3.12 HUMAN HEALTH AND SAFETY HAZARDS

Hazards that could threaten human health and safety within the project ROI are generally limited. The primary concerns of military training and operations affecting the environment include unexploded ordnance (UXO) on training ranges, lead and other contaminants from ammunition, the trichloroethylene (TCE) plume at SBMR, other installation restoration program (IRP) sites on military reservations, lead-based paint (LBP) and asbestos exposure, PCB contamination at KTA, and the ongoing threat of wildfires starting during live-fire training. These issues have been considered in all project-planning activities in order to minimize and possibly improve site conditions. Hazardous material and waste management continues to follow Army, federal, and state regulations in order to prevent impacts on human health or the environment.

3.12.1 Introduction/Region of Influence

This section provides an overview of the human health and safety hazards in and associated with the project area, such as hazardous materials and wastes that may be used and stored in the project ROI and current regulations that govern the use, transport, and disposal of these hazardous materials and wastes. This section also is a discussion of the electromagnetic fields that exist and threats and sources of wildfires within the project ROI. The TAMC Preventative Medicine Unit handles human health and safety issues affecting military personnel resulting from military operations. Civilian complaints, including human health and safety issues, are handled through the Public Affairs Office (PAO). In addition to the health and safety hazard issues addressed in this section, other issues associated with the proposed action that affect the public's health and safety are addressed in other sections, as follows:

- Aircraft and airspace issues are addressed in Section 3.4, Airspace;
- Air pollution is addressed in Section 3.5, Air Quality;
- Noise pollution is addressed in Section 3.6, Noise;
- Traffic issues are addressed in Section 3.7, Traffic;
- Water pollution and flooding are addressed in Section 3.8, Water Resources;
- Soil pollution and seismic and volcanic hazards are addressed in Section 3.9, Geology and Soils; and
- Emergency services are addressed in Section 3.15, Public Services and Utilities.

Sections 5.12 through 8.12 give detailed information about the hazardous materials and wastes used, stored, and generated, electromagnetic fields operating, and wildfire issues located within in the ROI. The ROI for the proposed actions includes the following locations:

- SBMR, SRAA, and WAAF;
- DMR and Dillingham Trail;
- KTA, KLOA, Helemanō Trail, and Drum Road; and
- PTA, BAAF, WPAA, and PTA Trail.

Because fences or mountain ranges cannot always confine or reduce impacts from hazardous materials, waste incidents, or natural hazards, such as wildfires, areas immediately adjacent to these project locations are considered part of the ROI.

3.12.2 Resource Overview

Hazardous Materials

According to the US Department of Transportation, a hazardous material is defined as a substance or material that the Secretary of Transportation has determined is capable of posing an unreasonable risk to health, safety, and property when transported in commerce and that has been designated as hazardous under section 5103 of the federal hazardous materials transportation law (49 U.S.C. 5103). The term includes hazardous substances, hazardous wastes, marine pollutants, elevated temperature materials, materials designated as hazardous in the Hazardous Materials Table (see 49 CFR 172.101), and materials that meet the defining criteria for hazard classes and divisions in part 173 of subchapter C of CFR chapter I (US DOT 2003).

According to The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), a hazardous substance can be defined as any substance that, due to its quantity, concentration, or physical and chemical characteristics, poses a potential hazard to human health and safety or to the environment. CERCLA has created national policies and procedures to identify and remediate sites contaminated by hazardous substances.

Typical hazardous materials at Army training sites include the following:

- Battery fluid;
- Aerosols;
- Petroleum, oils, and lubricants (POLs);
- Fluorescent light bulbs;
- Antifreeze/coolants;
- Solvents;
- Fuels (gasoline, diesel, and aviation fuels);
- Chlorine;
- Paint products;
- Pesticides; and
- Munitions.

The Army maintains site-specific spill prevention, control, and countermeasure (SPCC) plans and pollution prevention plans that regulate the storage and use of petroleum products and hazardous materials, respectively. Various Army regulations, pamphlets, training manuals, instructions, and codes address the safe storage, use, and transport of ammunition. Discussions of these materials are included in Appendix N-2.

Hazardous Waste

The Resource Conservation and Recovery Act (RCRA) specifically defines a hazardous waste as a solid waste (or combination of wastes) that, due to its quantity, concentration, or physical, chemical, or infectious characteristics, can cause or significantly contribute to an increase in mortality. RCRA further defines a hazardous waste as one that can increase serious, irreversible, or incapacitating reversible illness or pose a hazard to human health or the environment when improperly treated, stored, disposed of, or otherwise managed. A solid waste is a hazardous waste if it is not excluded from regulation as a hazardous waste or if it exhibits any ignitable, corrosive, reactive, or toxic characteristics (USEPA 1999).

