United States Department of the Interior

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In Reply Refer to:
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Memorandum

To: Regional Director, Region 1
Portland, Oregon

From: Assistant Regional Director, Budget and Administration, Region 1
Portland, Oregon

Subject: Action Memorandum for a Non-Time Critical Removal Action at Midway Atoll National Wildlife Refuge, Sand Island

Section 1.0: PURPOSE

The purpose of this Action Memorandum is to authorize actions necessary to protect public health or welfare or the environment by selecting a removal action addressing lead-based paint on structures and lead-contaminated soil at the Midway Atoll National Wildlife Refuge ("Refuge," "Midway," or "the Site"), Midway Island. A removal action is an action taken to address a release or threatened release of hazardous substances.

The proposed non-time critical removal action (NTCRA) will consist of abatement of the exterior lead on site structures and excavation of site soils around structures that contain lead at concentrations above a preliminary cleanup goal (PCG) of 75 mg/kg. Excavated soil and debris will be disposed of using ex-situ soil stabilization methods in a consolidation unit. The excavated sites will be back-filled with clean material and the sites will be restored. The proposed action is expected to provide a long-term, effective remedy that will reduce potential risks to ecological health. The PCG was developed to prevent potential exposure of birds to lead-contaminated soil at levels that would impair the birds.

The proposed removal action for this site is deemed appropriate pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. § 9601 et. seq. (CERCLA), and is not inconsistent with the factors set forth within the National Contingency Plan (NCP), 40 C.F.R. § 300.415(b) (2).

Section 2.0: SITE CONDITIONS AND BACKGROUND

2.1: Site Description and Background

Midway Atoll consists of three islands and a lagoon, enclosed by a circular coral reef approximately six miles in diameter surrounded on all sides by the Pacific Ocean. The largest island, Sand Island, has an area of about 1,100 acres and a permanent population that varies from 30 to 100 people. Eastern Island has an area of about 334 acres and has been uninhabited since 1970. Spit Island is an ephemeral sand spit with a current area of approximately 14 acres, and has never been inhabited. The Refuge is a United States possession located in the northwest end of the Hawaiian Islands archipelago, approximately 1,250 miles northwest of Oahu, Hawaii. The first permanent buildings on Sand Island were constructed in 1903 by the Commercial Pacific Cable Company for a relay station and employee housing for the trans-Pacific undersea telegraph cable. The cable station complex, consisting of the site and five remaining buildings, was determined to be eligible for listing on the National Register of Historic Places in 1980. Midway Atoll was placed under the control and jurisdiction of the U.S. Department of Navy (Navy) in 1903, in part to protect the cable station. The island was a strategic military location for both aviation and submarine bases, especially during World War II (WW II). The WW II facilities were listed on the National Register of Historic Places in May, 1987.

The Refuge was established as an overlay refuge in 1988 and was managed in coordination with the Naval Air Facility (NAF) Midway Island until October 1996 when control and jurisdiction was transferred to the U.S. Department of the Interior (DOI), for management by the U.S. Fish and Wildlife Service (Service), beginning on June 30, 1997.

The property and structures at Midway transferred to the Service included over 133 structures, of which 95 contained multiple layers of lead-based paint (LBP) on interior or exterior walls. Deterioration of these buildings over time has resulted in lead-based paint chips and residues throughout Sand Island with high concentrations of chips and residues immediately surrounding certain buildings. In addition, numerous buildings and structures that were previously demolished by the Navy prior to the Service management also contained lead-based paint. All Service operational facilities are located on Sand Island.

2.1.1: Removal Site Evaluation

Numerous environmental investigations and response actions have been performed across Sand and Eastern Islands. Much of this work occurred during the transfer of Midway from the Navy to the Service. The majority of the work was completed by Ogden Environmental and Energy Service (Ogden) and OHM Remediation Services Corporation (OHM). The following is a brief summary of previous investigations that have focused on lead contamination:

- **Lead in Soil Research** – Death of Laysan albatross nestlings (chicks) from LBP around buildings at Midway Atoll was first officially documented based on research that began in 1983 that was published in the 1987 Journal of Wildlife Disease (Sileo et al., 1987).

- **Lead-Based Paint Survey** - In 1994, Ogden completed a LBP and asbestos containing material (ACM) survey of all structures on Eastern and Sand Islands. The Ogden report indicates that as many as 85 percent of the structures on Sand Island contained LBP (Ogden, 1994).

- **Lead Exposure in Laysan Albatross Adults and Chicks** – Laysan albatross adults and chicks were sampled from 1993 through 1995 and found to have elevated lead levels. Laysan albatross chicks were found to have LBP chips in their stomachs and have high blood lead levels; "Laysan Albatross adults had minimal to no lead exposure" (Work et al., 1996 and 1998).

- **Comprehensive Long-Term Environmental Action Navy (CLEAN)** – The Base Realignment and Closure (BRAC) Cleanup Plan provided a summary of the environmental status of NAF Midway Island as of 1996 (Ogden, 1997a). The BRAC Cleanup Plan covered a number of contaminant issues, with limited discussion of LBP in soil. The BRAC Cleanup Plan did provide a summary of buildings with LBP and noted that the background level of lead in surface soils had a median concentration of 6.28 milligrams per kilogram (mg/kg) with a maximum concentration of 105 mg/kg. For subsurface soils, the median was 0.4 mg/kg with a maximum concentration of 171 mg/kg (Ogden, 1996). The BRAC Cleanup Plan summarized the results of Ogden's Site Investigation Report dated January 1996 (Ogden, 1996) and Ogden's Remedial Investigation (RI) report dated, March 1997 (Ogden, 1997b).

- **Year 2000 and 2001 Investigations** – A study conducted in 2000 and 2001 found isotopic agreement between lead in blood and LBP chips and showed that lead-containing paints from decommissioned military buildings on Midway serve as a significant source of lead poisoning to Laysan albatross. The route of exposure to lead poisoned birds was primarily through direct ingestion of LBP chips and not from lead contaminated soil (Finkelstein et al., 2003).

- **Year 2004 Investigations –** The cost to abate LBP and ACM, both inside and outside of buildings, and restore 35 selected buildings for Service use, was estimated to be $26 million. An additional $29 million would be needed for demolition of the remaining unwanted buildings. Consultants recommended that any debris with LBP and ACM be disposed of on-island, to reduce costs, and capping that debris with 12 inches of asphalt grindings and 12 inches of soil (Finkelstein, 2004).

  The Service estimated in 2004 that it would cost approximately $5.6 million to abate the LBP from 95 contaminated buildings. This would include removal of LBP and encapsulation of the buildings, shipping the LBP chips off Midway, excavating contaminated soil and backfilling with clean soil, storing the contaminated soil in the old concrete lined R2 water tanks, and capping it with a synthetic liner (USFWS, 2004a).

  The Service estimated that approximately 6,670 Laysan albatross chicks may be affected or die each year at Midway due to LBP (USFWS, 2004b). The estimate was based on limited surveys of the buildings and the following assumptions:

1) Average size of a building at Midway is 82 feet x 82 feet.
2) Soil contamination extends outward from each building's foundation by 16 feet (Finkelstein et al., 2003).
3) All chicks within 16 feet of buildings ingest paint chips.
4) Average Laysan albatross nesting density around buildings is 478 nests/acre.

- **Year 2006 Investigations** – In May 2006, Finkelstein estimated that as many as 10,000 Laysan albatross per year were potentially exposed to lethal levels of lead from the ingestion of LBP from deteriorating buildings and structures on the island (Finkelstein, Midway Update 2006). The number of chicks affected per year by lead poisoning was estimated using three different measurements:

  1) Initial surveys of lead-poisoned chicks in 2001 (Finkelstein et al., 2003).
  2) A survey of 41 buildings on Sand Island in May 2006 to estimate the number of chicks with nests close to buildings (Finkelstein, Midway Update 2006).
  3) An estimate of the number of chicks per hectare based on annual nest surveys and the proportion of the island habitat potential affected by lead-based paint from buildings.

  Finkelstein's 2006 estimate was slightly higher than the Service 2004 estimate, but was derived from more intensive surveys and included chicks located within a distance of 15 meters of buildings. The report noted that the actual number of chicks affected by LBP will vary from year to year based on the number of albatross that nest in a particular year (Finkelstein, 2006).

- **Year 2007 Investigations** – Refuge staff performed a survey of droopwing Albatross chicks around a portion of the buildings containing LBP at the Site during 2007. The objectives of this survey were to:

  1) Determine the frequency of Laysan albatross chicks affected by LBP around buildings on Sand Island.
  2) Determine if the frequency of droopwing albatross chicks has declined on Sand Island from 2006 to 2007 due to LBP remediation.

  Laysan albatross chicks with severe droopwing were only observed around buildings with LBP. The frequency of droopwing chicks observed during a nearly identical survey on Sand Island in 2006 by Finkelstein (2006) was more than twice that of this 2007 survey (15 percent versus 6.1 percent). The apparent decline in the frequency of droopwing chicks may have occurred because LBP was removed from nine of the survey buildings (22 percent) between August 2006 and February 2007. However, the apparent decline may have been biased, because the 2007 survey occurred 4 weeks later in the year compared to the 2006 survey (June 21 through 23, 2007 verses May 19 through 23, 2006). There was a possibility that more droopwing chicks were actually present in 2007, but died before the survey took place (Klavitter, 2007).

- **Year 2009 Investigations** – The Service completed an Ecological Risk Assessment (ERA) to assess risks posed by lead in soils at the Site to ground nesting seabirds on Sand Island (USFWS, 2009). Mean lead concentrations from soil around buildings ranged from 30 mg/kg (Building 4210, residential duplex) to 1,183 mg/kg (Building 342, paint and oil storage).

  Blood lead levels were reported for 103 Laysan albatross chicks that were located around buildings. Blood lead levels ranged from <3 micrograms per deciliter (ug/dL) to >65 ug/dL (the maximum detectable limit). The authors compared these blood levels to threshold levels of 20 ug/dL, 100 ug/dL and 500 ug/dL which were obtained from a summary paper by Franson (1996) and correspond to the following physiological effects:

  1) 20 ug/dL = subclinical, physiological effects only, bird would likely recover if exposure were eliminated,
  2) >100 ug/dL = toxic, severe physiological effects, leading to clinical signs of toxicity or death if exposure were not eliminated, and
  3) >500 ug/dL = compatible with death.

  Approximately 33% of the birds had concentrations associated with toxicity in sensitive avian species.

