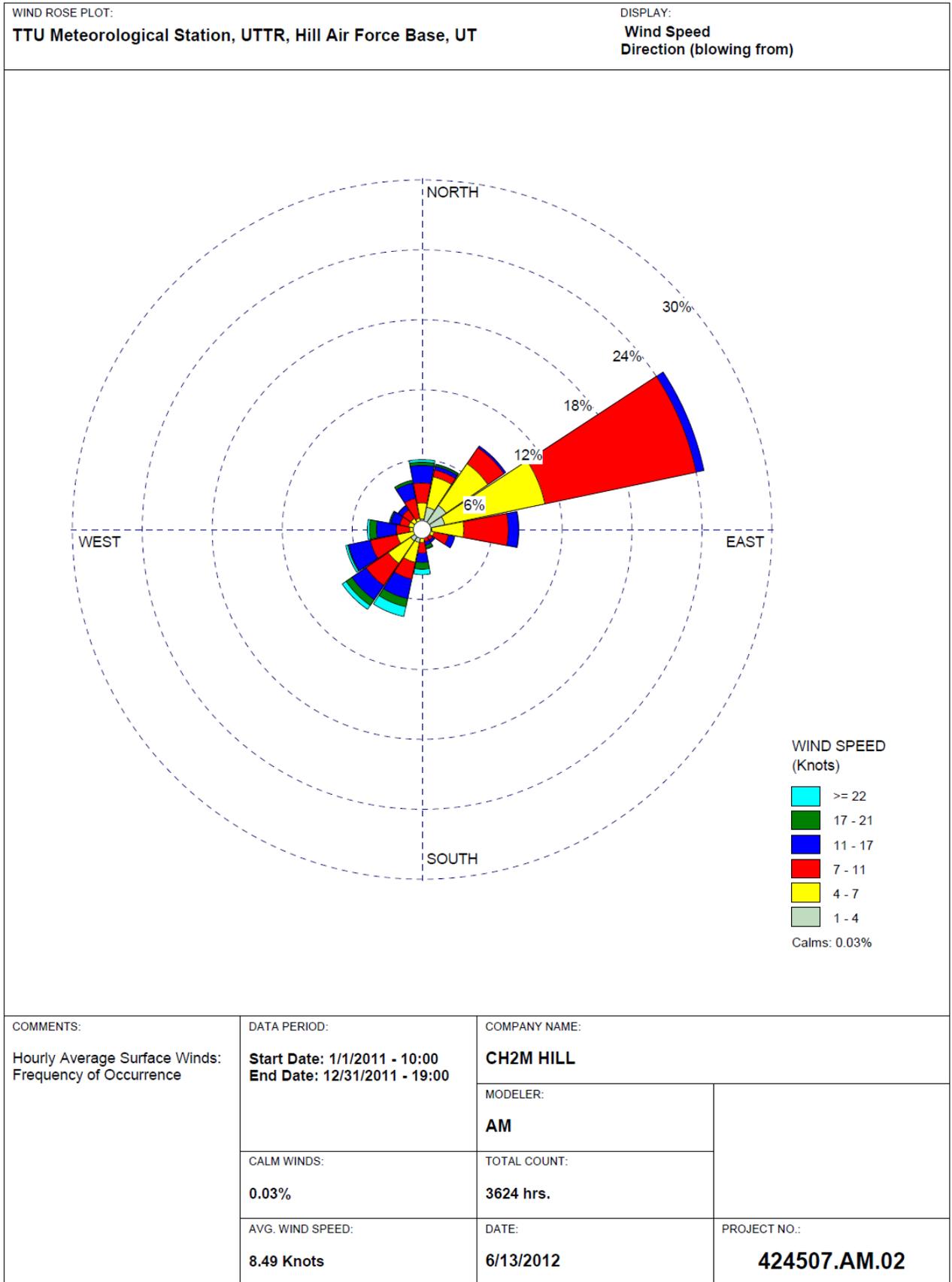


Figure 4. 2011 wind data from the TTU weather station.