

**PROPOSED DESTRUCTION OF
RECOVERED CHEMICAL MUNITIONS
AT SCHOFIELD BARRACKS, O`AHU, HAWAI`I**

ENVIRONMENTAL ASSESSMENT



January 2008

DRAFT
Finding of No Significant Impact for
Destruction of Chemical Munitions at Schofield Barracks, O`ahu, Hawai`i

Pursuant to the Council on Environmental Quality (CEQ) Regulations (40 CFR Parts 1500-1508) and Army regulation (32 CFR 651) for implementing the procedural provisions of the National Environmental Policy Act (42 USC 4321 et seq.), the US Army has prepared an environmental assessment (EA) to evaluate the potential environmental effects of destroying recovered chemical munitions on Schofield Barracks Military Reservation (SBMR).

Purpose and Need for Proposed Action: The purpose of the proposed action is to safely destroy 71 1940s-era chemical munitions that have been unearthed and placed in an interim holding facility (IHF) on SBMR. These munitions need to be destroyed (a) to prevent any possibility of future explosive incidents or chemical exposure to personnel and (b) to comply with the Chemical Weapons Convention. To accomplish this, the US Army proposes to deploy a Transportable Detonation Chamber (TDC) to SBMR, for a period of less than 6 months (in the spring of 2008), of which less than 90 days would be spent actually processing the munitions.

Alternatives: The Army identified two alternative technologies that would safely and effectively destroy both the explosive components and the chemical fill (phosgene and chloropicrin) in the recovered chemical munitions: (1) the TDC and (2) the Explosive Destruction System (EDS). Both systems have been proven to destroy chemical warfare materiel (CWM) in a safe, environmentally sound manner, without releasing chemicals to the environment. Chemical vapors are completely contained and treated in both systems, with secondary containment provided by a system enclosure with air filtration. The TDC is the Army's preferred alternative, because it has a higher throughput rate and produces less hazardous waste than the EDS. Other alternatives (other sites on SBMR, open detonation, or taking the CWM to a fixed-site destruction facility in the continental US) were determined not to be feasible. Although the No Action Alternative (indefinite storage of the CWM on SBMR) would not meet the purpose and need for the proposed action and would violate the Chemical Weapons Convention, it was evaluated as required by NEPA.

Factors Considered in Determining that No Environmental Impact Statement is Required: The EA, which is incorporated by reference into this draft Finding of No Significant Impact (FNSI), examined the potential effects of the proposed action and alternatives, including the No Action Alternative, on environmental and cultural resources on SBMR. Implementing the proposed action would result in a long-term benefit to safety and the protection of human health and the environment on SBMR by destroying the 71 chemical munitions.

Adverse impacts to the environment would be temporary and negligible. There would be negligible increases in annual air emissions at SBMR and negligible increases in existing noise levels. The proposed deployment site on SBMR (Firing Point 202) is a highly disturbed area that supports ongoing military activities. No special-status species or habitats are known to exist on this site or in the immediate vicinity. Only minimal grading and excavation (about ¼ acre) and no permanent structures are proposed, limiting the potential for erosion or damage to vegetation or water resources. Impacts to wildlife would be limited to temporary disturbance from noise and human activities.

All hazardous wastes generated by TDC operations would be collected, characterized, and transported to a permitted treatment, storage, or disposal facility (TSDF) in the continental

US. Disposition of non-hazardous solid and liquid wastes would be well within the capacity of local waste disposal facilities. Analysis of a worst-case hypothetical accident, based on the extremely unlikely scenario of an uncontrolled release of chemical fill outside of the engineering controls provided by both the TDC and system enclosure, shows that there is no chance of off-post fatalities.

No historic properties have been identified at or near the site. Therefore, the Army has made a determination of "no historic properties affected" for the project and has initiated Section 106 consultation with the State Historic Preservation Officer and appropriate consulting parties. In the unlikely event of a discovery, ground disturbing activities in the immediate vicinity would cease and standard notification and documentation protocols would be followed.

The proposed action would result in less than significant cumulative impacts for each of the individual resource areas evaluated, in relationship to the other past, present and future projects identified for cumulative impacts analysis.

Mitigation: Because the proposed action would not cause significant impacts, nor cumulatively cause existing impacts to rise above a less than significant status, mitigation measures are not required.

Conclusion: Based on the EA, which is herewith incorporated by reference, it has been determined that the implementation of the proposed action would have no significant direct or indirect impacts on the quality of the natural or human environment. Because no significant environmental impacts would result from implementing the proposed action, an environmental impact statement is not required and will not be prepared.

Public Comment: The EA and draft FNSI are available for review and comment for 30 days, beginning on 11 January 2008 and ending on 10 February 2008. The EA and draft FNSI can be reviewed at the following locations: Hawai'i State Library, Wahiawa Public Library, Mililani Public Library, Waianae Public Library, Waialua Public Library, Kahuku Public and School Libraries, and Pearl City Public Library, or on the website of the Hawaii Department of Health, Office of Environmental Quality Control: <http://www.state.hi.us/health/oeqc/>.

Comments may be sent by mail to Dale Kanehisa, USAG-HI, Directorate of Public Works, Environmental Division (IMPC-HI-PWE), 947 Wright Avenue, Wheeler Army Airfield Schofield Barracks, HI 96857-5013; by fax to (808) 656-1039; or by e-mail to dale.kanehisa@us.army.mil; and must be received by 7 February 2008.

Subject to review and consideration of comments submitted by individuals, organizations, or agencies during the comment period, USAG-HI intends to issue a final FNSI at the conclusion of the comment period and to proceed with the proposed action.

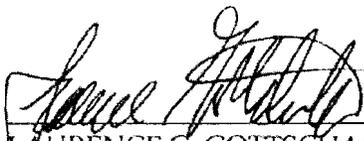
This FNSI is issued by:

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**Environmental Assessment for
Proposed Destruction of Recovered Chemical
Munitions at Schofield Barracks, O`ahu, Hawai`i**

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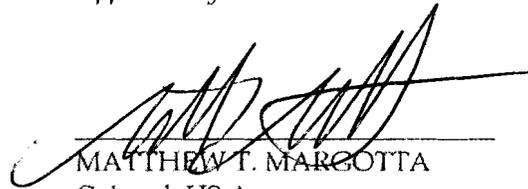

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Executive Summary

The US Army proposes to deploy a Transportable Detonation Chamber (TDC) to Schofield Barracks Military Reservation (Schofield Barracks, or SBMR), for a period of less than 6 months in the spring of 2008, in order to safely destroy 71 1940s-era chemical munitions that have been unearthed and placed in an interim holding facility (IHF), near the proposed deployment site on Schofield Barracks, Firing Point 202 (FP-202). These munitions need to be destroyed to prevent any possibility of future explosive incidents or chemical exposure to personnel and to comply with the Chemical Weapons Convention. The TDC system and support structures would occupy the site for several months, of which less than 90 days would be spent actually processing the munitions, and then be removed.

This Environmental Assessment (EA) documents the analysis of potential environmental effects associated with the Army's proposed action. Two alternative technologies are evaluated, the TDC and the Explosive Destruction System (EDS), along with the No Action Alternative. The TDC is the Army's preferred alternative, because it has a higher throughput rate and produces less hazardous waste than the EDS.

TDC Alternative (Proposed Action)

The TDC Alternative would result in long term beneficial effects to safety and protection of human health and the environment on Schofield Barracks by destroying the 71 chemical munitions.