Under the Hawai'i Hazardous Waste Management Act (HRS Title 19, Health, Chapter 342J), the state hazardous waste management program provides technical assistance to generators of hazardous waste to ensure safe and proper handling. The hazardous waste management program promotes hazardous waste minimization, reduction, recycling, exchange, and treatment as the preferred methods of managing hazardous waste, with disposal used only as a last resort when all other hazardous waste management methods are ineffective or unavailable. The state program is coordinated with Hawai'i's counties, taking into consideration the unique differences and needs of each county.

A detailed USARHAW 2002 hazardous waste report is provided in Appendix K-1 and gives an example of hazardous wastes that are managed by the (Directorate of Public Works) DPW and then disposed of by the Defense Reutilization and Marketing Office (DRMO), as required under 40 CFR 265. The report identifies wastes managed solely at SBMR and WAAF, but similar wastes are generated at the other project installations.

Hazards associated with the proposed action include both wildfires and exposure to radio frequency (RF) electromagnetic fields. The Wildland Fire Management Plan (WFMP) addresses fire actions for Army training lands and fits within the larger framework of the 25th ID(L) and USARHAW wildfire management program for all Army lands on Hawai'i. Potential civilian and military personnel exposure to RF electromagnetic fields is managed through DOD Instruction 6055.11, (Protection of DOD Personnel from Exposure to Radio Frequency Radiation). Both of these hazards are discussed in greater detail below.

3.12.3 Specific Health and Safety Hazards

The following section provides brief definitions and descriptions of human health and safety hazards and identifies specific hazardous materials and wastes that may be used, stored, or transported within the project ROI. These hazardous materials and wastes could affect the environment and often have specific regulations that govern their use, storage, and disposal. Site-specific information is provided under the discussion of individual installations in chapters 5 through 8.

Ammunition

Live-fire training takes place at SBMR and PTA. The general public is not allowed into areas where ammunition is stored or used. Ammunition to be used for training is drawn from ammunition storage facilities at WAAF, from the naval magazines at Lualualei, or from West Loch, where various types of ammunition are stored in specially designed facilities. The section leader must sign for the exact quantities of ammunition issued. WAAF is just south of SBMR, Lualualei is approximately 35 miles (56 kilometers) northwest of Honolulu, and West Loch is approximately 20 miles (32 kilometers) west of Honolulu and 18 miles (29 kilometers) southeast of Lualualei.

Unexploded Ordnance

DOD 6055.9 Standard defines UXO as "explosive ordnance that has been primed, fuzed, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected, or placed in such a manner as to constituted a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause." The only weapons used in live-fire training that can produce UXO are grenades, mortars, and artillery; all other ammunition is inert. UXO is an obvious threat to Army personnel working on the range areas, as well as civilians living in the area. The environment is also at risk by the presence of UXO and ammunition, as chemicals such as lead and explosives propellant could leach into the soils and groundwater.

The ammunition is stored at ammunition holding areas in the vicinity of the exercise, is continuously guarded throughout the exercise, and is dispensed as needed. The various live-fire training exercises are described in Chapter 2, Description of Proposed Action and Alternatives. When a live-fire training range is closed, explosive ordnance disposal (EOD) specialists destroy all UXO. Ordnance normally is destroyed where it is found. No known dud rounds are left in place at the conclusion of a training exercise. Any unused ammunition must be returned to the original storage facility at the end of the exercise.

In addition, soldiers are educated on identifying UXO and proper procedures for handling UXO. Soldiers are given the *Skills Level 2 through 4 Manual* and Field Manual 21-16, *Unexploded Ordnance Procedures* (HQDA 1994), detailing the types of UXO, safety guidelines, and handling procedures. Before they are deployed, soldiers are provided with additional training regarding specific types of UXO in the deployment location. UXO classes are periodically given to soldiers for further training on UXO abatement. Finally, soldiers who are chosen to assist EOD specialists with UXO clearance are given special training prior to range sweeps (Dunn 2003).

Live-Fire Training

The live-fire activities conducted at SBMR and PTA include artillery and mortar (A&M) training, which requires use of bags filled with explosive propellant. Propellant charges are powder that propels or shoots the round of ammunition out of the gun barrel when ignited. Charges are transported to the firing point in the canister they come in. Canisters are transported only with a maximum holding of three charges. If charges are removed from the originally packed canister prior to movement, the canister is resealed to prevent disturbance from moisture or other influences.