- **Years 2010 - 2011 Investigations -** A Preliminary Assessment/Site Inspection (PA/SI) was completed in June 2010. The Service concluded that ongoing deterioration of abandoned buildings and insufficient maintenance of existing buildings could continue to add lead contamination to Sand Island. Although elevated lead concentrations occurred primarily at shallow depths, it was observed at deeper depths in some locations. Some locations with little or no elevated surface concentrations of lead had high subsurface concentrations.

  Laysan albatross chicks located within five meters of a building known to have lead contaminated soil are at a higher risk of lead poisoning than chicks located in areas with less lead contamination in the soil. These contaminated soils pose continued risk to chicks if left in place.

  Based on the findings of the PA/SI, the Service concluded that hazardous substances have been released, as defined in Section 101(22) of CERCLA, and there is a substantial threat of ongoing and future releases into the environment at Midway Atoll that pose an imminent and substantial threat to the public health or welfare, and/or the environment, and a removal action is appropriate to address the lead contamination. An Engineering Evaluation/Cost Analysis (EE/CA) was proposed to further delineate the nature and extent of the release or threatened release of lead contamination at the Refuge, and to develop and evaluate various removal action alternatives under Section 300.415(b) (4) of the National Contingency Plan (NCP).

  The EE/CA was completed in January 2011. The analysis performed in the EE/CA provided a basis for selecting a CERCLA NTCRA to address the release and substantial

threat of release of lead contamination at the Refuge. The Streamlined Risk Evaluation that was completed for the EE/CA recommended a PCG for soil lead concentrations of 75 mg/kg. The PCG was selected based on multiple lines of evidence including:

1) A dietary lead/blood lead correlation.
2) An avian exposure model.
3) An evaluation of existing soil lead/avian blood lead data.

2.1.2: Site Location

The Refuge is located in the Northwestern Hawaiian Islands at 28°12’35’’ North latitude and 177°22’47’’ West longitude, approximately 1,250 miles northwest of Oahu, at the northwestern end of the Hawaiian Island chain (Figure 1). Due to the remote location, the Refuge operates self-sufficiently as a small town. Only one flight per week lands on Midway bringing supplies and visitors. A barge brings additional supplies twice a year.

The Service facilities consist of an airfield, single and multi-unit residences, dining and recreational facilities, and support facilities. A layout of Sand Island is shown in Figure 2.

2.1.3: Site Characteristics

The surface of Sand Island consists of a variety of open spaces, grassy areas, buildings, concrete and other surface improvements. The majority of the Site is relatively flat with little topographic relief.

The climate on Midway Atoll is subtropical. Temperatures range from about 50 degrees Fahrenheit (°F) to 100°F, and average about 73°F. Temperatures below 60°F or above 85°F are rare regardless of season or time of day. East-northeasterly trade winds predominate from March through November. During the rest of the year, the trade-wind pattern is often interrupted by cyclonic winter storms. Winds average about 10 miles per hour and range up to about 60 miles per hour. Humidity is usually relatively high, with dew point temperatures ranging from 34 to 82°F and averaging 73°F.

Precipitation normally occurs as rain, ranging from mist to moderately intense. Total monthly rainfall ranges up to about 7.5 inches. Average annual rainfall is approximately 25 inches.

No active streams are present on either Sand or Eastern Islands. Nine freshwater seeps were excavated to create habitat for the (successful) translocation of Laysan Ducks in 2004.

The atoll is underlain by hundreds of feet of limestone, a result of millions of years of reef building by coral colonies. A test boring drilled in 1965 on Sand Island penetrated 516 feet of limestone to reach olivine basalt (Ladd, 1970). Another test boring in the lagoon reached basalt at 1,261 feet. The basalt is the result of volcanic eruptions similar to the ongoing eruptions that continue to build the islands of Hawaii. Midway is near the northwestern end of a line of islands and seamounts (submerged islands) that extend eastward to the island of Hawaii. The further westward from Hawaii, the older are the islands and seamounts. Over time, the islands subsided

beneath sea level, and coral reefs that began to fringe the islands eventually became atolls and shoals as their volcanic bases sank deeper.

The average elevation of Sand Island is 10 feet above mean sea level (amsl), with the highest point at 39 feet amsl. Eastern Island is even lower in elevation with 12 feet amsl as the highest point. The proximity to sea level makes the islands susceptible to events such as storm surges and tsunamis. The tsunami events following the earthquake in Japan on March 11, 2011 swept completely over parts of Eastern Island and inundated Sand Island several times.

Soils to the maximum depths explored consist of calcareous sands with varying amounts of silt and gravel. The uppermost 6 inches of soil typically contains significant amounts of organic debris from vegetation and guano.

During a previous investigation by GeoEngineers, (GeoEngineers, 2004) soil samples were analyzed for total organic carbon (TOC), soil moisture content and specific gravity. Soil moisture content ranged from 2.8 percent to 22 percent, and TOC ranged from 0.09 percent to 3.9 percent. In addition, the porosity of Site soils was calculated and ranged from 34.3 percent to 37.3 percent. Using the Unified Soil Classification System (USCS), the soil is described as brown-tan poorly graded clean coral sand.

Groundwater beneath Sand Island occurs in a thin, biconvex, basal lens of fresh to brackish water that is in dynamic equilibrium with the underlying seawater. The thin groundwater lens occurs approximately 6 to 8 feet below the ground surface and flows towards the shore where it discharges into the ocean, although the gradient and flux are small. Saltwater intrusion from the surrounding ocean causes the shallow groundwater to be brackish; though percolating rain water tends to freshen the uppermost portion of the aquifer. Salinity decreases with distance from the nearest shoreline.

Water supply for Sand Island is currently obtained by collecting rain in catchment systems. In the past, a salt water desalination system provided water for housing and fire protection, and brackish groundwater was used to augment the catchment system when catchment levels were low. The brackish water and desalination systems have both been abandoned for many years. The only current use of groundwater on Sand Island is to supply water to wetlands created for Laysan ducks. It is unlikely that groundwater will be used in the future for any other purpose (especially drinking water), because rain water catchment is a more than adequate source for the small human population that is expected to be residing on Sand Island for the foreseeable future.

Midway is characterized by flora consisting of ironwood trees (*Casuarina equisetifolia*) and other vegetation, including various forbs, grasses and shrubs, (e.g., bunch grass, *Eragrostis variabilis*), most of which have been introduced. Birds common to this area include Laysan and Black-footed Albatross (*Phoebastria immutabilis and Phoebastria nigripes*, respectively) and Bonin Petrel (*Pterodroma hypoleuca*) in addition to other shorebirds and seabirds. Midway is home to the largest colony of Laysan Albatross, consisting of 71% of the world's population and provides a unique habitat for both threatened and endangered and other species.

2.1.4: Release or Threatened Release into the Environment of a Hazardous Substance or Pollutant or Contaminant

As previously stated, studies conducted by the Service and others at Sand Island between the late 1980s and 2009, have shown that Laysan albatross chicks exhibited symptoms of lead toxicity and that their exposure is likely related to ingestion of LBP chips and soil contaminated with LBP chips, which the birds often pick up and place into their nests (FWS, 2009). Based on these reports, existing information concerning the release or threatened release of hazardous substances, pollutants, or contaminants at the Refuge was compiled in a PA/SI report.

The Service concluded in the PA/SI that there is evidence of hazardous substances (lead) being released into the environment and these substances have affected the ecological receptors from direct exposure to lead contaminated soil. The PCG is recommended to prevent lead contamination from causing toxicity to bird species on Midway.

The primary source of lead in soil is the LBP used on the current and historical structures on Midway. Paint chips from these structures have high levels of lead and are present in the soil where the Laysan albatross nests are located.

A review of current activities indicates that ongoing deterioration of abandoned buildings and lack of maintenance of existing buildings could continue to add lead contamination to Sand Island.

2.2: Other Actions to Date

The following sections outline the site-specific activities that have been conducted in the past and/or are being conducted at the present time at Midway.

2.2.1: Previous Actions

- In 2003, the Service installed plastic fencing from ground level to the second floor balcony around the five Cable Buildings to prevent albatross chicks from walking inside of the Cable Buildings to ingest LBP chips. The fencing prevented adults and chicks from entering the building, but most chicks continued to exhibit lead poisoning signs (droopwing) around the buildings.

- In July 2004, the Service attempted to mitigate LBP by placing shade cloth near buildings. Shade cloth was installed on the ground in a swath extending outward 3 meters around each building foundation with peeling LBP to prevent Albatross nesting from occurring in proximity to LBP flakes that could be ingested by chicks (USFWS, 2004b). The felt shade cloth degraded from rain and sunlight within 12 months and was found to be ineffective at preventing LBP poisoning in albatross chicks.

- In 2005, the Service installed a woven plastic shade cloth extending outward 3 meters around 22 buildings known to have high levels of LBP. The Service planned to use backpack vacuums to remove LBP chips (that fall off the buildings) from the cloth twice

a year. The shade cloth seemed to slightly lower the number of chicks affected by LBP at the buildings where it was installed. However, high winds made it difficult to keep the shade cloth secured to the ground and caused the edges of the shade cloth to unravel, which entangled birds. The entanglements were unacceptable and the shade cloth was replaced with a better material or was better secured by the summer of 2006. The shade cloth continued to be problematic and was removed by March 2007.

- In October 2006, the Service began LBP remediation (removal of leaded paint). By January 2007, LBP had been removed from six buildings (Parachute Building, Electric Shop, Transportation Building, Carpentry Shop, Metal Shop, and Dry Storage). The Electric Shop, Transportation building and Dry Storage building were repainted with an environmentally friendly lead encapsulating product.

- Between February 2007 and October 2008, LBP was removed from or encapsulated on the following buildings: Paint Shop, SKI Warehouse, 4208, 4209, 4210, 4211, 414, 323 Sewer Building, and Charlie Barracks, bringing the total number of buildings remediated to 16.

- In 2009, the Service received American Recovery and Reinvestment Act (ARRA) funding to restore seven buildings (Officer Quarters 417, 418, 419, 421, 422, 423 and 424), which included the total removal of all LBP from the interior and the encapsulation of all LBP on the exterior. Exterior LBP from homes 415 and 416 was also encapsulated. In addition to the buildings above, exterior LBP from the Nuclear Test Ban Treaty building and the TV satellite building were encapsulated, bringing the total number of buildings remediated to 26.