The TDC uses controlled, enclosed detonation to destroy recovered chemical warfare materiel (CWM) through rapid gas phase hydrolysis. The primary components of the TDC system are the detonation chamber, expansion tank, and off-gas treatment system with air monitoring. The TDC system would be installed inside a transportable tent-like structure, referred to as the system enclosure, which would be connected to another air filtration system and equipped with plastic flooring. An area of about $\frac{1}{4}$ acre would be graded to support the TDC and system enclosure.

Adverse impacts to the natural environment would be temporary and minimal. TDC operations would result in negligible increases in annual air emissions at SBMR and temporary, negligible increases in existing noise levels. The proposed site, FP-202, is a highly disturbed area that supports ongoing military activities. No special-status species or habitats are known to exist on this site or in the immediate vicinity. Only minimal excavation and no permanent structures are proposed, limiting the potential for erosion or damage to vegetation. Impacts to wildlife would be limited to temporary disturbance from noise and human activities. No cultural resources are known to exist on the site.

All hazardous wastes generated by TDC operations would be collected, characterized, and transported to a TSDF in the continental US. Disposition of non-hazardous solid and liquid wastes would be within the capacity of local waste disposal facilities. Analysis of a worst-case accident scenario shows that there is no chance of off-post fatalities, in the unlikely event of an accidental release of chemical fill. The proposed action and alternatives would

result in less than significant cumulative impacts in relationship to the other past, present, and reasonably foreseeable future projects identified for cumulative impacts analysis.

EDS Alternative

The EDS Alternative would result in long term beneficial effects to safety and protection of human health and the environment on Schofield Barracks by destroying the 71 chemical munitions.

The EDS uses donor explosive charges to rupture the munition shell and release the chemical fill. Chemical neutralization is used to treat the chemical fills. The primary component is the containment vessel. Like the TDC, the EDS would be installed in a system enclosure to provide secondary containment.

The EDS Alternative would cause a temporary and moderate increase in the total amount of hazardous wastes generated annually at Schofield, a short-term minor impact. All hazardous wastes generated by EDS operations would be collected, characterized, and transported to a TSDF in the continental US.

Adverse impacts to the natural environment would be temporary and negligible, similar to the impacts of the TDC Alternative.

No Action Alternative

The No Action Alternative would require indefinite storage of the recovered CWM on Schofield Barracks. The No Action Alternative would not result in any significant impacts to the environmental resources evaluated in this EA. However, long-term storage of the recovered CWM would increase the potential for deterioration of the munitions and an accidental release of chemical fill. Indefinite storage of the recovered CWM on Schofield Barracks would violate the Chemical Weapons Convention.

Environmental Consequences of the Alternatives

Table ES-1 summarizes and compares the potential environmental consequences of the three alternatives. The following terms are used in Table ES-1, if applicable, to describe the magnitude of impacts:

- No Impact: The action does not cause a detectable change
- Negligible: The impact is at the lowest level of detection
- Minor: The impact is slight but detectable
- Moderate: The impact is readily apparent
- Major: The impact is severely adverse or exceptionally beneficial

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
The following resources were considered and found to have no potential for environmental impacts (and therefore not further discussed in the EA):			
Land Use	No impact. Consistent with current and planned use at FP-202 and the surrounding ranges. Would not permanently change land use on SBMR in any way.	Same	No change
Socioeconomics	No impact. Would require a workforce of about 20 personnel to be on-post for several months (with TDC operations for less than 90 days). No long-term effects on population, employment or community services.	Same	No change
Public Services – Police, fire, and emergency medical services	No impact. These existing services are accustomed to accommodating fluctuations in troop strength.	Same	No change
Utilities	No connection to existing utilities. Potable water, portable toilets, diesel fuel, and propane gas would be brought to the site by truck; electric power would be supplied by a diesel-fueled generator.	Same	No change
The following resources were evaluated in more detail in the EA:			
Air Quality	Negligible impact on annual emissions at SBMR. Minimal fugitive dust during set-up on the site. Less than <i>de minimis</i> emissions of criteria pollutants, including particulates, and minimal emissions of hazardous air pollutants from generators. Negligible (trace) amounts of hazardous components from operation of the TDC.	Negligible impact on annual emissions at SBMR. Minimal fugitive dust during set-up on the site. Less than <i>de minimis</i> emissions of criteria pollutants, including particulates, and minimal emissions of hazardous air pollutants from generators. Negligible (trace) amounts of hazardous components from operation of the EDS.	No direct effect.
Noise	Negligible short-term impact. Operational noise levels of the TDC would be less than 100 decibels (dba) at a 100-foot distance and 65 dba at the nearest housing, would occur during daytime only, for up to 3 weeks during the less-than-90-day operating period.	Negligible short-term impact. Operational noise of the EDS would be similar to the TDC, only one detonation per day but for more weeks during the less than 90-day operating period.	No effect

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
Geology and Soils			
Geology/Topography	No effect	No effect	No effect
Soils	Negligible impact. Minimal potential for erosion, less than ¼ acre of ground disturbance. Soil contamination prevented by complete containment and removal of wastes from the site.	Negligible impact. Minimal potential for erosion. Soil contamination prevented by secondary containment and removal of wastes from the site.	No effect
Prime Farmland	No effect	No effect	No effect
Water Resources			
Surface Water	Negligible impact. Minimal potential for erosion, minimal ground disturbance.	Negligible impact. Minimal potential for erosion, minimal ground disturbance.	No effect
Hydrogeology/Groundwater	Negligible impact. Water contamination prevented by containment and removal of all wastes.	Negligible impact. Water contamination prevented by containment and removal of all wastes.	No effect
Potable Water	Negligible short-term impact. Minimal requirements for potable water (<1,500 gallons).	Negligible short-term impact. Minimal requirements for potable water (<5,000 gallons).	No effect
Floodplains	No effect	No effect	No effect
Wetlands	No effect	No effect	No effect
Stormwater	Negligible impact. No permanent increase in impervious surface area.	Negligible impact. No permanent increase in impervious surface area.	No effect

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
Biological Resources			
Vegetation	Negligible impact. Temporary disturbance of non-native vegetation on disturbed site.	Negligible impact. Temporary disturbance of non-native vegetation on disturbed site.	No effect
Wildlife	Negligible short-term impact. Wildlife temporarily disturbed by TDC noise; individuals adapted to noise from surrounding firing ranges. Accidental release of chemical vapors (extremely unlikely due to secondary containment) could be fatal to wildlife in the immediate vicinity.	Negligible short-term impact. Wildlife temporarily disturbed by EDS noise, less frequent than for TDC. Accidental release of chemical vapors or chemical reagents (extremely unlikely due to secondary containment) could be fatal to wildlife.	No direct effect. Accidental release of chemical vapors or chemical reagents (unlikely due to overpacks and storage unit) could be fatal to wildlife.
Sensitive Species	No impact. No recorded special status species or suitable habitat.	No impact. No recorded special status species or suitable habitat.	No effect
Cultural Resources			
Architectural Resources	No effect	No effect	No effect
Archaeological Resources	No effect. No known resources and less than ¼ acre of ground disturbance.	No effect. No known resources and less than ¼ acre of ground disturbance.	No effect
Native Hawai`ian	No known resources	No known resources	No effect other than current use of the site
Transportation	Negligible short-term impact. Transport of TDC, system enclosure and other equipment requires a total of 16 tractor-trailers. A permit for Oversize and/or Overweight Vehicles and Loads and coordination with local transportation agencies is required for transporting the TDC.	Negligible short-term impact. Transport of EDS, system enclosure and other equipment requires a total of 7 tractor-trailers. No Oversize/Overweight permit is required for transporting the EDS.	No effect