The propellant containers are transported by cargo-type vehicles displaying appropriate DOT placards and equipped with two operable 10-lb-BC fire extinguishers. Vehicles used to transport ammunition must pass a rigorous safety inspection before they are allowed to enter any ammunition storage facility. All personnel involved in the transportation of ammunition are trained in accordance with Army, federal, and state standards and are certified to transport munitions and hazardous materials. Artillery and mortar ammunition are packed separately from ignition fuses to preclude accidental detonations. In addition, all ammunition is stored in specialized packing materials designed to withstand an impact 15 times greater than the force of gravity, which further reduces the risk of accidental explosion. All vehicles used in moving ammunition use diesel fuel or JP-8 (kerosene), fuels that are thicker, that are harder to ignite, and that are much less volatile than gasoline. These factors substantially reduce the risk of explosion in a vehicle accident (Onyx 2001, 131-132).

The amount of charges used generally determines how far the round travels. The exact number of bags of propellant required cannot be determined prior to training because acquisition of each target will require adjustments to trajectory and distance. Therefore, extra propellant is maintained on-site during training in order to ensure enough propellant will be available. The charges that are not used for firing missions on SBMR and PTA are burned as a part of training at designated burn pan areas, creating a residue. The constituents of this residue changes, but generally the contents include chemicals such as lead, 2,4- and 2,6-Dinitrotoluene (DNT), benzene, and cyanide. Residues from burned propellant are the only hazardous wastes temporarily stored at these range burn sites in a designated Hazardous Waste Shop Storage Point (HWSSP). When the HWSSP reaches full capacity on SBMR or PTA it is brought to the 90-day transfer accumulation point (TAP) facilities at SBER or PTA pending disposal by the DRMO, Hawai'i, in accordance with federal regulations (Borja 2002a).

Following training, the units remove any target equipment they may have provided, gather brass casings from spent rounds, remove litter, and otherwise make every effort to restore the facility to its condition prior to their use. Units are required to turn in as much of their ammunition residue (i.e. spent shells) as is practical to the ammunition storage point (ASP). For example, on a rifle range where there are established firing points, all of the brass shell casings are cleaned up and turned in as it is practical to retrieve it all. On the other hand, on a squad battle course, where there are no established firing points, units will have to return to where they fought the biggest battles and retrieve what they can. All ASPs require that a certain percentage of weight of brass and links be returned. If the unit is short, they either go back to the training site and find more residue to meet their weight requirement or the commander signs a statement to the effect that it is not practical to try to retrieve any more residue. The disposal of ordnance, such as ammunition, is regulated under RCRA. Specific details related to these regulatory requirements are included in Appendix N-2.

The range facility management support system (RFMSS) keeps a consumption report in the Range Scheduling Office, updated daily with data on all ammunition expended at each range, on what date, and by which unit the ammunition was expended (Borja 2002a). The Directorate of Plans, Training, Mobilization, and Security Range Division, Hawai'i Scheduling Office conducts long-term scheduling of range facilities. Units can access the RFMSS to check the schedule of specific ranges and to request facilities at PTA (Sato 1996, 5-7).

Materials Not Used in Training

Due to public concern, certain hazardous chemicals, specifically Agent Orange and depleted uranium, are being addressed. Various Air Force studies document that in 1971, chemical agents stored in Okinawa were transported to Johnston Island for storage at the Chemical Storage Facility. Public Law 91-672, passed in 1972, prohibited the transport of chemical agents from Okinawa to the United States and authorized destruction of Agent Orange outside these areas. In 1972, the 1.4-million gallon (5.3-million-liter) stockpile of Agent Orange amassed during the Vietnam War was transported directly to Johnston Island and also placed in storage there. In 1977, Agent Orange stored at Johnston Island, as well as in Mississippi, were destroyed by high-temperature incineration at sea in the South Pacific (Onyx 2001, 137). There is no record of Agent Orange used, stored, or disposed of on the islands of O'ahu or Hawai'i.

Military installations hosting training with depleted uranium rounds must apply for and be granted a license from the Nuclear Regulatory Commission for possession of depleted uranium cartridge penetrators. To date, of the three installations in the United States that have such licenses, none are in Hawai'i. A memorandum from the Deputy Chief of Staff, Logistics, Munitions (2000) states that a records search for depleted uranium rounds was conducted and determined that these types of munitions were never a part of the Army's inventory in Hawai'i and that the Army did not and does not have any plans to introduce depleted uranium to the State of Hawai'i (Onyx 2001, 127-128).

Range Sampling

Surface soil and water sampling was conducted on SBMR and PTA firing ranges from November 8 through 14, 2002, in order to obtain information about surface soils on these two installations. Sampling focused on where existing ranges overlapped with proposed ranges.