- A time critical removal action (TCRA) was completed in April 2011. From 2005 to February 2010, the Service remediated 26 of the 95 buildings containing LBP. On April 14, 2011, the Service shipped 16 conex boxes loaded with ACM waste, lead hazardous waste, and lead contaminated construction debris generated as a result of these remediation activities from Midway Atoll NWR to Honolulu, HI and the Continental United States. This TCRA resulted in the transport and disposal of 17 tons of asbestos waste and 85 tons of lead hazardous waste and lead contaminated construction debris previously stored at the Midway Atoll NWR.

2.2.2: Current Actions

The January 2011 EE/CA, described in greater detail in Section 5.3, includes an evaluation of clean-up alternatives and a recommended alternative for a CERCLA NTCRA addressing the release and substantial threat of a release of lead at the Refuge. The EE/CA identifies and evaluates removal action alternatives according to three criteria: effectiveness, cost, and ability to implement.

Analysis in the EE/CA divides the Site into nine Decision Units, (demarcated on Figure 2), allowing the Service to prioritize remediation activities at the areas presenting the highest threats and in the most cost-effective manner. The Decision Units include:

- Decision Unit 1 – Buildings 619, 623, 626, 628, 643 (Cable Buildings) and the soils surrounding the structures.
- Decision Unit 2 – Buildings 578, 579 (Marine Barracks) and the soils surrounding the structures.
- Decision Unit 3 – Building 4203 (Bachelors Office Quarters [BOQ] Bravo Barracks), Building 4212, and the lead contaminated soil in the vicinity of Buildings 4203, 4204, the Officers Quarters buildings 415, 416, 417, 418, 419, 421, 422, 423 and 424, residential duplexes including buildings 4209, 4210, 4211 and 414. The exterior LBP has been removed and/or encapsulated for all the buildings in this Decision Unit, except Building 4203 and 4212.
- Decision Unit 4 – Building 259 (Midway Mall), Building 2403 and 2404.
- Decision Unit 5 – Building 5309 (the former Transmitter building) and 5303 (R2 Unit)
- Decision Unit 6 – Buildings 393 (SKI warehouse), 342 (hazardous materials storage), 356 (Transportation shop), 357 (Machine shop), Building 353 (Carpenter shop), 349 (Cold storage), 363 (Torpedo shop/recycling) and 151 (Seaplane Hangar).
- Decision Unit 7 – Building 331 (Medical Clinic/offices), 3502 (Galley), 3503 (Barracks C), 3504 (Barracks D) and 3512 (Gymnasium).
- Decision Unit 8 – Fuel storage tanks located at the old fuel farm.
- Decision Unit 9 – The remaining structures that are in use at the Refuge (except for the above ground water tanks near the airport that will be painted with lead-encapsulating paint by another contractor), and the remaining contaminated soils. This Decision Unit is broad based and includes the remaining buildings, storage buildings, pump houses, lift stations and other ancillary structures. There are at least 44 buildings and a number of ancillary structures (memorials, lift stations, electrical substations, flag poles, hydrants, etc.) that have been painted with LBP. Soil around these structures will be sampled as part of the Removal Action Work Plan.

Based on analytical results, the Decision Units with the highest potential to affect wildlife are Decision Unit 1, Decision Unit 6 and Decision Unit 2. The following is the ranking of risk for the Decision Units:

1. Decision Unit 1
2. Decision Unit 6
3. Decision Unit 2
4. Decision Unit 4
5. Decision Unit 7
6. Decision Unit 5
7. Decision Unit 3
8. Decision Unit 8
9. Decision Unit 9

2.3: State and Local Authorities' Roles

Pursuant to CERCLA § 104(a), whenever a hazardous substance is released, or there is a substantial threat of such release into the environment, a removal action consistent with the NCP may be undertaken, if, at the discretion of the lead agency, such action is necessary to protect public health or welfare or the environment. Pursuant to Executive Order 12580, as amended, DOI is the "lead agency," as that term is defined by the NCP, with respect to releases of hazardous substances on or solely from land under the jurisdiction, custody, or control of the Department. This authority has been delegated by the Secretary of the Interior to the Service with respect to land under the jurisdiction, custody, or control of the Service.

All response actions or other activity at this Site will be consistent with 40 CFR Part 300. Prior to making a final decision abating lead paint on the Commercial Pacific Cable Company buildings at Midway, the Service will consult with the Hawaii State Historic Preservation Division (SHPD) as described in a June 2009 memorandum of agreement (MOA) with the SHPD.

Section 3.0: THREATS TO PUBLIC HEATH OR WELFARE OR THE ENVIRONMENT AND STATUTORY AND REGULATORY AUTHORITIES

3.1: Threats to Public Health or Welfare or the Environment

Previous reports have documented clinical lead toxicity in albatross chicks on Sand Island (Sileo and Fefer 1987, Sileo et al. 1990, Work and Smith 1996, Burger and Gochfeld 2000(a, b, c), Finkelstein et al. (2003). This occurs through incidental ingestion as chicks pick up contaminated material such as lead paint chips in their mouths to put in their soil cup nests. In addition, Finkelstein et al. (2003) looked at the relationship between lead in the soil, lead paint chips and albatross exposure. Through isotope analysis, it was concluded that lead paint chips were a primary source of lead to the chicks. Both small and large particles are consumed during this activity.

The above mentioned reports have documented that lead levels in some Laysan albatross chicks on Midway are so high that it damages their peripheral nervous systems, leading to a symptom known as "droopwing." The chicks are unable to hold their wings tucked up against their bodies, and their wings often drag on the ground. It is a classic symptom of lead poisoning, comparable to the 'wrist drop" symptom in humans. Chicks experiencing lead toxicity severe enough to result in droopwing may survive as long as their parents are feeding them, but once they reach the fledgling stage and their parents leave, they will starve because they can't fly to obtain food. According to refuge staff, Laysan albatross chicks with droopwing are common around the buildings on the island. It is estimated that approximately 6,670 Laysan albatross chicks are affected each year. This number indicates approximately 1.5% of Midway's chicks are affected annually (Klavitter 2004).

In summary, studies conducted by the Service and others at Sand Island between the late 1980s and 2011, have shown that Laysan albatross chicks exhibited symptoms of lead toxicity and that their exposure is likely related to ingestion of LBP chips and soil contaminated with LBP chips, which the birds often pick up and place into their nests (Service, 2009). The studies evaluating lead toxicity to the Laysan albatross have identified lead-induced damages to the birds'

peripheral nervous systems, leading to a syndrome known as droopwing, where chicks are unable to retract their wings, which often drag on the ground (Service, 2009).

3.2: Statutory and Regulatory Authorities

The Service has the authority to undertake CERCLA response actions, including removal actions, under 42 U.S.C. § 9601 et.seq., the NCP, and Federal Executive Order 12580.

The Service conducts removal actions in accordance with CERCLA, the NCP, and United States Environmental Protection Agency (U.S. EPA) and DOI guidance. The NCP requires the lead agency to take any appropriate removal action to abate, prevent, minimize, stabilize, mitigate, or eliminate the release or threat of release, where the lead agency determines such action is necessary based on enumerated factors in the NCP at 40 CFR 300.415(b)(1). The U.S. EPA has categorized removal actions in three ways: emergency, time-critical, and non-time critical based on the type of situation, the urgency and threat of the release or potential release, and the subsequent timeframe in which the action must be initiated. In this case, the Service has initiated a NTCRA in response to lead-based paint on existing structures and lead-contamination in the soil, which currently pose an imminent and substantial threat to the public health, or welfare, or the environment.

Section 4.0: ENDANGERMENT DETERMINATION

The Service has concluded that hazardous substances have been released at the Refuge, as defined in § 101(22) of CERCLA, 42 U.S.C. § 9601(22). There is a substantial threat of ongoing and future releases of lead into the environment at Midway from lead based paint on the remaining structures and soil contamination from paint chips that have peeled from the structures. The lead poses an imminent and substantial threat to the public health or welfare or the environment and a removal action is appropriate to address the lead contamination.

Section 5.0: PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed NTCRA will consist of abatement of lead-based paint from the exterior of buildings, consultation regarding the demolition of certain historic structures, excavation of lead-contaminated soil above the PCG, and on-site disposal of the contaminated soil using ex-situ soil stabilization methods in a consolidation unit. The excavated areas will be backfilled with clean material, and the Site will be restored. These actions will mitigate the environmental health threat posed by contact to lead contaminated soils and ingestion of LBP chips.

5.1: Removal Action Objective

Removal Action Objectives (RAOs) are site-specific goals for protecting human health and the environment established on the basis of the nature and extent of contamination, resources that are currently and potentially threatened, and the potential for human and environmental exposure. The RAOs specify the contaminants of concern (COCs), potential exposure routes and receptors, and acceptable contaminant concentrations (or range of acceptable contaminant concentrations for each exposure route).

Based on Site data and evaluations of potential risk, lead was identified as being a COC. The primary cause of ecological risk at the Site is the direct ingestion of lead. Therefore, the RAO for the Site is to prevent potential exposure of birds to contaminated soil that would create blood levels above 20 ug/dL, which is at the low end of the 20 to 150 ug/dL range reported by Franson (1996) as being protective of various species of falconiforme, columbiforme and galiforme bird species.

5.2: Proposed Action

Removal technologies and options identified in the EE/CA were based on Site contaminants, characteristics, and removal action objectives. These were screened for effectiveness, implementability, and relative cost. Alternatives were developed for each decision unit. The selected alternative for all decision units is Alternative 3. A consolidation repository will be constructed using the former R2 water storage unit.

The following is a summary of the selected alternative for each decision unit.