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
Hazardous Materials and Waste Management			
Hazardous Wastes	<p>Negligible impact. Potentially hazardous wastes generated by TDC would be containerized, characterized, and stored in accordance with 90-day RCRA permit until transported to treatment, storage, or disposal facility (TSDF) in continental US: used lime (0.5 ton), pea gravel (about 2 tons); used pre-filters (18) and HEPA filters (36); used laboratory solvent (5 gallons). Metal fragments (about 2 tons) also would be containerized and shipped to TSDF.</p> <p>Moderate beneficial impact provided by eliminating the 71 chemical munitions.</p>	<p>Negligible impact. Potentially hazardous wastes generated by EDS would be containerized, characterized, and stored in accordance with 90-day RCRA permit until transported to TSDF in continental US: neutralents, spent decontamination solutions and rinse waters (approximately 4,000 gallons, or about 74 drums of 55-gallon each); metal fragments (approximately 3 tons); drum filters.</p> <p>Moderate beneficial impact provided by eliminating the 71 chemical munitions.</p>	<p>No direct effect in the short term. However, these munitions would eventually require destruction and disposal in accordance with the Chemical Weapons Convention. Therefore, taking no action would only postpone the hazardous wastes that would eventually be generated.</p>
Wastewater	<p>Negligible impact. One-time disposal of 1,000 gallons non-contact cooling water. Cooling water will be tested for residual metals before disposal.</p>	<p>Negligible impact. One-time disposal of spent decontamination solutions and rinse waters (less than 2,000 gallons), if found to be non-hazardous after sampling and analysis.</p>	<p>No effect</p>
Solid Wastes	<p>Negligible impact. Generation of solid wastes would be well within the capacity of local waste disposal facilities.</p>	<p>Negligible impact. Generation of solid wastes would be well within the capacity of local waste disposal facilities.</p>	<p>No effect</p>
Petroleum, Oils, Lubricants and Storage Tanks	<p>Negligible impact. Approximately 4,000 gallons of diesel fuel stored onsite with containment; handling and storage in accordance with Spill Prevention, Control, and Countermeasures (SPCC) Plan.</p>	<p>Negligible impact. Less than 4,000 gallons of diesel fuel stored onsite with containment; handling and storage in accordance with the SPCC plan.</p>	<p>No effect</p>

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
Human Health and Safety			
Ranges and Munitions	Negligible impact. Training/operations at the adjacent Grenade House, OP Mike and NBC Chamber would be suspended during TDC operations. Only essential personnel allowed on ranges or in the operational area of FP-202, unless escorted.	Negligible impact. Training/operations at the adjacent Grenade House, OP Mike and NBC Chamber would be suspended during EDS operations. Only essential personnel allowed on ranges or in operational area of FP-202, unless escorted.	No effect
Munitions and Explosives	Negligible impact. TDC located at the farthest point away from road. Non-essential personnel kept at safe distance. Donor explosives and CWM brought to site daily in certified vehicle, stored in separate secure Munitions Storage Unit and day box until needed; not stored onsite overnight; loading/unloading only by highly trained personnel. Site-specific safety procedures.	Negligible impact. EDS located at the farthest point away from road. Non-essential personnel kept at safe distance. Donor explosives and CWM brought to site daily in certified vehicle, stored in separate secure Munitions Storage Unit and day boxes until needed; not stored onsite overnight; loading/unloading only by highly trained personnel. Site-specific safety procedures.	Moderate impact. Potential for deterioration of the munitions and incidental leakage over time. Additional risk to personnel handling munitions if they were repackaged for long-term storage.
Environmental Justice	No disproportionately adverse effects	No disproportionately adverse effects	No disproportionately adverse effects
Indirect and Cumulative Impacts	The Proposed Action (TDC and EDS Alternatives) would result in less than significant cumulative impacts for each of the individual resource areas discussed in relationship to the other past, present and future projects identified for cumulative analysis.		
Potential Effects of Accidents (Hypothetical Worst-Case Scenario)	<p>Moderate impact, if the hypothetical worst-case accident were to occur. However, no impact is expected under anticipated conditions, with the administrative and engineering safeguard controls that would be employed for storage, transport, and destruction operations. There has never been such an accident in the history of destroying CWM using the EDS or TDC.</p> <p>The ultra-conservative accident analysis is based on the extremely unlikely scenario of an uncontrolled release of all 11 pounds of phosgene from the largest CWM (155-mm) found at SBMR, outside of the containment provided by overpacks, the TDC (or EDS), and the system enclosure. It does not reflect the administrative and engineering safeguard controls that actually would be employed to prevent or minimize any incident, and it further assumes no actions would be taken to control or mitigate the consequences of an accidental release of chemical fill. The scenario locations examined are the current storage location; the 0.3-mile on-post transportation route from the storage area to the operations site; and the proposed operation site; thus, both of the action alternatives as well as the no action alternative of indefinite storage are addressed.</p>		

TABLE ES-1

Potential Environmental Consequences

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

TDC (Preferred) Alternative	EDS Alternative	No Action Alternative
<p>There is no chance of off-post fatalities. The “no effects” area would extend about 1 mile downwind and the “no adverse effects” area would extend 784 feet downwind, both of which are well inside the SBMR boundary. The nearest off-post housing (Kunia Drive area) is more than 2.5 miles away. Buildings in the cantonment area and Army housing are located within the “no effects” area. The nearest Army housing is located 2,000 feet away from FP-202.</p>		
<p>On-post personnel very close to an incident could be subjected to a lethal or sub-lethal dose. The Army would take all necessary action to provide the appropriate protective equipment and to restrict on-post personnel from the immediate vicinity of the storage area, along the route, and near the site while conducting the proposed action.</p>		

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Purpose, Need, and Scope

1.1 Introduction

The US Army (the Army) proposes to deploy a Transportable Detonation Chamber (TDC) to Schofield Barracks Military Reservation (Schofield Barracks, or SBMR), for a period of less than 6 months in the spring of 2008, in order to safely destroy 71 1940s-era chemical munitions that have been unearthed and placed in an interim holding facility (IHF). The proposed deployment site on Schofield Barracks, Firing Point 202 (FP-202), is near that IHF (Figure 1-1).

This Environmental Assessment (EA) documents the analysis of potential environmental effects associated with the Army's proposed action. Details about the proposed action are set forth in Section 2.0 and alternatives are discussed in Section 3.0.

1.2 Purpose and Need

In 1997, the US became a signatory to the Chemical Weapons Convention, which not only prohibits the use of chemical weapons, but mandates the elimination of existing stockpiles that have been in storage in the US since World War II.

Under Public Law 102-484 (October 23, 1992), and in compliance with the Chemical Weapons Convention, the US Army is responsible for the centralized management and safe destruction of all Department of Defense (DoD) non-stockpile chemical warfare materiel (CWM). Recovered CWM refers to CWM items that are not part of the current US stockpile. These are items that have been recovered, or that will be recovered in the future, from burial sites or test and firing ranges throughout the US and its territories.

Until the 1950s, chemical munitions were typically disposed of by land burial, which had been considered an acceptable practice before that time. CWM that had been previously disposed of as wastes are excluded from the requirements of the Chemical Weapons Convention, but only as long as the CWM remains buried. When buried chemical munitions are discovered and unearthed – for example during a munitions response or range clearance – they become recovered CWM (also referred to as non-stockpile CWM) and must be destroyed.

The US Army has unearthed and stored 1940s-vintage legacy munitions containing chemical fill on Schofield Barracks. (See Section 2.2 for more information.) These munitions need to be destroyed to prevent any possibility of future explosive incidents or chemical exposure to personnel and to comply with the Chemical Weapons Convention.

The proposed action would accomplish, safely and effectively, both the destruction of the explosive components in the recovered CWM stored on Schofield Barracks and treatment of their chemical contents. Use of the completely contained TDC is proposed, in accordance

with DoD policy stating that open detonation of chemical weapons is only acceptable when an item is determined to be unsafe for handling or movement. (Open detonation is further discussed in Section 3.3.1.)