Secondary explosives compounds, primarily trinitrotoluene (TNT) and cyclotrimethylene-trinitramine (RDX), which are the major ingredients in nearly all munitions formulations, were the focus of these investigations. Other organic chemical explosives used in specific munitions formulations were also tested for, including those that are no longer used in munitions but whose residues potentially remain on contaminated sites. Additionally, full characterization for metals was conducted in parallel with explosives at all of the site ranges.

The results of this sampling revealed that metals (aluminum, iron, lead, and antimony), explosives (RDX, TNT, and nitroglycerin), and semivolatile organic compounds (PAHs) were found at levels exceeding EPA Region IX PRGs on both SBMR and PTA. The PRG are not regulatory standards but used as conservative criteria to indicate a potential problem. The PRG levels used for evaluating the sampling results are levels used to evaluate industrial sites, and do not necessarily apply to areas whose current and future uses are for military training. As further discussed in Section 4.8 (Water Resources), aluminum and iron naturally occur above PRGs in the Hawaiian Islands due to minerals found in the volcanic rock, but the concentrations of lead and other metals could be attributable to man-made sources. These results and their potential affect on surface soil and water pollution are further discussed in Sections 4.8 (Water Resources) and 4.9 (Geology, Soils, and Seismology). The investigation report is included in Appendix M1.

Trichloroethylene

TCE is a nonflammable colorless liquid at room temperature, with a sweet odor and sweet burning taste. TCE is mainly used as a solvent to remove grease from metal parts. TCE can also be found in some household products, including paper correction fluid, paint removers, adhesives, and spot removers (ATSDR 2001). Exposure to TCE occurs by breathing, eating, touching, or drinking it. The USEPA has set a drinking water standard for TCE of 5 parts per billion (ppb). OSHA has also set a worker exposure limit for an 8-hour workday, 40-hour work week of 100 ppm in air. The 15-minute average exposure in air should not exceed 300 ppm at any time during a workday (ATSDR 2001).

In 1985 TCE was found in four wells supplying potable water to SBMR at levels exceeding the health advisory level of 2.8 ppb established by DOH and the federal limit of 5.0 ppb (although the 5.0 ppb EPA federal limit was not established until 1987) (Belt Collins 1993, IV-21). Due to the presence of TCE in the groundwater, SBMR was put on the National Priorities List (NPL), and the Directorate of Public Works (DPW) established an IRP for the site in 1990 (Belt Collins 1993, IV-21). The SBMR NPL site was delisted in August 2000. Because potential contamination and the history of this site has been a public concern, the issue is addressed in the discussion of IRP sites in Section 5.12.

Installation Restoration Program Sites

The IRP is an ongoing DOD-administered program for identifying, evaluating, and remediating contaminated sites on federal lands under DOD control. Through its IRP, the Army evaluates and cleans up sites where hazardous materials and wastes have been spilled or released into the environment. The IRP provides a uniform thorough methodology to evaluate past disposal sites, to control the migration of contaminants, to minimize potential hazards to human health and the environment, and to clean up contamination. IRP sites within the proposed action installations are described in sections 5.12 through 9.12 and appendices K-2 and K-3.

Lead-Based Paint

Lead was a major ingredient in house paint used throughout the country for many years. LBP is defined as any paint or surface coating that contains more than 0.5 percent lead by weight. LBP is a hazard because it can slough off as dust or chips that children can easily inhale or ingest. In 1978 the 0.06 percent maximum lead content of newly applied dry paint was set by the Consumer Product Safety Commission. LBP use was discontinued entirely in 1980 (USCG 2002, 3-123). Army policy, like USEPA policy, is to manage LBP in place unless it presents an imminent health threat, as determined by the installation medical officer or unless operational, economic, or regulatory requirements dictate its removal. Army policy also imposes requirements to reduce the release of lead, lead dust, or LBP into the environment from deteriorating paint surfaces, building maintenance, or other sources on Army installations or on Army-controlled property.

Lead management practices are consistent across SBCT installations and DPW has established an installation lead hazard management program to ensure the health and safety of soldiers and civilians within USAG-HI. The program includes an annually updated lead hazard management plan. The plan implements a management program for identification, risk assessment, worker safety, worker training and certification, community outreach and education, childhood lead poisoning prevention, evaluating, managing, and abating LBP hazards in accordance with Army Regulation 420-70 (USARHAW 2001b). The Army environmental department also maintains a database of lead surveys and results, which is updated as surveys are finalized (Song 2002). The most recent version of the lead survey database for SBMR, WAAF, KTA, PTA, and DMR is available through the Army DPW.