- Decision Unit 1, Alternative #3 – Abatement of lead on Building 643 and, pending the outcome of historic preservation consultation, the demolition of the remaining structures with limited excavation of soil with lead at concentrations above the PCG and the installation of a geotextile and a soil cap. On-site disposal of the demolition debris and soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost for Alternative #3 - $2,500,000

- Decision Unit 2, Alternative #3 – Removal of ACM transite siding from the structures, demolition of the structures, and excavation of soil with lead at concentrations above the PCG. On-site disposal of the contaminated soil and demolition debris using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $2,500,000

- Decision Unit 3, Alternative #3 – Abatement of lead on the exterior of Building 4212, abatement of ACM inside Building 4203 (Bravo Barracks) and demolition of 4203 with excavation of soil with lead at concentrations above the PCG. On-site disposal of the demolition material and contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $1,500,000

- Decision Unit 4, Alternative #3 – Abatement of lead on the exterior of Buildings 259, 2403, and 2404 with the excavation of soil with lead at concentrations above the PCG. On-site disposal of the contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $3,000,000

- Decision Unit 5, Alternative #3 – Abatement of lead on the exterior of Buildings 5309 and 5303 with the excavation of soil with lead at concentrations above the PCG. On-site

disposal of the contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $1,750,000

- Decision Unit 6, Alternative #3 – Abatement of lead on the exterior of the buildings with limited excavation of soil with lead at concentrations above the PCG and the installation of a geotextile and a soil cap. On-site disposal of the contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost for Alternative #3 - $5,000,000

- Decision Unit 7, Alternative #3 – Abatement of lead on the exterior of the buildings with the excavation of soil with lead at concentrations above the PCG. On-site disposal of the contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $1,750,000

- Decision Unit 8, Alternative #3 – Decommissioning of the above ground storage tanks (ASTs) by removal with excavation of soil with lead at concentrations above the PCG. On-site disposal of the contaminated soils using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $1,500,000

- Decision Unit 9, Alternative #3 – Abatement of lead from the exterior of the structures with limited excavation of soil with lead at concentrations above the PCG and the installation of a geotextile and a soil cap. On-site disposal of the contaminated soil using ex-situ soil stabilization methods in the R2 consolidation unit.
    - Estimated cost - $1,500,000

A work crew of between 10 and 15 people is anticipated. Removal activities will primarily be implemented when the majority of the birds are not present at the Refuge. This period is generally July through October of each year. Based on a four month construction window, completion of all Decision Units will take 5 to 6 years to complete. Portions of each Decision Unit may be implemented during nesting months. It is possible that the LBP abatement activities and painting activities can be conducted during nesting periods. Housing space is a concern due to the limited housing arrangements on Midway and the presence of visitors and other contractors.

Based on analytical results, the decision units with the highest potential to affect wildlife are Decision Unit 1, Decision Unit 6 and Decision Unit 2. Although Decision Unit 1 has the highest potential to affect wildlife, the removal of Cable Station buildings 619, 623, 626 and 628, along with the mechanized removal of soils around the Cable Station Complex may have an adverse effect on historic buildings and will require consultation, initiated by the Service, and modification of the MOA between the Service and Hawaii SHPD.

The Service has selected Decision Unit 6, Alternative #3 as the first response action expected to be performed when the Laysan albatross are not on the Refuge (July through October 2011).

Actions selected through this memorandum that may adversely impact historic structures may be modified pending the outcome of consultations about the impact of the actions on those structures.

5.2.1: Effectiveness.

The proposed action (Alternative 3) for the nine Decision Units will provide long-term effectiveness and permanence. The risk associated with the contaminated soils would be eliminated or controlled. Additionally, Five-Year Reviews would be performed to verify the protectiveness of the alternative. The alternative would involve removing the contaminated soils above the PCG, thus eliminating the potential of contaminant migration into groundwater and adjacent surface water and support future ecological use at the Site.

Source area removal excavation will provide a high degree of effectiveness and permanence because contaminants are physically removed and replaced with clean fill. Excavated soils will be stabilized in a consolidation unit. While the excavated soils do not fail toxicity characteristic leaching procedure testing, the use of the stabilized mixture minimizes concerns about long term leaching or liner failure that may expose ecological receptors to lead contamination. A site-specific Health and Safety Plan will be prepared and implemented.

5.2.2: Implement Ability.

The proposed action is readily implementable because lead abatement, excavation and ex-situ soil stabilization methods are relatively mature technology and contractors can provide the necessary equipment, materials, and labor to abate, excavate and stabilize the contaminated soil. Implementation will require coordination, planning and management. Excavation and disposal are widely used and well understood and can be completed using standard construction procedures and conventional earthmoving equipment. Construction of a consolidation unit has become a standard practice.

5.4: Applicable or Relevant and Appropriate Requirements

Section 300.415(j) of the NCP provides that removal actions must attain applicable or relevant and appropriate requirements (ARARs) to the extent practicable, considering the exigencies of the situation. ARARs fall into three categories:

- Chemical-specific ARARs are health-based or risk-management-based criteria that provide concentration limits for the occurrence of a chemical in the environment.
- Location-specific ARARs restrict actions or discharges in certain cultural, agricultural, or ecologically sensitive environments.
- Action-specific ARARs are activity-based or technology-based, and typically control response activities that perform specific actions, such as generating wastes.

ARARs may be applicable; relevant and appropriate; or to be considered (TBC) criteria. Applicable standards include standards of control and other substantive environmental protection

requirements, criteria, or limitations promulgated under Federal environmental or facility citing laws that specifically address a hazardous substance, pollutant or contaminant, response action, location or other circumstances at a CERCLA site.

Relevant and appropriate requirements are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under Federal law that are well suited to the particular site. While not necessarily "applicable" to the specific site circumstances, relevant and appropriate requirements address problems or situations similar to those encountered at the site to justify their use.

A requirement must first be determined to be relevant, then appropriate. In general, this involves a comparison of a number of site-specific factors, including the characteristics of the removal action, the nature of the hazardous substance present at the site and applicable regulatory requirements.

TBC criteria are non-promulgated advisories or guidance issued by the Federal Government that are not legally binding and do not have the status of potential ARARs. However, in many circumstances TBCs will be considered along with ARARs. For example, the EPA Regional Screening Levels (RSLs) (EPA, April 2009) are considered TBCs for specific contaminants.

5.4.1: Chemical-Specific ARARs

Chemical-specific ARARs address management of specific chemicals, including the release to the environment of materials possessing certain chemical or physical characteristics or containing specific chemical compounds. Lead is the COC for soil at the site. There are no chemical-specific ARARs for the COCs in soil. The TBC criteria for the COCs in soil are provided in Appendix A.

5.4.2: Location-Specific ARARs

Location-specific ARARs restrict activities in certain sensitive environments, such as wetlands and flood plains. The potential location-specific ARARs and TBC criteria for the removal action alternatives evaluated are provided in Appendix A.

Proposed work in Decision Units 1 and 2 may include the removal of historical buildings. This action will be considered an adverse effect. The Service will work with the Hawaii SHPD and Advisory Council to modify the MOA between the Service and SHPD to allow for the complete demolition and removal of the Cable Buildings (Decision Unit 1) and Marine Barracks (Decision Unit 2) and associated concrete foundations of the buildings. If an agreement cannot be made, the decommissioning of the Cable Buildings may be done via dismantling and the concrete foundations may remain in place.

5.4.3: Action-Specific ARARs

Action-specific ARARs are activity-based or technology-based requirements, and typically affect performance, design, or other similar action-specific controls or restrictions, on certain activities related to remediation. The potential action-specific ARARs for the removal action alternatives evaluated are summarized in Appendix A.

5.5: Project Schedule

Work will be performed at the Midway Atoll National Wildlife Refuge, Midway Island. Work will primarily be implemented when the majority of albatross are not present on the Site. This period is generally July through October of each year. Based on an annual four month construction window and anticipated funding, completing work at all decision units will take 6 to 7 years. It is possible that portions of the LBP abatement activities and painting activities can be conducted during nesting periods. Work on the R2 consolidation unit and Decision Unit 6, is anticipated to be performed July through October 2011.

5.6: Estimated Costs

The costs listed below include labor, materials, and project preparation plans (Removal Action Work Plan, Sampling and Analysis Plans, QA Project Plan, Health and Safety Plans and Storm Water Pollution Prevention Plans), for abatement, excavation, demolition, preparation of consolidation units, transportation and disposal of LBP and ACM waste, backfilling, site restoration, lodging and per diem. The dollar amount for the removal action is estimated in 2011 dollars with a performance period of 7 years.

Removal costs per year associated with each Decision Unit are listed below.

Base year (2011)	Decision Unit 6	$5,000,000
Option year 1 (2012)	Decision Unit 1	$2,500,000
Option year 2 (2013)	Decision Unit 2	$2,500,000
Option year 3 (2014)	Decision Unit 4	$3,000,000
Option year 4 (2015)	Decision Units 5 and 7	$3,500,000
Option year 5 (2016)	Decision Units 3 and 8	$3,000,000
Option year 6 (2017)	Decision Unit 9	$1,500,000

The total estimated cost for all Decision Units, by the selected alternative (Alternative #3) is $21,000,000.

Section 6.0: EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

If action should be delayed or not taken, the extent of lead-contaminated soil could potentially increase which will result in increased exposure to LBP chips and soil contaminated with LBP chips to Laysan albatross chicks. Delaying the removal action would increase the lead toxicity to bird species occurring on Midway and possible future removal costs.

Section 7.0: OUTSTANDING POLICY ISSUES

The proposed removal action involves Historic Property. Alternative #3 would demolish four Cable buildings that are included in the Cable Station complex (Decision Unit 1), as well as the Marine Barracks (Decision Unit 2), which are listed on the National Register of Historic Places. In addition, the soils surrounding these buildings may contain historical cultural deposits that would be disturbed during the removal of contaminated soils. As such Alternative #3 constitutes an "adverse effect" as per 36 C.F.R. § 800.5 of the NHPA. The Service will work with the Hawaii SHPD and Advisory Council to modify the MOA between the Service and SHPD to allow for the complete demolition and removal of the Cable Buildings and the concrete foundations of the buildings. If an agreement cannot be made, the decommissioning of the Cable Buildings may be done via dismantling and the concrete foundations may remain in place.

Section 8.0: ENFORCEMENT

The Service has not identified non-Federal potentially responsible parties against whom enforcement action could be taken to compel performance of necessary response action or to recover response costs incurred by the Service. The Service intends to work cooperatively with the Navy in addressing contamination existing at the Refuge prior to the transfer of Midway to DOI.

Section 9.0: COMMUNITY INVOLVEMENT

Recommendations in this memorandum are based on consideration of community input. A Community Relations Plan was prepared in accordance with the NCP. As part of this plan, the Service issued a fact sheet which included a brief summary of the results of the EE/CA, alternatives considered, and the Service's recommended NTCRA. The EE/CA was available for public review and comment from January 19, 2011, through February 19, 2011. An Administrative Record was prepared for this action and notice of availability of that record was published in the EE/CA fact sheet and local newspapers.