1.3 Scope of the EA

This EA has been developed in compliance with the National Environmental Policy Act (NEPA), and its implementing regulations found at 40 *Code of Federal Regulations* (CFR) Part 1500 through Part 1508 (40 CFR 1500-1508), and the Army's regulations implementing NEPA, found at 32 CFR 651. Its purpose is to inform decision makers and the public of the potential environmental impacts of the proposed action and alternatives.

In addressing environmental considerations, the Army is guided by relevant statutes (and their implementing regulations) and Executive Orders (EOs) that establish standards and provide guidance on environmental and natural resources management and planning. These include, but are not limited to, the Clean Air Act, Clean Water Act, Noise Control Act, Endangered Species Act, National Historic Preservation Act, Archaeological Resources Protection Act, Resource Conservation and Recovery Act (RCRA), EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*), and EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*).

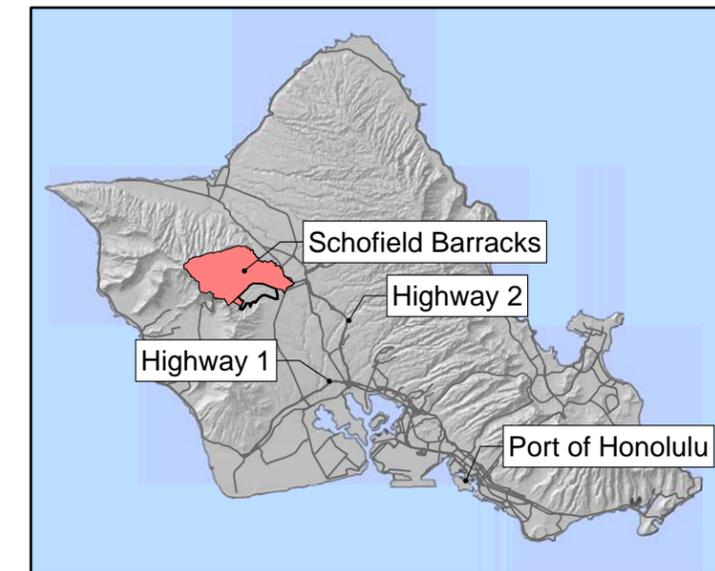
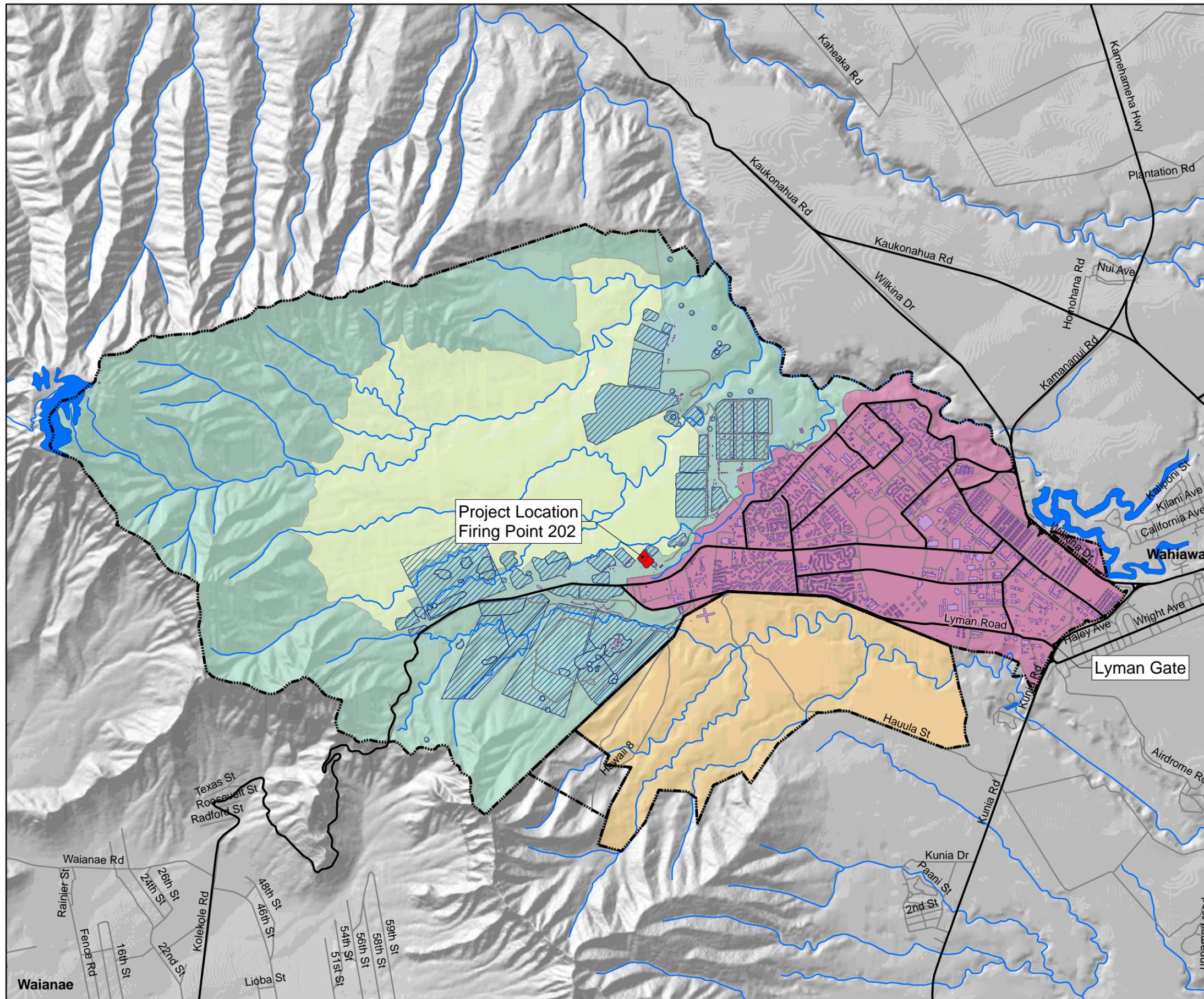
This EA identifies, evaluates and documents the potential environmental effects of destroying 71 recovered CWM items on Schofield Barracks. Discussion of the potential environmental effects of alternative methods for destroying the CWM on Schofield Barracks assumes that the action will be a short-term action, requiring less than 6 months on the site, of which less than 90 days would be spent actually processing the CWM. Other reasonably foreseeable future actions during this time period are addressed in the cumulative impacts/effects section of this EA.

This EA also discusses the potential impacts of the No Action Alternative, as required by NEPA, to provide a benchmark for comparison of the potential impacts of the proposed action and the alternatives. The No Action Alternative would involve indefinite storage of the recovered CWM on Schofield Barracks.

1.4 Public Involvement

Public involvement opportunities with respect to this EA and decision making on the proposed action are guided by 32 CFR Part 651. When the environmental analysis is complete, the Final EA and Draft Finding of No Significant Impact (FNSI) will be made available to the public for comment for a period of 30 days. At the end of the 30-day period, the Army will consider all comments submitted by individuals, agencies, and organizations.

If necessary, the Army may revise the FNSI and/or EA to reflect important changes identified through public or agency comments. Then, if appropriate, the Army may execute the FNSI and proceed with implementation of the proposed action. If it is determined that implementation of the proposed action would result in significant impacts, the Army will publish in the *Federal Register* a Notice of Intent to prepare an Environmental Impact Statement (EIS).