Lead from Ordnance /Ammunition

Lead is also used in manufacturing ordnance/ammunition, such as that used for small arms training. Lead accumulates in backstops, range floors, and berms and can leach into groundwater, be carried off-site by stormwater, be ingested by wildlife, or become airborne. Erosion can overload streams and rivers with sediments. The type and amount of ammunition used on the range, along with its operational history, will greatly influence the risk of lead migration to groundwater. Different calibers of ammunition contain varying amounts of lead, so when looking at the risk of lead migration, both the total number and type of rounds fired must be taken into consideration. This risk is substantially reduced if regular maintenance has been performed on the backstop and apron areas to remove rounds and fragments from soil (USAEC 1998, 8-10). As discussed previously, The Army implements general cleanup procedures following training events to remove shell casings and other munitions residue from the ranges, and explosive ordnance disposal (EOD) specialists destroy all UXO.

The Army recognizes the threats associated with lead. The Army document, Prevention of Lead Migration and Erosion from Small Arms Ranges (USACE 1998) provides management practices to minimize adverse impacts on human health and the environment from small arms ranges.

Asbestos

The USEPA and OSHA regulate asbestos-containing material (ACM) removal and clean-up. The Toxic Substances Control Act (TSCA), the Asbestos Hazardous Emergency Response Act (AHERA), and OSHA regulations provide protection for employees who encounter or remove and clean up ACM. The National Emission Standard for Hazardous Air Pollutants (NESHAP) regulates the renovation, demolition, and disposal of ACM. Asbestos is managed uniformly across the installations of the proposed action. An installation asbestos management program has been established by the DPW to ensure the health and safety of soldiers and civilians within USARHAW. Specific details of asbestos management program are included in Appendix N-2.

Polychlorinated Biphenyls

Polychlorinated biphenyls (PCBs) are mixtures of synthetic organic chemicals with the same basic chemical structure and similar physical properties, ranging from oily liquids to waxy solids. Due to their nonflammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used in hundreds of industrial and commercial applications, including electrical, heat transfer, and hydraulic equipment (USEPA 2002b). PCBs can be found in the cooling fluid of electrical equipment, including transformers and capacitors, particularly if such equipment was manufactured before the early 1970s. PCBs are also found in other manufactured items and as plasticizers and fire retardants in many solid materials (USCG 2002, 3-122).

The USEPA regulates the removal and disposal of equipment containing PCBs in concentrations of 50 parts per million (ppm) or greater under this act (the USEPA regulations implementing TSCA are found in 40 CFR, Part 761). These regulations classify electric transformers containing PCBs as either PCB-contaminated (containing between 50 and 500 ppm) or PCB (containing greater than 500 ppm). The use and disposal of transformers containing less than 50 ppm are not regulated by the USEPA, but disposal of transformer oils containing PCBs is regulated on a state and local level down to 2 ppm. The use and disposal of capacitors containing PCBs at greater than 2 ppm are also regulated (PRC 1995, 1-4).

The Army is committed to removing or retrofilling all electrical equipment containing regulated amounts of dielectric fluid containing PCBs. Active devices containing regulated levels of PCBs are to be replaced with non-PCB devices or retrofilled and reclassified to non-PCB status, in accordance with reclassification requirements outlined in 40 CFR Part 761.30(a)(2)(v). Inactive devices containing regulated levels of PCB are to be removed from the installation and disposed of (PRC 1995, 4).

Electromagnetic Fields

DOD Instruction 6055.11, Protection of DOD Personnel from Exposure to Radio Frequency Radiation, applies to all DOD civilian and military personnel who may be exposed to RF electromagnetic fields, except for patients undergoing diagnostic or therapeutic procedures in medical and dental treatment facilities (DOD 1996, 1-3). It also applies to operations during peacetime and, to the maximum extent possible, during wartime, to limit personnel exposure to RF electromagnetic fields. The instruction states that it is DOD policy to limit personnel Radio Frequency exposure to levels that are within the permissible exposure limit; these limits are identified in enclosure 5 of the instruction. In addition, Army Pamphlet 385-64, described above, addresses electrical hazards.

The production of electromagnetic fields (EMF) is associated with the generation, transmission, and use of electrical energy (NIEHS 2002). The frequency of the field describes the number of cycles that occur in one second and is measured in hertz (Hz). Extremely low frequency (ELF) EMF has cycle frequencies of greater than 3 Hz and less than 300 Hz. In the United States, electricity is usually delivered as alternating current that oscillates at 60 Hz (OSHA 2002). Electromagnetic fields get weaker with distance from their source.