The EE/CA and Administrative Record can be reviewed and downloaded from the Midway Atoll National Wildlife Refuge Website at http://www.fws.gov/midway/lpa.html. Copies of the EE/CA and Administrative Record are available at the Service, Division of Engineering, Region 1, 911 NE 11th Avenue, Portland, Oregon 97232 and at the Service, Papahanaumokuakea Marine National Monument office, 300 Ala Moana Blvd, Room 5-231, Honolulu, Hawaii 96850. The Administrative Record is available at the Information Repositories in Portland, Oregon and Honolulu, Hawaii.

Section 10.0: RECOMMENDATION

This decision document presents the selected removal action for the removal of lead-based paint from structures and lead-contaminated soil from the Midway Atoll National Wildlife Refuge. The selected removal action was developed in accordance with CERCLA, as amended, and is not inconsistent with the NCP. This Action Memorandum provides information relating to the selection of the proposed action at the site. Conditions at the Site meet the criteria for undertaking the selected removal action, as specified by the NCP, 40 C.F.R. § 300.415(b) (2).

selection of the proposed action at the site. Conditions at the Site meet the criteria for undertaking the selected removal action, as specified by the NCP, 40 C.F.R. § 300.415(b) (2).

Attachments

APPROVE: Chris McKay
ACTING Regional Director

Date: July 11, 2011

DISAPPROVE: _____
Regional Director

Date: _____

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References

Arata, J. A., P. R. Sievert, and M. B. Naughton. 2009. Status assessment of Laysan and black-footed albatrosses, North Pacific Ocean, 1923-2005: U.S. Geological Survey Scientific Investigations Report 2009-5131. 80 p.

Burger J. and M. Gochfeld. 2000a. Metals in Albatross Feathers from Midway Atoll: Influence of Species, Age, and Nest Location. Environmental Research. 82:207-221.

Burger J. and M. Gochfeld. 2000b. Metals in Laysan Albatrosses from Midway Atoll. Arch. Environ. Contam. Toxicol. 38:254–259.

Burger J. and M. Gochfeld. 2000c. Metal Levels in Feathers of 12 Species of Seabirds from Midway Atoll in the Northern Pacific Ocean, The Science of The Total Environment. 257:37-52.

Finkelstein, M.E., Gwiazda, R.H. & Smith, D.R. 2003. Lead poisoning of seabirds: environmental risks from leaded paint at a decommissioned military base. Environ. Sci. Technol. 37:3256–3260.

Finkelstein, M. 2004. Midway Atoll National Wildlife Refuge lead poisoning of Laysan albatross chicks. Unpublished report. June 2004.

Finkelstein, M. 2006. Supplemental Information: Lead Poisoning of Laysan albatross chicks on Midway Atoll. U.C. Santa Cruz Report. Santa Cruz, CA. August 2006.

Finkelstein, M., M. Nakagawa, P. Sievert, J. Klavitter, and D. Doak. 2009. Assessment of demographic risk factors and management priorities: Impacts on juveniles substantially affect population viability of a long-lived seabird. Pacific Seabird Group Annual Meeting. February 18 - 26, 2009. Hakodate, Hokkaido, Japan.

Finkelstein, M., M. Nakagawa, P. Sievert, J. Klavitter, and D. Doak. Assessment of demographic risk factors and management priorities: Impacts on juveniles substantially affect population viability of a long-lived seabird. Journal of Animal Conservation. April, 2010

Franson, Interpretation of Tissue Lead Residues in Birds Other than Waterfowl. In "Environmental Contaminants in Wildlife, Interpreting Tissue Concentrations." W.N. Beyer, G.H. Heinz and A.W. Redmond-Norwood, eds. Society of Environmental Toxicology and Chemistry, Special Publication Series, Lewis Publishers, Boca Rotan, Florida, 1996, pp. 265-279.

GeoEngineers, Inc. 2004. Draft Remedial Investigation Report, February 2003 JP-5 Release. U.S. Fish and Wildlife Service, Sand Island, Midway Atoll National Refuge. December 30, 2004.

GeoEngineers, Inc. 2011, Engineering Evaluation/Cost Analysis for Removal of Lead-based Paint at Midway Atoll National Wildlife Refuge, Midway Island January 18, 2011.

Klavitter, J. 2007. June 2007 Survey for "Droop wing" Laysan Albatross Chicks at Midway Atoll National Wildlife Refuge. U.S. Fish and Wildlife Service Report. July 16, 2007.

Ogden Environmental and Energy Services. 1994. Midway Island Survey: asbestos and lead-based paint survey report. February 18, 1994. Honolulu, Hawaii.

Ogden Environmental and Energy Services. 1996. Site Inspection Report for Naval Air Facility, Midway Island, January 1996. Honolulu, Hawaii.

Ogden Environmental and Energy Services. 1997a. Base Realignment and Closure Cleanup Report for Naval Air Facility, Midway Island, October 1997. Honolulu, Hawaii.

Ogden Environmental and Energy Services. 1997b. Remedial Investigation Report for Naval Air Facility, Midway Island, July 1997. Honolulu, Hawaii.

Sileo et al., "Causes of Mortality of Albatross Chicks at Midway Atoll," Journal of Wildlife Diseases 1987; 26(3) 329-338, 1990.

Sileo, L. and Fefer, S.I. 1987. Paint chip poisoning of Laysan albatross at Midway Atoll, Pacific Ocean. Journal of Wildlife Diseases. 23:432–437.

U.S. Fish and Wildlife Service. 2004a. Phases for the lead-based paint removal at Midway Atoll NWR. U.S. Fish and Wildlife Service Report. July 2004.

U.S. Fish and Wildlife Service. 2004b. Temporary lead-based paint abatement at Midway Atoll National Wildlife Refuge. U.S. Fish and Wildlife Service Project Proposal. Honolulu, HI. July 14, 2004.

U.S. Fish and Wildlife Service. 2007. Lead-Based paint remediation efforts at Midway Atoll National Wildlife Refuge. U.S. Fish and Wildlife Service Report. June 27, 2007.

U.S. Fish and Wildlife Service. 2008. Lead-based paint remediation efforts at Midway Atoll National Wildlife Refuge. U.S. Fish and Wildlife Service Report. May 6, 2008.

U.S. Fish and Wildlife Service. 2009. Ecological risk assessment for lead in soil and Laysan albatross chicks on Sand Island, Midway Atoll National Wildlife Refuge. U.S. Fish and Wildlife Service Report. December 2009.

U.S. Fish and Wildlife Service. 2010. Combined Preliminary Assessment/Site Inspection Report, Midway Atoll National Wildlife Refuge, Sand Island Project, U.S. Fish and Wildlife Service Report. December, 2010.

Work, T.M and M.R. Smith. 1996. Lead exposure in Laysan albatross adults and chicks in Hawaii: prevalence, risk factors and biochemical effects. Archives of Environmental Contamination and Toxicology 31: 115-119.

Work, T. M., M.R. Smith, and R. Duncan. 1998. Necrotizing enteritis as a cause of mortality in Laysan albatross, *Diomedia immutabilis*, chicks on Midway Atoll, Hawaii. Avian Diseases 42:1-5.

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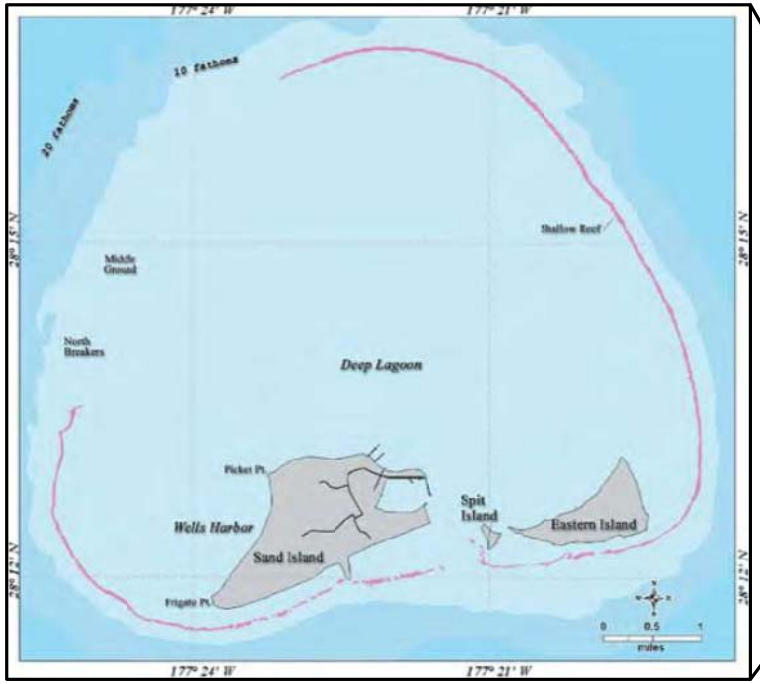

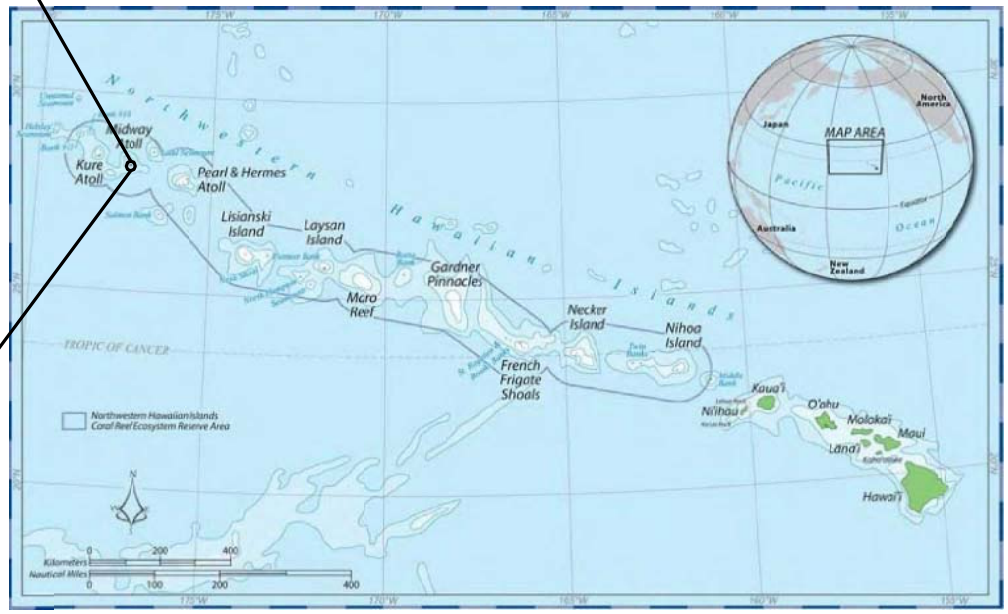

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. can not guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Unknown.