Legend

- Installation Boundary
- Project Location
- Firing Point Area
- Ordnance Impact Area
- Schofield Barracks Range Area
- Schofield Barracks South Range
- Schofield Barracks Cantonment Area
- Building
- Wetland
- Stream
- Highway
- Street

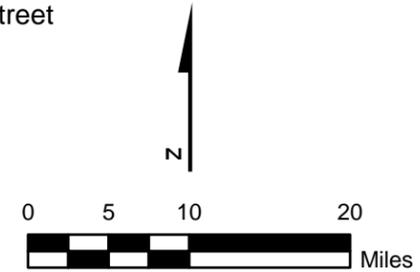


Figure 1-1
Location of Schofield Barracks Military Reservation (SBMR)
 EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

1.5 Issues Considered and Eliminated from Further Analysis

The Army has applied a systematic and interdisciplinary approach to ensure that the environmental resources at the proposed site were evaluated and that potential issues were identified for the temporary operation of a TDC at FP-202 on SBMR.

To avoid unnecessary documentation and to comply with the intent of the CEQ's guidance at 40 CFR 1500.4 on reducing paperwork, this EA references the non-site-specific findings of previous NEPA documents for the Army's Explosive Destruction System (EDS Alternative; see Section 3.1), where appropriate, rather than presenting new analyses. In addition, where it is clear that the deployment for 6 months and operation for less than 90 days of a transportable system on Schofield Barracks would not appreciably affect certain resources, this EA does not present detailed existing conditions for those resources.

Table 1-1 identifies the resources that were considered and found to have no potential for environmental impacts, thereby eliminating them from further discussion in this EA.

TABLE 1-1

Issues Considered and Eliminated from Further Analysis

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Resource Eliminated from Further Analysis	Rationale for Elimination
Land Use	Land use planning at SBMR is performed by the US Army Garrison Hawai'i. Deployment and operation of the TDC for several months is consistent with current and planned use at FP-202 (temporary storage of donor explosives for detonating munitions during range cleanup) and with the firing and training ranges that surround it. The proposed action would not permanently change land use on SBMR in any way.
Socioeconomics – Population, employment, economic activity, and community services	<p>Transporting, setting up, operating, and removing the TDC would require a workforce of about 20 personnel to be on-post for several months, with actual operation of the TDC lasting less than 90 days. Therefore, no long-term effect on population or employment would result and no appreciable population-driven effects on community services are expected.</p> <p>Short-term effects on the regional economy associated with procuring supplies and services (including temporary lodging) for the TDC operations on SBMR would be beneficial, but minimal or undetectable in comparison to ongoing economic activity associated with SBMR, Wheeler Army Airfield, and Honolulu County. No long-term economic effects are expected.</p> <p>Environmental justice is discussed separately in Section 4.12.</p>
Public Services – Police, fire, and emergency medical services	<p>The small TDC operating workforce of 20 personnel would result in temporary, minimal or undetectable increases in the demand for law enforcement, fire protection, and emergency medical services to be provided by the garrison. These services at SBMR are accustomed to accommodating fluctuations in troop strength, and therefore no appreciable adverse effect is expected.</p> <p>Safety and health concerns related to TDC operations are discussed in Sections 4.10, Human Health and Safety, and 4.11, Potential Effects of Accidents.</p>

TABLE 1-1

Issues Considered and Eliminated from Further Analysis

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Resource Eliminated from Further Analysis

Rationale for Elimination

Utilities – potable water, electricity, communications

None of these utilities are available at FP-202, and no connection to existing offsite utilities would be made under the proposed action. Potable water, portable toilets, diesel fuel, and propane gas would be brought to the site by truck; electric power would be supplied by a diesel-fueled generator.

Management of fuels and disposal of hazardous and non-hazardous wastes (including landfill and wastewater treatment utilities) are discussed in Section 4.9, Hazardous Substances and Waste Management.

Transportation to Hawai'i

The TDC system would be transported, in compliance with all applicable Department of Transportation regulations, in a disassembled condition by tractor trailers over major highways from Illinois to the west coast, containerized, and transported by cargo ship to O'ahu. No appreciable impacts on transportation resources of the continental US are expected.

Transportation of the TDC system from the port of Honolulu to FP-202 on Schofield Barracks is discussed further in Section 4.8, Transportation, because of the limitations of the local transportation network.

Description of the Proposed Action

2.1 Introduction

This section describes the Army's proposed action of destroying recovered CWM on SBMR. The Army evaluated the available technologies that would meet the purpose and need for the proposed action. Two technologies were identified, the TDC and the EDS. Section 3.0 provides further discussion of alternative technologies and methods considered. These systems were considered independently, and the TDC was judged to be the more-appropriate technology.

For readability, this description of the proposed action discusses the preferred alternative. However, if the EDS is found to cause less environmental impact, to be more feasible, or is ultimately a better option, either at the conclusion of the environmental review or at any point prior to implementation, the EDS alternative could be selected. The EDS alternative is introduced in Section 3.1.

The advantages of destroying CWM in a closed system, such as the TDC or the EDS, compared to open detonation, include the following:

- Eliminates shock, heat, and shrapnel
- Lowers air emissions
- Reduces noise
- Reduces the (otherwise slight) chance of soil, stormwater, and groundwater contamination

2.2 Implementation of the Proposed Action

2.2.1 Background

In 2005, the Army unexpectedly discovered a number of WW II-era chemical-filled munitions that had been buried on the SBMR range, while sweeping the range for munitions in preparation for constructing a Battle Area Complex training facility.

After they were unearthed, whenever possible the munitions were made safe to transport, store, and assess. The Army used non-intrusive evaluation to examine the munitions, which proved to contain phosgene and chloropicrin. Phosgene (also known as carbonyl chloride) and chloropicrin are industrial chemicals that were used as chemical weapons in World War I. (See the Glossary for additional information on these chemicals.)

Several of the munitions were determined to be unsafe to move and were detonated in place, using standard open detonation procedures, in compliance with applicable laws and in coordination with the State Department of Health. The remaining 71 munitions containing industrial chemicals were deemed safe and were placed in overpack containers,

sealed, and placed in an interim holding facility to await future destruction (Figure 2-1). The CWM in storage on Schofield Barracks consists of:

- Ten 4-inch Stokes mortars filled with phosgene
- One 4-inch Stokes mortar filled with suspect chloropicrin
- Thirty-eight 155-mm projectiles filled with phosgene
- Twenty-two 75-mm projectiles filled with phosgene

2.2.2 Overview of Proposed Action

This subsection describes how the TDC system would be brought to the site, set up, operated, and removed. Following this overview, additional details about the TDC system's components and processes are provided in Subsection 2.2.3 TDC Process and Controls.

The TDC uses donor explosive charges to detonate the munitions shell, explosives, and chemical fill contained in the munitions. The primary components of the TDC system are the detonation chamber, expansion tank, and off-gas treatment system with air monitoring. The TDC system would be located inside a commercially available, transportable tent-like structure, referred to as the system enclosure, which is connected to another air filtration system.