In 1992, the US Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID Program) in the Energy Policy Act (NIEHS 2002). The EMF-RAPID Program was funded jointly by federal and matching private funds, with substantial financial support from the utility industry. Congress instructed the National Institute of Environmental Health Sciences (NIEHS) and the Department of Energy (DOE) to direct and manage a program of research and analysis aimed at providing scientific evidence to clarify the potential for health risks from exposure to ELF-EMF. The NIEHS is one of 25 institutes and centers of the National Institutes of Health (NIH). The EMF-RAPID Program had the following three basic components:

- A research program focusing on health effects research;
- Information compilation and public outreach; and
- A health assessment for evaluating any potential hazards arising from exposure to ELF-EMF.

The NIEHS was directed to oversee the health effects research and evaluation (NIEHS 2002), and provide a report outlining the possible human health risks associated with exposure to ELF-EMF. The document that responds to this requirement of the law is the NIEHS Report on *Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields*.

In its report, the NIEHS concludes that ELF-EMF exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard. In the opinion of the NIEHS, "this finding is insufficient to warrant aggressive regulatory concern. However, because virtually everyone in the United States uses electricity and therefore is routinely exposed to ELF-EMF, passive regulatory action is warranted such as a continued emphasis on educating both the public and the regulated community on means aimed at reducing exposures. The NIEHS does not believe that other cancers or non-cancer health outcomes provide sufficient evidence of a risk to currently warrant concern" (NIEHS 2002).

Based on the results of the NIEHS report discussed above, ELF-EMF are not addressed in this EIS as a potentially harmful issue of concern, but project activities involving electromagnetic field frequencies higher than ELF-EMF are addressed. This includes radio frequency EMF.

Remote automated weather stations (RAWS) are located on some of the installations, primarily in remote wildland fire areas, and are used to collect weather information to aid in determining the threat of wildfires (Shelley 2002). RAWS use radio frequencies to transmit weather data to a geostationary operational environmental satellite. The RAWS transmit information for approximately 15 seconds each hour, every hour around the clock. Exposure to any RAWS EMF is limited because they are typically located in remote locations, are unmanned, and transmit information for a short duration.

Equipment producing EMF that could pose a serious health risk is operated under strict constraints, in site-approved areas, and by qualified personnel (Moreno 2002). In addition to mobile radar equipment, stationary equipment is located at WAAF and SBMR. Mobile radar equipment is owned by Division Artillery and consists of a radar set designed to detect incoming artillery and projectiles. It is operated and managed by the Forward Area Defense section. Specific stationary equipment producing EMF that could pose a serious health risk is located at SBMR and WAAF and is discussed in Chapter 5.

Petroleum, Oils, and Lubricants

POL products form a major category of hazardous materials used at the project installations and include engine fuels (gasoline, diesel, jet fuel [JP-8]), motor oils and lubricants, and diesel and kerosene heating fuels. More specifically, vehicle and heating fuels include a mixture of aliphatic hydrocarbons and such aromatic organic compounds as benzene, toluene, ethylbenzene and xylene (BTEX) (IMS 1994, 3-20). CERCLA definitions of hazardous substances (42 USC 9601[14]) and pollutants exclude petroleum unless specifically listed. The USEPA interprets petroleum to include hazardous substances found naturally in crude oil and crude oil fractions, such as benzene, and hazardous substances normally added to crude oil during refining. Petroleum additives or contaminants that increase in concentration in petroleum during use are not excluded from CERCLA regulations.

USTs/ASTs

Both underground storage tanks (USTs) and aboveground storage tanks (ASTs) are used to store hazardous substances and petroleum products at locations throughout the project area. USTs are regulated under RCRA and its implementing regulation (40 CFR, Parts 280 and 281 as mandated by the Hazardous and Solid Waste Amendments of 1984, PL 98-616, 98 Stat. 3221); Hawai'i's Department of Health Environmental Management Division (State Statutes Chapter 342-L); and USEPA (Technical Standards and Corrective Action Requirements for Owners and Operators of USTs [40 CFR 280]. See Appendix N-2 for details on the Army's UST Program.

Oil/Water Separators

Oil/water separators (OWSs) separate oil, fuel, and grease from water by gravity because these substances have a specific gravity that is less than that of water (i.e. gasoline floats on water). OWSs are often located below ground or housed in a vault constructed flush with the ground surface and therefore they can create environmental issues similar to USTs. A vehicle maintenance area may contain a small self-contained OWS unit with access through trenches and floor drains, whereas a wash rack may contain a larger industrial-sized OWS unit capable of higher flow rates and larger volumes of wastewater. Many larger OWSs are connected to USTs where the oils will then be stored. Each month, the oils are skimmed from the surface of these OWSs or USTs and recycled or disposed of; sediments are removed every six months or more frequently, if needed, by a service contractor. Oils and other hazardous wastes are then disposed of by the service contractor (McGinnis 2002).