Vicinity Map

USFWS - Midway Atoll
Midway Island

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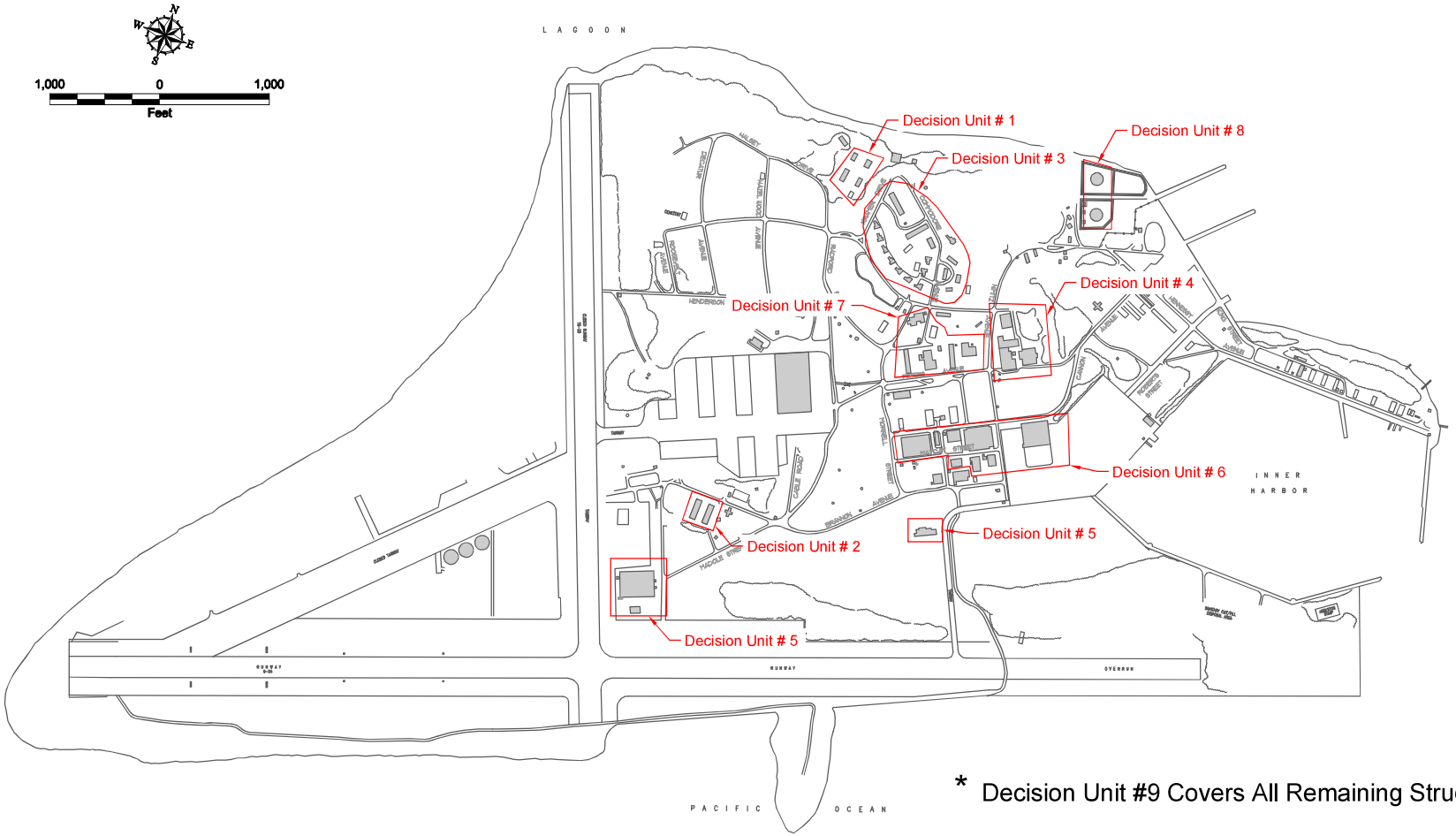
Figure 1



* Decision Unit #9 Covers All Remaining Structures.

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Reference: Base drawing provided by Feraro Choi - Midway Site Plan 2003 and modified by GeoEngineers' field personnel.

LEGEND:

STRUCTURE

DECISION UNIT

Overall Site Plan with Decision Units

Engineering Evaluation and Cost Analysis
Midway Atoll National Wildlife Refuge

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Figure 2A

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Table 6

Potential Chemical Specific ARARs

Midway Atoll National Wildlife Refuge

Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
EPA Regional Screening Levels (RSLs) (EPA, May 20, 2008)	To Be Considered	Numerical standards recommended for chemicals at Superfund sites. Guidance document.	For a residential land-use scenario, the RSLs are: 400 mg/kg for lead
RCRA Hazardous Waste Determination 40 CFR 261.21, 261.22, 261.23, and 261.29 and 40 CFR 261 Subchapter D	Applicable	A waste is considered a RCRA hazardous waste if it exhibits any of the characteristics of: ignitability, corrosivity, reactivity, or toxicity, or it is listed as a hazardous waste.	Wastes generated during construction, monitoring, or remediation must be characterized and managed in accordance with RCRA requirements (see Action-Specific ARARs).
Contained-In Policy (63 CFR 28618-28620; May 26, 1998) Management of soils containing hazardous waste	Applicable, if media containing hazardous waste is generated.	Contaminated media, of itself, is not hazardous waste. However, contaminated environmental media can be subject to regulation under RCRA if it "contains" hazardous waste.	Environmental media containing hazardous waste must be managed as hazardous waste until it no longer contains the hazardous waste.
Disposal of soils containing hazardous waste 40 CFR 268	Applicable	If hazardous waste is to be disposed of on land (such as, placed in a landfill), it must first be treated to meet the LDRs found in 40 CFR 268. Debris treatment is an action-specific ARAR. If the soil is a characteristic hazardous waste (for example, it fails TCLP for lead), it must be treated for the characteristic that makes it hazardous (e.g., lead) and all other underlying hazardous constituents (UHC, those constituents above the Universal Treatment Standards [UTSs] in 40 CFR 268.48)	
		Under 40 CFR 268.49, soils contaminated by hazardous waste must be treated until the hazardous constituent concentrations are either: 1. 90% of the initial concentrations, or 2. 10x the UTS for nonwastewaters found in 40 CFR 268.48. The soils must be treated to the higher of these two standards. If soil containing hazardous waste is treated on site prior to land disposal (even if the disposal is off site), a waste analysis plan is needed in accordance with 40 CFR 268.7(a)(5).	
Management of remediation waste in a Corrective Action Management Unit (CAMU) 40 CFR 264.552	Applicable, if a CAMU is used	Remediation wastes are all solid and hazardous wastes and all media and debris associated with a site cleanup. Remediation wastes can be placed in a CAMU if the principal hazardous constituents (PHCs) are treated before placement. Those constituents that are PHCs that fail TCLP (e.g. lead) must be treated before being disposed of. If there is a PHC, then the remediation waste will need to be treated for that PHC before placing it in the CAMU.	A discussion of CAMU design requirements is included under the Action-Specific ARARs. If the contaminated waste is debris (e.g., concrete, steel), then the debris needs to be treated as hazardous waste debris and decontaminated (see discussion under the Action-Specific ARARs).
EPA Revised Interim Soil-lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities	To Be Considered	Establishes screening levels for lead in soil for residential land use, describes development of site-specific preliminary remediation goals, and describes a plan for soil-lead cleanup at CERCLA sites. Office of Solid Waste and Emergency Response (OSWER) Directive 9355.4-12, July 14, 1994	This guidance recommends using the EPA Integrated Exposure Uptake Biokinetic Model (IEUBK) on a site-specific basis to assist in developing cleanup goals.

EPA Strategy for Reducing Lead Exposures	To Be Considered	Presents a strategy to reduce lead exposure, particularly to young children. EPA, February 21, 1991	The strategy was developed to reduce lead exposure to the greatest extent possible. Goals of the strategy are to 1) significantly reduce the incidence above 10 µg Pb/dL in children; and 2) reduce the amount of lead introduced into the environment.

Notes:

ARAR - applicable or relevant and appropriate requirement
CAMU - Corrective Action Management Unit
CFR - Code of Federal Regulations
LDR - land disposal restriction
mg/kg - milligram per kilogram
PHC - principal hazardous constituents
PRG - Preliminary Remediation Goal (EPA Region IX)
RCRA - Resource Conservation and Recovery Act
RSL - Regional Screening Level
TCLP - toxicity characteristic leaching procedure
UHC - underlying hazardous constituent
USC - United States Code
UTS - Universal Treatment Standard