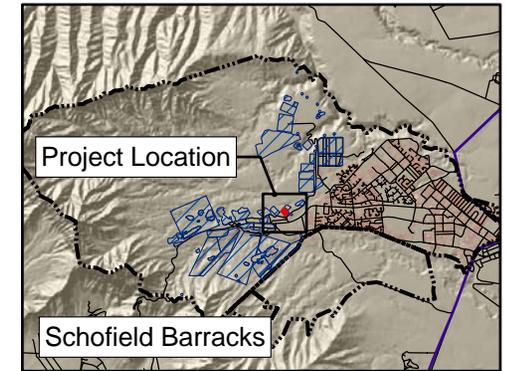
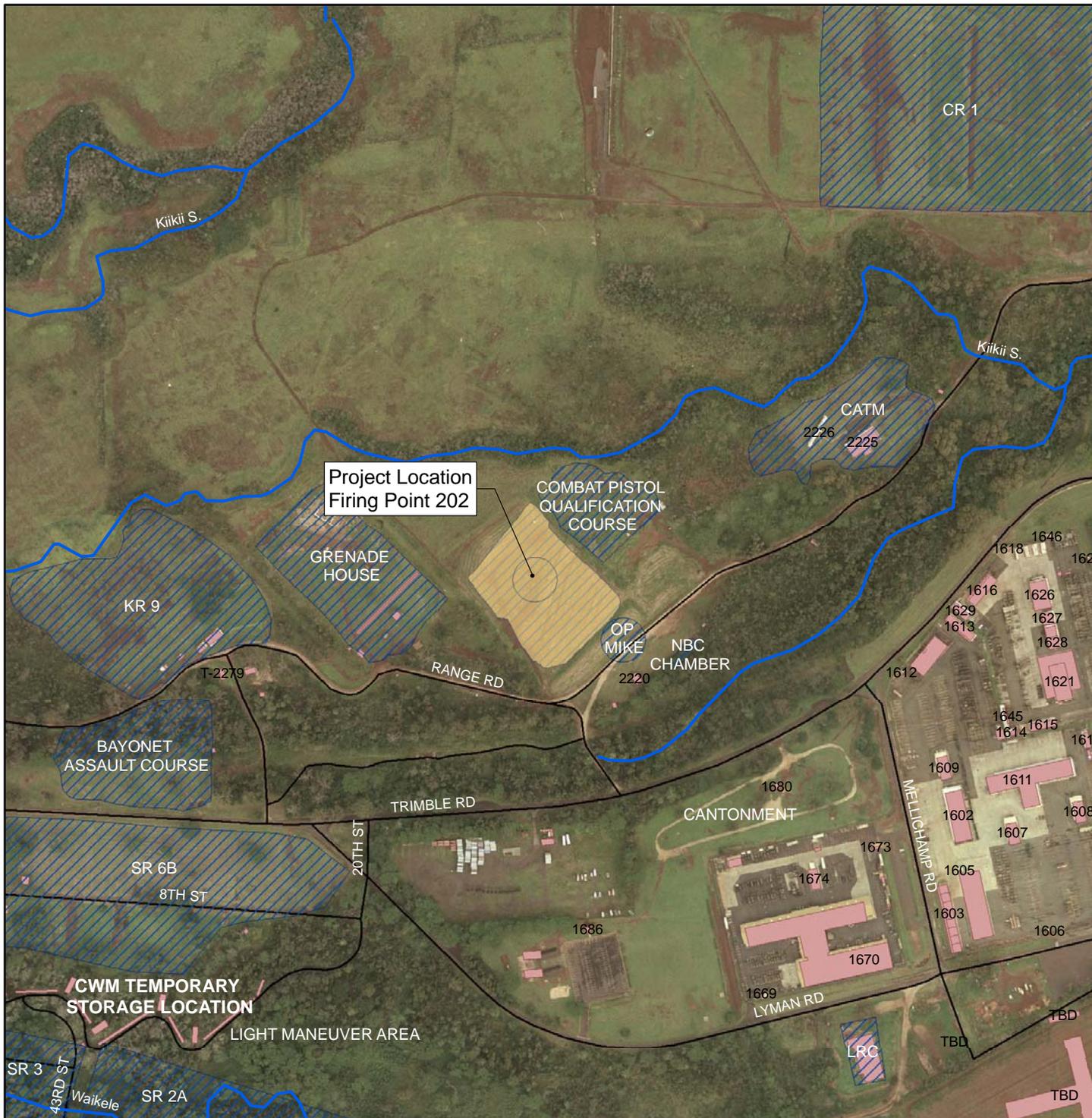
2.2.2.1 Transportation to the Site

The TDC system can be transported by commercial vehicles over improved and semi-improved roads. The system, including the detonation chamber and auxiliary equipment, would require 8 tractor-trailers or trucks. The system enclosure, filter systems and other equipment would be transported on 8 additional tractor-trailers, arriving about 1 week after the TDC system.

The TDC system would be transported, in a disassembled condition and in compliance with all applicable Department of Transportation regulations, over major highways to the west coast and by cargo ship from the continental US to the Port of Honolulu; from the port, it would be transported by tractor-trailers to the proposed site on Schofield Barracks (Figure 2-1). No hazardous materials would be shipped with the system. Oversize load permits would be obtained for public highways where required. All required shipment documentation would be prepared.

2.2.2.2 Site Preparation and Layout

The proposed site, FP-202, is a previously graded, grassy field of approximately 5 acres with dirt berms along its boundaries (Figure 2-1). The site was selected because it is close to the IHF where the recovered CWM is stored and because its current use makes it appropriate for TDC operations. The Army currently uses FP-202 to store the commercial explosives (referred to as donor explosives) that are used in the destruction of unexploded ordnance during range sweeps in the impact areas of the live-fire range. The proposed TDC system and support structures would occupy the FP-202 area for up to 6 months and then be removed.



Legend

- Project Location
- Firing Point Area
- Building
- Stream
- Street

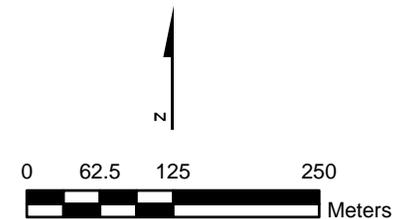


Figure 2-1
Location of Site FP202
 EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

To maintain the required explosive safety quantity distance, the TDC system and explosives storage would be sited along the northern berm, a location the farthest away from the road (Figure 2-2). The CWM would be brought to the site daily and placed into a Munitions Storage Unit (MSU). Donor explosives also would be brought to the site daily and held in a day box until needed in the destruction process. No donor explosives or CWM would remain onsite after operations cease for the day.

For proper use and safety, an area of approximately 8,000 square feet (less than $\frac{1}{4}$ acre) would be graded and leveled to support the TDC. After the TDC system is set up, the system enclosure would be assembled on FP-202, lifted by a crane, placed over the TDC system, and surface anchored.

Office trailers would be brought to the site and set up at a safe distance (minimum 200 feet) from the chamber (Figure 2-2). Office trailers and other support structures would be placed on the ground surface with little or no ground disturbance.

The site would be divided into two portions: (1) the area where the TDC system, auxiliary equipment, monitoring stations for the equipment operators, and daily munitions storage would be located, and (2) the area where the trailers would be placed and support operations would occur. For safety, only essential (pre-authorized and trained) personnel would be allowed inside the TDC portion of the site once operations begin. Access to the site would be at the prerogative of the Garrison Commander. Figures 2-2 and 2-3, respectively, show the anticipated layout on the site and the typical equipment layout of the TDC system.

2.2.2.3 System Enclosure

The TDC would sit inside a ventilation-controlled system enclosure (Figure 2-3) of approximately 5,600 square feet (ft²), which would be connected to an air filtration system with particulate and carbon filters. Flooring of chemical-resistant plastic would be used to provide secondary containment for any accidental spills.

The exhaust filtration system for the system enclosure is designed to prevent the escape of chemical vapor in the event of an accidental release inside the enclosure. Vapors generated during TDC operation would be controlled by the TDC's off-gas treatment system, so the system enclosure's filtration would provide a secondary control. The exhaust filtration system would consist of prefilters, high efficiency particulate air filters and carbon filters, along with a motor, fan, and ductwork.