Pesticides/Herbicides

The USEPA defines a pesticide as any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest (USEPA 2002c). Pests can be insects, mice, and other animals, unwanted plants (weeds), fungi, or microorganisms, such as bacteria and viruses. Though often misunderstood to refer only to insecticides, the term pesticide also applies to herbicides, fungicides, avicides (bird agents), rodenticides, and various other substances used to control pests. A pesticide is also defined as any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant (USEPA 2002c). The inclusive pesticide issue for this project discussion includes the specific herbicide title due to the explicit concern on herbicide use and storage. All pesticides used on federal lands must be applied by a trained and certified pesticide applicator or by a trainee under the direct supervision of a certified pesticide applicator.

Biomedical Waste

The Medical Waste Tracking Act (PL 100-582, 42 USC §§6912, 6992, et seq.) under RCRA establishes the standards for tracking and managing medical waste. This act is strictly a demonstration program to track the disposition and transportation of medical wastes.

OSHA regulates occupational exposure to blood, regulated waste, and certain other body fluids that have been shown to transmit bloodborne diseases. OSHA defines regulated waste as liquid or semiliquid blood or other potentially infectious materials, contaminated items that would release blood or other potentially infectious materials in a liquid or semiliquid state if compressed, items that are caked with dried blood or other potentially infectious materials and are capable of releasing these materials during handling, contaminated sharps, and pathological and microbiological wastes containing blood or other potentially infectious materials (USCG 2002, 3-123).

The Army follows strict guidelines according to AR 200-1 in the handling, use, and disposal of medical, dental, and veterinary supplies; this is discussed in detail in Appendix N-2.

Most medical waste within the project vicinity is produced and temporarily stored outside of the project area at Tripler Army Medical Center. The medical clinics on SBMR and PTA produce small amounts of regulated chemical and medical waste. The regulated waste from SBMR is picked up weekly by a private contractor and is sent to Tripler Army Medical Center (Thomas 2002). The regulated waste from PTA is transported on an as-needed basis, generally once per year, and delivered to Hilo Hospital (Hill 2002). The medical waste is combined and temporarily stored before being disposed of at a regulated off-base disposal site. Emergency medical training medics accompany units on deployment at KTA and DMR and biomedical waste is shipped back to SBMR with the units.

Radon

Radon is a colorless and odorless gas that is produced by the decay of naturally occurring uranium and is found in high concentrations in rocks containing uranium, granite, shale, phosphate, and pitchblende. Atmospheric radon is diluted to insignificant concentrations. Radon trapped in soil can enter a building through small openings and can accumulate in enclosed areas, such as basements.

Radon is measured in picocuries per liter (pCi/L) of air. The average level of radon is estimated to be 1.3 pCi/L indoors and 0.4 pCi/L outdoors. There are no laws that require testing and remediating radon, but the USEPA has made recommendations for both residential housing and schools. The USEPA-recommended action level for radon is 4 pCi/L.

Radon occurs in low concentrations in the Hawaiian Islands. Hawai‘i's low radon concentrations can be attributed to soils low in uranium, and year-round natural ventilation of frequently occupied buildings, such as homes and schools. The Army follows a Radon Reduction Program under AR 200-1 to reduce radon exposure of military personnel and civilians. The Army Radon Reduction Program is discussed in detail in Appendix N-2.

As part of the National Radon Database, the USEPA and the USGS have evaluated the radon potential in both Honolulu and Hawai‘i counties. This evaluation categorized both Hawai‘i and Honolulu counties as Radon Zone 3 areas (EDR 2002a-e). These areas have the lowest average short-term radon measurements (less than 2 pCi/L) that can be expected to be measured in a building without implementing radon control methods. The three USEPA radon zone concentrations are listed below:

- Zone 1, highest potential (greater than 4 pCi/L);
- Zone 2, moderate potential (from 2pCi/L to 4 pCi/L); and
- Zone 3 (Honolulu and Hawai‘i counties), lowest potential (less than 2 pCi/L).

Data from several radon surveys in Hawai‘i show concentrations much lower than the USEPA's recommended action level of 4 pCi/L of air. For example, a 1993-1996 Radon School Survey of 97 schools in Hawai‘i resulted in an average radon level of 0.6 pCi/L (DOH 1998). Additionally, the latest Environmental Compliance Assessment (ECAS) Report (1999) for SBMR WAAF, and PTA, there were no findings for radon (USACE 1999). An ECAS report is an in-house study of the compliance status of military installations. For this reason, radon is not addressed in the individual installation analyses.