Table 7

Potential Location Specific ARARs

Midway Atoll National Wildlife Refuge

Location	Regulatory Citations	ARAR Status	Description	Comment
Cultural Resources				
Presence of archaeological resources	43 CFR 7	Applicable	May not excavate, remove, damage, or otherwise alter or deface such resource unless by permit or exception. Archeological resources are defined as those older than 100 years.	
Presence of human remains, funerary objects, sacred objects, or objects of cultural patrimony for Native Americans	43 CFR 10.4 (c) and (d)	Potentially applicable, if human remains are discovered during remediation	Must stop activities in the area of discovery and make a reasonable effort to secure and protect the objects discovered.	
Historic project owned or controlled by a federal agency	National Historic Preservation Act: 16 U.S.C. 470, et seq; 40 C.F.R. § 6.301; 36 C.F.R. Part 1.	Applicable	Property within areas of the Site is included in or eligible for the National Register of Historic Places.	The removal alternatives will be designed to minimize the effect on historic data.
Site within an area where action may cause irreparable harm, loss, or destruction of artifacts.	Archeological and Historic Preservation Act; 16 U.S.C. 469, 40 C.F.R. 6.301.	To be considered	Property within areas of the site contains historical and archaeological data.	
Floodplains				
Within floodplain	Executive Order 11988, Floodplain Management	Potentially applicable	Avoid, to the extent possible, the long-and short-term adverse effects associated with occupancy and modification of floodplains.	Measures taken to mitigate adverse effects include minimum grading requirements, runoff controls, design and construction constraints, and protection of ecologically sensitive areas.
	Executive Order 11988, Floodplain Management	Potentially applicable	Potential effects of an action taken in a floodplain shall be evaluated. Identify, evaluate, and implement alternative actions that may avoid or mitigate adverse impacts on floodplains.	
Within 100-year floodplain	40 CFR 264.18(b), Hazardous Waste Landfills, Floodplains	Applicable	Existing solid waste landfills and hazardous waste landfills located in a 100-year floodplain must be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood.	
Wetlands				
Wetlands	Executive Order 11990, Protection of Wetlands	Potentially applicable	Requires that actions be taken to avoid adverse effects on wetlands and prohibits discharge to wetlands.	These requirements would be applicable if the CAMU, treatment units, or associated facilities were constructed in wetlands.
	40 CFR 6.302(a) and Appendix A		Appendix A of 40 CFR 6 sets forth policy for carrying out provisions of the Protection of Wetlands Executive Order.	
Wetlands and surface water	Clean Water Act 33 USC §1344, Section 404(b)(1) 40 CFR 230.10 33 CFR 323.3(b)	Potentially applicable	Except as provided under Section 404(b)(2) of the Clean Water Act, discharge of dredged or fill material into an aquatic ecosystem is not permitted if there is a practicable alternative that would have less adverse impact.	
National Wildlife Refuge				
Wildlife Refuge	50 CFR 27	Applicable	Only actions allowed under the provision of 16 USC 668 dd [c] may be undertaken in areas that are part of the National Wildlife Refuge System	
Shorelines				
Coastal zone	Coastal Zone Management Act, 16 USC §1463, et seq. 15 CFR 930	Potentially applicable	Activities affecting the coastal zone including wetland, floodplain, estuary, beach, dunes, reef, and fish and wildlife habitat in the coastal zone. Federal activities must be consistent with state coastal zone management plan (see next item).	

Shoreline area	Shoreline Setbacks, Chapter 23 ROH	Potentially applicable	Structures constructed must be set back 40 feet from the state-determined shoreline to minimize risk of adverse impacts on beach processes.	Structures may be built as part of the remediation (e.g., tanks, a building to store equipment).
Endangered Species and Other Animals				
Endangered or threatened species	Endangered Species Act, 16 USC §1531 Endangered and Threatened Species 50 CFR 17	Applicable	Activities affecting species listed as endangered or threatened or their critical habitat is regulated. Prohibits the taking, harassment, harming, or killing of endangered or threatened species of flora and fauna.	If the removal proposed impacts endangered or threatened species or habitat, NOAA, USFWS, and/or NMFS should be informally consulted.
Any species of native bird	Migratory Bird Treaty Act 16 USC 703	Applicable	The taking of any native species of wild bird is prohibited. Take also includes the poisoning of birds by hazardous waste site.	Removal activities that might affect migratory birds will require consultation with USFWS. Removal alternatives shall consider effects on migratory birds.
Coral reefs	Coral Reef Conservation Act	Relevant and appropriate, for remedies affecting coral reefs	Preserve, sustain, and restore coral reef ecosystems by reducing the impacts of pollution on coral reefs.	

Notes:

ARAR - applicable or relevant and appropriate requirement

CFR - Code of Federal Regulations

NMFS - National Marine Fisheries Service

NOAA - National Oceanic and Atmospheric Administration

USC - United State Code

ARAR status depends on the specific removal alternatives evaluated. ARAR status will be reevaluated once the remedy is selected.

Table 8

Potential Action Specific ARARs

Midway Atoll National Wildlife Refuge

Action	Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
Site Preparation, Construction, and Excavation Activities				
Activities that effect historical structures	National Historic Preservation Act 36 CFR 800	Applicable, if construction activities will disturb historical strucutures	FWS will consult historical associations as needed.	FWS will consult historical associations as needed.
Activities that effect historical structures	Memorandum of Agreement between FWS and Honolulu Historic Preservation Office	Applicable to work performed around the Cable Buildings	FWS will need to address the MOA between FWS and Honolulu Historical Preservation Office.	FWS may work with the Preservation Office to modify or change the MOA.
Activities causing stormwater runoff from construction activities	40 CFR 122 26(b)(15)	Applicable, if construction activities disturb more than 1 acre of land.	Implement good construction management techniques, sediment and erosion controls, storm water management measures, and housekeeping best management practices (BMPs) to ensure stormwater discharges comply with the substantive requirements of the Stormwater General Permit (http://www.epa.gov/npdes/pubs/cap2003.fs.pdf).	Construction activities (including other land-disturbing activities) that disturb one acre or more are regulated under the NPDES stormwater program; this includes smaller sites that are part of a larger common plan of development. At other bases, EPA has interpreted this to mean all of the remediation sites on-base together are the planned development.
Activities causing stormwater runoff from construction activities	NPDES General Permit for Discharges from Large and Small Construction Activities, effective January 21, 2005, Section 3	To be considered	A Stormwater Pollution Prevention Plan (SWPPP) will be prepared.	
Discharges to a sediment pond	NPDES General Permit for Discharges from Large and Small Construction Activities, Section 3.6C	To be considered	Sediment from sediment traps or ponds must be removed when design capacity has been reduced by 50%.	
Activities causing stormwater runoff from construction activities	NPDES General Permit for Discharges from Large and Small Construction Activities, Section 3.10	To be considered	Inspections must be conducted every 7 days OR at least once every 14 days and within 24 hours of the end of a storm event of 0.5 inches or more. Specific information must be collected, and the inspections must be performed by a qualified person.	
Activities causing stormwater runoff from construction activities	NPDES General Permit for Discharges from Large and Small Construction Activities, Section 3.13	To be considered	Stabilization measures must be implemented within 14 days after construction is temporarily or permanently halted.	
Asbestos	40 CFR 61 Subpart M	Applicable, if debris with asbestos is encountered during remediation.	Asbestos-containing wastes must be managed in a certain manner.	
Materials Management				
Storage of fuels and oils in quantities greater than 1,320 gallons in 55 gallon drums or larger	40 CFR 112	Potentially applicable, if fuels and oils are stored.	All containers ≥55 gallons must be secondarily contained, inspected routinely, have a spill prevention, control, and countermeasures (SPCC) plan prepared, and meet other specific SPCC requirements.	
Waste Generation/Management				
Generate used oil	40 CFR 279	Potentially applicable, if used oil is generated or discovered during remedial activities.	No new oil, used oil, or recycled oil shall be discharged or caused or allowed to enter into sewers, drainage systems, surface or ground waters, water courses, marine waters, or onto the ground; no person shall transport, market or recycle used oil except by permit; all transporters, receivers, recyclers and burners of used oil must invoice all transactions; used oil that exceeds halogen concentrations of 1,000 ppm must be disposed of as hazardous waste.	

Generate solid wastes as defined in 40 CFR 261.2	40 CFR 262.11(a)	Applicable	Wastes generated during a study or a remedial action would be characterized to determine if such wastes are hazardous (e.g., contaminated PPE, equipment, wastewater) or excluded under 40 CFR 261.4.	
	40 CFR 262.11(b)	Applicable	Determine if the waste is listed hazardous waste under 40 CFR 261 (i.e., is F-, K-, P-, or U-listed waste).	
	40 CFR 262.11(c)	Applicable	Determine if the waste is hazardous by testing using prescribed methods (i.e., the waste is reactive, corrosive, ignitable, or toxic [the D waste codes]) or by applying generator knowledge based on information regarding material or processes used.	
	40 CFR 262.11(d)	Potentially applicable, depending on the waste constituents.	If waste is hazardous, it must be managed in accordance with the hazardous waste regulations.	
Hazardous waste accumulation	40 CFR 262.34	Potentially applicable, depending on the waste constituents.	These requirements are applicable to hazardous waste that is held temporarily on site prior to off-site disposal. Very specific requirements are discussed in the regulations, including labeling, management, training, and others. Consult the regulations for specific information.	Accumulation of hazardous wastes on site for longer than 90 days would be subject to RCRA requirements for storage facilities.
Waste Storage				
Hazardous Waste				
Container Storage	40 CFR 264.171 through 175, 179; 40 CFR 262.34(c)(1)	Potentially applicable, depending on the waste constituents.	Containers of RCRA hazardous waste must: be maintained in good condition; be compatible with hazardous waste to be stored; be closed during storage except to add or remove waste; be inspected weekly; have adequate secondary containment when stored on site; and be marked with "hazardous waste" or other words identifying contents.	These requirements are applicable to hazardous wastes that are generated and stored temporarily in containers at the site prior to off-site disposal and may include wastes such as soil, debris, or treatment residuals (water, sludge, filters).
	40 CFR 264.175 (a) and (b)	Potentially applicable, depending on the waste constituents.	Place containers on a sloped, crack-free base, and protect from contact with accumulated liquid. Provide a containment system with a capacity of 10 percent of the volume of containers with liquids. Remove spilled or leaked waste in a timely manner to prevent overflow of the containment system.	These requirements are applicable to hazardous wastes that are generated and stored temporarily in containers at the site prior to off-site disposal.
Container management	40 CFR 262.30 through 33	Potentially applicable, depending on the waste constituents.	Prior to transportation, containers would be packaged, labeled, marked, and placarded in accordance with RCRA and Department of Transportation requirements.	These requirements are applicable to containers that are used to hold hazardous wastes that are sent off site for disposal.
Recordkeeping for hazardous wastes sent off site	40 CFR 262.40	Potentially applicable, depending on the waste constituents.	Records of wastes sent off site must be kept and reported to EPA. Manifests discrepancy and late reports must be submitted to EPA.	Only applies to wastes sent off site.
Water Discharges				
Discharge of any substance into state waters or from a treatment works or waste outlet	NPDES	Potentially applicable, if the discharge goes off site (i.e., into the lagoon).	Requires an NPDES permit for discharging any pollutant and requires public participation in the permitting process.	
	40 CFR 122.21	Relevant and Appropriate if discharge is completely on site.		
Excavation				