2.2.2.4 Site Utilities

There are no permanent utilities on FP-202. Temporary supplies of potable water, fuel, and sanitary facilities would be brought to the site by truck and placed at a safe distance from the TDC system. Diesel fuel would be stored in one or more 1,000 or 2,000-gallon portable aboveground storage tanks, with secondary containment to catch any spills. Potable water would be used for drinking, PPE decontamination, and equipment cleaning.

A 455 kilowatt (kW) diesel-powered generator would provide the electricity needed for lighting, the electronic equipment in the trailers, and for operating the chamber system. The electric generator would run 24 hours per day to maintain the monitoring equipment and also to keep the TDC system operational, thereby reducing start-up time.

An emergency backup generator of the same size would be available to restore power to the chamber system, in case the main generator fails, and would be test-run approximately one hour per week. In addition, one 230kW backup generator would be provided for the monitoring equipment, support trailers, lab, and filter systems and would also be test-run about 1 hour per week.

2.2.2.5 Daily Operations

The TDC uses controlled, enclosed detonation to destroy CWM. During this treatment, the carbon monoxide resulting from detonation of high explosives is oxidized, and the chemical fill is destroyed by chemical oxidation and/or reduction. The entire cycle duration is approximately 35 minutes. The chamber system would be installed inside the system enclosure, a temporary transportable shelter with controlled ventilation and chemical-resistant plastic flooring, to provide secondary containment and filtration (in addition to the containment and filtration that is integral to the TDC system itself).

Additional detail is provided in subsection 2.2.3, TDC Process and Controls.

The CWM to be processed each day would be brought from the IHF to the site in a truck that is approved for transporting munitions and placed in a Munitions Storage Unit. The donor explosives also would be brought to the site daily and held in day boxes until needed in the destruction process. No donor explosives or CWM would remain onsite after operations cease for the day. The Munitions Storage Unit, day boxes, auxiliary equipment supporting the TDC, and monitoring stations for the equipment operators would be located within the area where only essential personnel are allowed during operations.

The four office trailers, located at a safe distance (minimum 200 feet) from the chamber and day storage, would be used for a command post, secure workspace for inspectors from the Technical Secretariat of the Organisation for the Prohibition of Chemical Weapons, a break room, and storage of operators' personal protective equipment (PPE).

The CWM would be processed one or two at a time in the TDC. Sampling would be conducted to verify destruction of each chemical weapon and the chemical fill contained in it. At the end of each day, any remaining CWM and donor explosives would be returned to the IHF.

The TDC requires a team of approximately 20 personnel to operate. It is anticipated that explosive operations would be conducted during daylight hours.

The TDC could destroy all 71 CWM items within about 3 weeks total during this period, allowing for unexpected interruptions such as adverse weather conditions, but operations might not be continuous.

2.2.2.6 Site Closure

When the inventory of munitions is destroyed, the TDC system would be dismantled and returned to the continental US. All wastes generated by operations would be characterized according to the TDC waste management plan and disposed of in accordance with federal, State of Hawai'i, and US Army regulations (see Section 2.2.3, TDC Process and Controls). Other than the small area graded to support the TDC system, the site would be left very much as it was found and would be returned to its prior use.

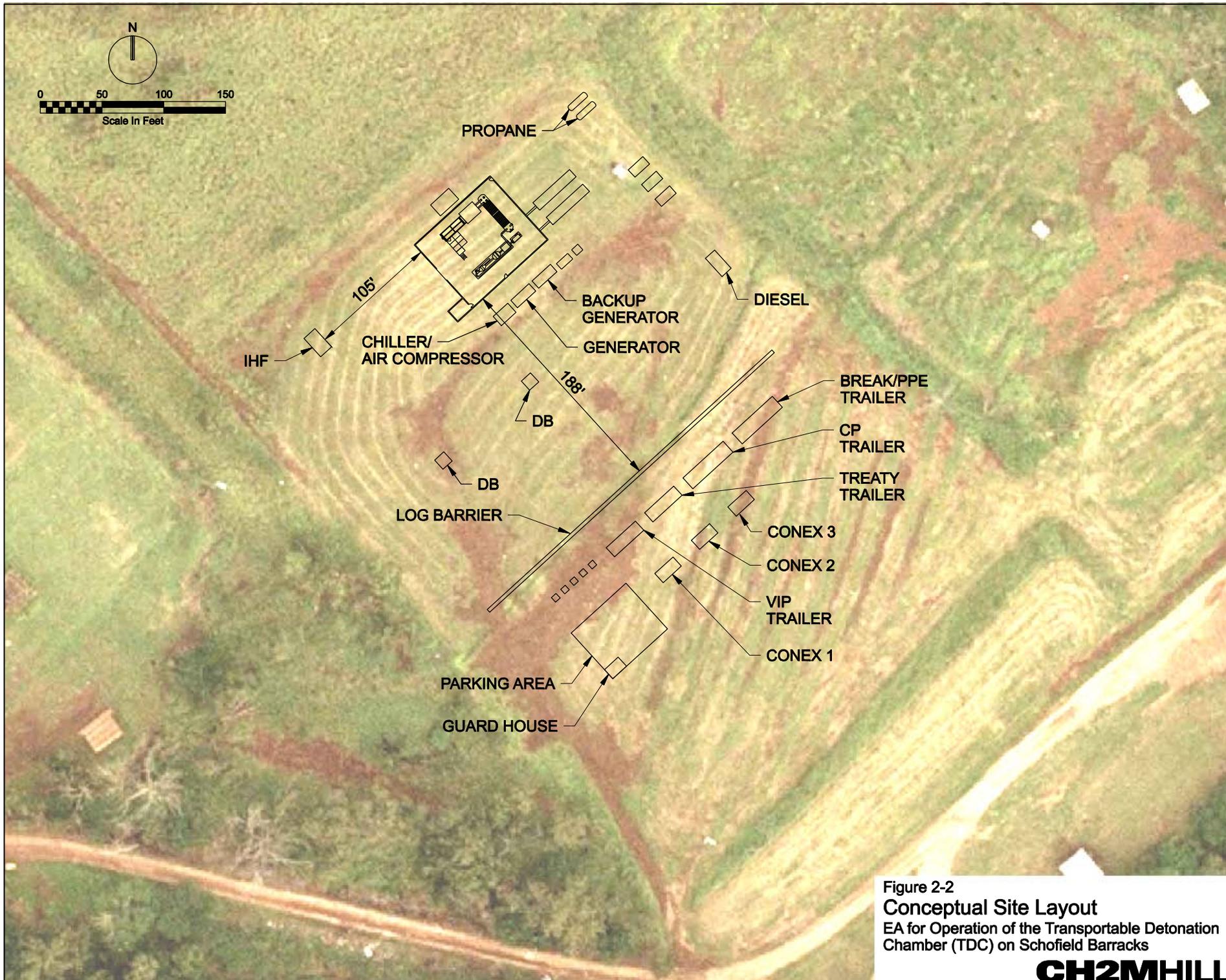


Figure 2-2
Conceptual Site Layout
 EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