Wildfires

Wildland fire management on Army-controlled O‘ahu lands is conducted in accordance with the NHPA and the ESA (USARHAW and 25th ID[L] 2001a, 69). See Section 3.11, Cultural Resources, and Section 3.10, Biological Resources, for further details on these acts. The WFMP for Pōhakuloa and O‘ahu Training Areas was developed to establish specific guidance, procedures, and protocols for managing wildfires on Army training lands. The WFMP acknowledges that most fire history files are incomplete; the files were primarily retained as records, and after five years, following the disposition of records, they were destroyed, in accordance with the Modern Army Recordkeeping System (USARHAW and 25th ID[L] 2000, 1-1 and 3-9). Much attention is given to both fire prevention and fire suppression actions. (Chapter 1 of the WFMP is provided in Appendix O.) Preventive actions include managing vegetation, prescribed burns, firefighter training, and establishing water sources for firefighting.

Access to water resources and the efficient use of water can significantly affect the outcome of efforts to control wildland fires on training lands. The locations of water storage resources are described in the separate installation chapters of the WFMP. Fire trucks and rotary-winged aircraft with fire buckets primarily use the water storage resources. If a water resource is off Army land, formal agreements between the Army and the owners of the water resource are needed for those resources to be deemed potentially useful. Although water storage resources such as dip ponds are maintained, sea and brackish water are often the most readily available sources of water for wildland firefighting in Hawai'i. The use of seawater to control wildland fires is acceptable in emergency situations and when freshwater is not available (USARHAW and 25th ID[L] 2000, 4-13).

According to the WFMP, in the recent past, the entire Hawaiian ecosystem has experienced an increase in wildfire frequency (USARHAW and 25th ID[L] 2000a, 3-9). Causes for the increase in fire frequency include the spread and intensification of alien grasses. On Army land, technological advances in ammunition and supporting pyrotechnic devices used for training have contributed to the fire frequency increase. In 1991, the Army began to reduce the frequency of fires on Army land with the application of a fire prevention and prescribed burn program. One of the goals includes reducing fuel loading and fire intensity by managing the fire-adapted alien grasses within designated ordnance impact areas. Another goal includes protecting the native vegetation outside of the ordnance impact areas.

On O'ahu, when northeasterly trade winds prevail and flammable fuels are abundant, the threat of fire to natural communities intensifies (USARHAW and 25th ID[L] 2001a, 34, 69). Prior to human settlement, natural fires on O'ahu were rare. Most wildfires are of human origin because lightning is rare on O'ahu. The fires on O'ahu mostly occur at lower elevations and in drier leeward locations, and are fueled by nonnative grasses. Military live-fire activities start many of the fires within ordnance impact areas, but most of the fires that start on training lands on O'ahu are contained within the boundaries of the installation.

Seven fire management areas (FMAs) are established in the WFMP (USARHAW and 25th ID[L] 2000a, 7-1 to 7-13). FMAs are designated for MMR, SBMR, SBMR East Range, KTA, KLOA DMR, and PTA. The Army describes wildfire management measures specific to the FMA by assessing previous fires, identifying likely ignition sources, and developing methods for reducing fuel loads.

Wildland fire SOPs in the WFMP describe how to carry out firefighting procedures (USARHAW and 25th ID[L] 2000a, Annex A). Each of the FMAs identified above has its own set of wildland fire SOPs but only the MMR FMA and SOP have been completed.

To control fires, the Army uses the long-term liquid concentrate fire retardant LCA-R, which consists of ammonium, attapulgite clay thickener, a corrosion inhibitor, and a coloring agent diluted with water. (LCA-R is manufactured by Fire-Trol Holdings, LLC.) LCA-R is primarily used on prescribed fires, while water and nonpotable water are primarily used on wildfires. Salt water is used as a last resort on wildfires. LCA-R is approved for use by the US Forest Service under USDA Forest Service Specifications 5100-00304 and has been determined not hazardous to people (Enriques 2002a, 2002b, and 2002c).

During a typical training exercise, unit leaders receive briefings from Range Division staff on the locations of fire hazards and fire prevention measures and procedures. Before maneuver live-fire training, unit leaders walk the areas to be used in a training scenario, accompanied by Range Division staff members who direct the location and limitations for weapons firing. When the live-fire walk through is completed, the unit leaders use blank ammunition and signaling devices to rehearse the attack scenario. Where necessary, the scenario is modified to reduce the risk of fire or other damage to the environment. The unit leaders then brief every soldier in the unit on the importance of preventing wildland fires. In the event of fire at any location, the unit takes all appropriate actions to put out the fire.