Excavation	40 CFR 268.40	Potentially applicable, depending on the waste constituents.	Movement of excavated materials characterized as hazardous to new location or placement in or on land will trigger LDRs for the excavated material.	Applicable if excavated soil and waste characterized as hazardous waste is placed on land (e.g., accumulation of soil prior to disposal). LDRs must be met for wastes excavated and then placed in an area outside of a corrective action management unit, treatment unit, or staging pile.
				The federal rules allow a 10x the waste LDR concentration for land disposal of soils under 40 CFR 268.49 or a soil treatability variance according to 40 CFR 268.44 (h)(3) and (4).
Habitat restoration	National Environmental Policy Act, 42 USC §4371 et. seq., 40 CFR 1508.20, USFWS Mitigation Policy (46 FR 7644 to 7663, 1981)	Not applicable for CERCLA actions	Regulates activities that could affect habitat for federally protected species. Mitigation includes: •Avoiding the impact altogether by not taking a certain action or parts of an action. •Minimizing impacts by limiting the degree or magnitude of the action and its implementation. •Rectifying the impact by repairing, rehabilitating, or restoring the affected environment. •Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action. •Compensating for the impact by replacing or providing substitute resources or environments.	
Solid Waste Disposal				
Solid waste disposal	Solid Waste Disposal Act, 42 USC §6901 et. Seq. Subtitle D	Potentially applicable	Establishes procedures and minimum requirements for land disposal of solid waste.	If solid wastes are stored or disposed off site or off island, all RCRA permitting regulations must be complied with.
Solid waste disposal	40 CFR 257	Potentially applicable, if solid wastes are disposed of.	Establishes minimum standards for solid waste disposal facilities, including banning open burning.	
Wastes sent off site	off site Rule 40 CFR 300.440	Applicable	Any CERCLA wastes sent off-site must be sent to a facility reviewed by EPA under the off-site rule (OSR). CERCLA wastes include all wastes and media containing CERCLA hazardous substances.	Hazardous wastes are a subset of CERCLA wastes. CERCLA wastes can pass TCLP, and still must go to an EPA-approved facility.
Hazardous Waste Management Units and Disposal				
Management of remediation waste in a Corrective Action Management Unit (CAMU)	40 CFR 264.552	Potentially applicable	CAMUs can be used to consolidate remediation wastes from various sites on the same facility. A CAMU most be designated either in a permit, order, or in a CERCLA decision document. CAMUs most be designed to meet three criteria. These criteria are:	The CAMU will need to be designated in the ROD or Action Memorandum prior to implementation of the remedial action. It can be constructed as part of the remedial action.

			1. Minimum composite liner and leachate collection system requirements for new, replacement, or laterally expanded CAMUs (e.g., 10-7 permeability, see 40 CFR 264.552[el[3][i]). For the purposes of the CAMU design standards, solid waste management units that are in existence at the time of a remedial action are not considered "new" units if they are designated as a CAMU.	
			2. Minimum design criteria for CAMU caps. 3. Take corrective action, as necessary to protect human health and the environment, for releases from CAMUs to groundwater. If all of the constituents in the wastes going into the CAMU are at or below remedial goals, then the above liner criteria, capping criteria, and groundwater monitoring are not required.	
Disposal of non-hazardous waste in a CAMU	40 CFR 264.552[a][1][iii]	Applicable if a CAMU is used	Non-hazardous wastes may be placed in the CAMU, if it facilitates implementation of the corrective action. Remediation wastes from any site could be taken to the CAMU, as long as it is discussed in the decision document. Note that as-generated wastes from industrial operations could not be taken to the CAMU, but as-generated non-hazardous waste (e.g., trash such as paper towels, cardboard) can be placed in the CAMU when it facilitates implementation of the corrective action). Liquids may not be placed in the CAMU.	
Disposal of RCRA hazardous waste in a land-based unit (not a CAMU)	RCRA, LDRs, 40 CFR 268	Potentially applicable	Hazardous waste may be land disposed of only if it meets the requirements in the table "Treatment Standards for Hazardous Waste" at 40 CFR 268.40 before land disposal.	Land disposal of hazardous wastes may be part of the selected remedy. See also discussion under "Excavation" above.
Disposal of debris containing hazardous waste	40 CFR 268.45	Potentially applicable	If debris is contaminated by a hazardous waste (e.g. soils on/adjacent to the debris are hazardous per 40 CFR 261), the debris is called hazardous debris. Hazardous debris must be treated in accordance with the 40 CFR 268.45 standards before it can be land disposed of. This treatment essentially consists of a specialized decontamination.	
Treatment in tanks	40 CFR 264.192 through 194, and 196	Relevant and Appropriate	These regulations include requirements to ensure that tanks and ancillary equipment are adequately designed, operated, and maintained to ensure that the tank system will not fail.	Substantive portions of these requirements may be relevant and appropriate to tanks that are used during hazardous waste treatment.
Waste pile	40 CFR 264.251	Relevant and Appropriate	Hazardous waste that is put into piles is subject to LDRs. A double liner with leachate collection system is required, although a single liner may be used with EPA approval.	Relevant and Appropriate to non-containerized accumulation of solid nonflammable hazardous soil that may be stockpiled on site prior to treatment or off-site disposal.

Corrective action (temporary units)	40 CFR 264.553	Applicable	For temporary tanks and container storage areas used for treatment or storage of hazardous remediation waste during corrective action activities, it may be determined that a design, operating, or closure standard applicable to such units may be replaced by alternative requirements that are protective of human health or the environment The temporary unit may be in place for1 year with the possibility of 1-year extension.	This provision would allow for temporary treatment or storage of hazardous waste that is excavated, stored, and treated.
Corrective action (staging piles)	40 CFR 264.554	Relevant and Appropriate	During corrective action, remediation waste can be placed in piles without triggering LDRs or MTRs. Must not operate for more than 2 years and must be designated by appropriate agencies.	This provision would allow for temporary storage of remediation wastes characterized as hazardous before and/or after treatment.
Treatment in miscellaneous units	40 CFR 264.601/40 CFR 265.401	Relevant and Appropriate	These regulations include design, operation, maintenance, and closure requirements for miscellaneous treatment units and units that use chemical, physical, or biological treatment methods to treat hazardous waste.	These requirements are relevant and appropriate to units that treat waste ex situ.
General Facility/Operational Requirements				
Worker Safety	Occupational Safety and Health Rules, 29 CFR	Applicable	Regulates worker health and safety.	
Workplace exposure to contaminants from site cleanup	29 CFR 1910.120	Applicable	Ensures employers implement applicable procedures for the protection of employees against exposure or the reasonable possibility of exposure to safety and health risks during hazardous substance cleanup operations and hazardous waste operations pursuant to RCRA and during emergency response operations regarding hazardous substances.	
Groundwater Monitoring				
Water quality monitoring at hazardous waste landfills	Hazardous Waste Interim Status Standards 40 CFR 265.91 through 94. Hazardous Waste Permitted Standards 40 CFR 264.93, 94, 95, 97 and 98	To be considered	Establishes general requirements for water quality monitoring and response programs, including groundwater and the unsaturated zone, at permitted hazardous waste disposal facilities. Also addresses the point of compliance for groundwater monitoring.	
Groundwater monitoring at solid waste landfills	40 CFR 258 Subpart E	Applicable, if site is a landfill.	Specific types of data must be gathered for groundwater monitoring for solid waste landfills, including the location of the point of compliance. See the regulations for specific requirements.	
Closure and Postclosure Care				
Closure of hazardous waste units		Relevant and appropriate	Hazardous waste management units must be closed in a manner that minimizes the need for further maintenance and minimizes post-closure escape of hazardous constituents to groundwater, surface waters, or to the atmosphere.	
Postclosure care of a CAMU	40 CFR 552	Applicable	Groundwater monitoring and post closure care are required for CAMUs where wastes remain in place. Groundwater monitoring requirements are very general and should address (40 CFR 264.552[e][5])	
Municipal solid waste landfill	Closure and Postclosure Care 40 CFR 258 Subpart F	Applicable	All municipal solid waste landfill units must install a final cover system designed to minimize infiltration and erosion.	

Waste pile closure	40 CFR 264.258(a)	To be considered	At closure, owner shall remove or decontaminate all waste residues, contaminated containment system components, contaminated subsoils, structures, and equipment contaminated with waste and leachate, and manage them as hazardous waste.	
Hazardous waste landfill cover design	40 CFR 264.310(a)	To be considered	The final cover for a hazardous waste landfill must be designed.	The cover design requirements may be considered in guiding the design of cover improvements for the site.
Hazardous waste landfill cover maintenance	40 CFR 264.310(b)	To be considered	After closure, the owner of the landfill must comply with the postclosure requirements (40 CFR 264.117).	The cover maintenance requirements may be considered in guiding the design of cover improvements for the site.
Postclosure care	40 CFR 264.117	To be considered	Postclosure care lasts for 30 years unless otherwise decided by the EPA Administrator.	
Planning postclosure care	40 CFR 264.118	To be considered	A written postclosure care plan will be prepared.	
Notifications	40 CFR 264.119(a)	To be considered	Within 60 days of final closure, the zoning authority and EPA must be notified of the type, location, and quantity of hazardous waste disposed of at the facility.	
Notice in deed	40 CFR 264.119(b)	To be considered	A notice must be placed in the deed that the land has been used to manage hazardous wastes, the land use is restricted under Subchapter G regulations, and the notifications mentioned in 40 CFR 264.119(a) have been made. A certification that this information has been submitted must be made to EPA.	
Completion of postclosure care	40 CFR 264.120	To be considered	The owner/operator must submit a certification to the EPA that postclosure care has been completed in accordance with the plan within 60 days after completion of postclosure care.	
Transportation of Hazardous Material	Standards Applicable to Transporters of Hazardous Waste, 40 CFR 263.20 through 22	Applicable, if hazardous wastes are sent off site for disposal.	Sets standards that apply to persons transporting hazardous waste within the United States if transportation requires a manifest under 40 CFR 262. Transporter of hazardous waste must comply with the Manifest System and Record Keeping.	
	Hazardous Materials Transportation Act, 40 USC §1811, 49 CFR 171-177	Applicable, if hazardous materials are sent off site.	Established standards for packaging, labeling, and transporting hazardous materials (which include hazardous wastes).	

Notes:

ARAR - applicable or relevant and appropriate requirement
BMP - best management practice
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
EPA - U.S. Environmental Protection Agency
FR - Federal Register
LDR - land disposal restriction
MTR - minimum technology requirements for hazardous waste land disposal units
NPDES - National Pollutant Discharge Elimination System
ppm - parts per million
RCRA - Resource Conservation and Recovery Act
SPCC - spill prevention, control, and countermeasures
SWPPP - Stormwater Pollution Prevention Plan
USC - United States Code
ARAR status depends on the specific remedial alternatives evaluated. ARAR status will be reevaluated once the alternatives are determined.