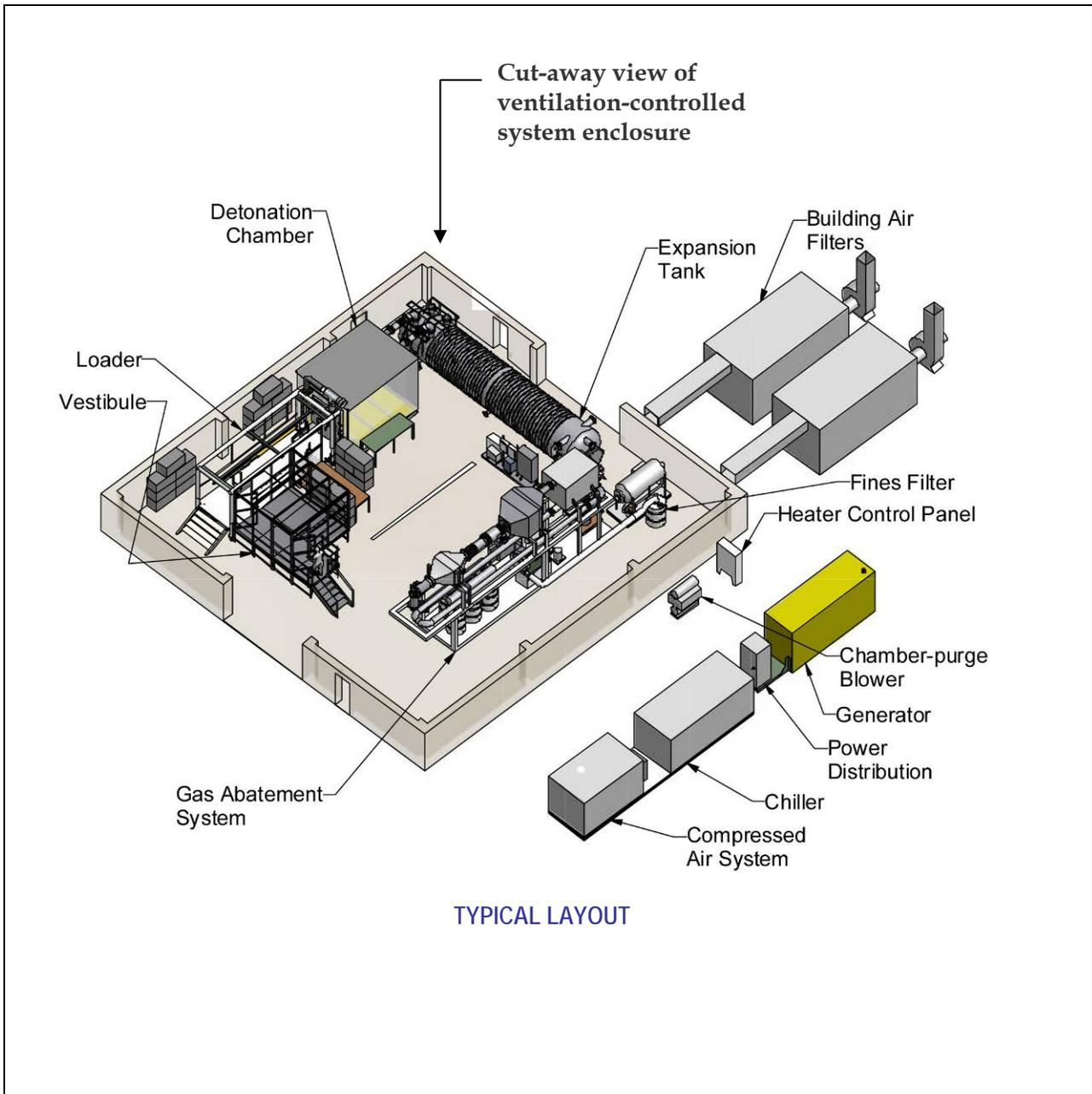


Figure 2-3
TDC Equipment Layout
 EA for Operation of the Transportable
 Detonation Chamber (TDC) on Schofield
 Barracks

2.2.3 TDC Process and Controls

2.2.3.1 TDC Process

The following describes typical operations of the TDC. Figure 2-3 illustrates the conceptual layout of the equipment described and Figure 2-4 provides a simplified process flow diagram. Table 2-1 describes the TDC's process components, auxiliary equipment and support systems.

TABLE 2-1
TDC Components, Auxiliary Equipment, and Support Systems
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

TDC Components

Vestibule: A steel-framed structure within the system enclosure, containing the loading area. It is covered and sealed with plastic sheeting, with one end sealed to the detonation chamber entrance. It is designed to prevent the escape of chemical vapor outside of engineering controls, with continuous air purging that discharges directly into the off-gas treatment system. The source of supply air is the ambient air within the system enclosure.

The entrance section of the vestibule is farthest from the chamber door. It is used for personnel decontamination and for storing scrap metal waste from the chamber. The entrance section may be used for storing air lines for air-supplied respirators and other equipment needed for chamber interior maintenance.

Mechanical loader: Lifts munitions and water-filled bags into the chamber

Firing system: Activates the electrical detonation circuit and detonates the CWM

Detonation chamber: The detonation chamber design, for Schofield Barracks, will handle an explosive force equivalent to approximately 40 pounds of trinitrotoluene (TNT) for repeated detonation use.

The chamber is equipped with an inner and outer door system to prevent leakage during the detonation event. The space between the two doors is vented directly to the off-gas treatment system, through ducting coupled to the outer door. The inner blast door has a high-temperature silicone seal designed to withstand the heat and pressure of the detonation event. The outer vapor door provides secondary containment of any leakage that may occur during the detonation.

The floor of the chamber is covered with 12 inches of pea gravel and sand is placed between the inner wall and the outside skin of the chamber, both of which help to absorb and dampen the blast energy.

Off-gas treatment system (see additional description and figures following this table), consisting of:

Purge blower	Direct air dehumidifier
Expansion tank	Closed loop off-gas heat exchanger
Hot-gas generator	Carbon filtration
Reactive bed filter	Process fan

Human-machine interface control system: Operating interface, with resistive touch screen that allows the operator to monitor and control the CWM destruction and provides continuous feedback to operator

Auxiliary Support Equipment

Propane tanks: Two tanks (1,000 or 1,500 gallons each) would be required for operating the hot-gas generator.

Electrical power generation and distribution: Supplied by a 455kW diesel-fired generator and distributed to an electrical power distribution panel that is connected to local power disconnect boxes for major equipment. All equipment is grounded to the diesel generator. The diesel generator is equipped with a 300-gallon fuel tank that would be filled from one or more 1,000 or 2,000-gallon storage tanks onsite. Approximately 4,000 gallons would be needed for the estimated period of operation. (In case the main generator fails, a similar-sized emergency backup generator would be available to restore power to the chamber systems, with a smaller generator to restore power to the monitoring equipment and trailers.)

TABLE 2-1

TDC Components, Auxiliary Equipment, and Support Systems
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Water supply tank, pumps, and chiller: Cooling water is contained in a 1,000-gallon tank. A closed-loop design is used to provide cooling water to the heat exchanger. The chiller is used to cool the water that has been heated in the heat exchanger. The supply temperature of water is 55°F and the return water temperature is 70°F.

Compressed air supply: Compressed air is used to operate the pneumatic-actuated valves and the pulse-cleaning manifold of the reactive bed filter.

Support systems and services

System enclosure and filtration system: Designed to prevent the escape of chemical vapor outside of engineering controls, if there were an accidental release inside the enclosure, with plastic flooring providing secondary containment for any accidental spills.

Waste collection and disposal: See subsection 2.2.3.5 Waste Management, following

Personnel decontamination: Takes place in the vestibule, whenever the chamber is entered (about once a week). Soapy water and bleach is used to clean boots and the outer surface of PPE.

Site security: provided to keep unauthorized persons away from the site and to ensure equipment is secure

Monitoring and laboratory support: Air monitoring is performed to ensure that TDC operations are safely conducted. Sample analysis provided by an offsite laboratory, to verify complete destruction of the CWM and to ensure that all waste products are properly characterized and handled.

The TDC is designed to destroy munitions that contain chemical agents (such as mustard) or industrial chemicals (such as phosgene and chloropicrin). It has three main components: a blast chamber, in which the detonation occurs, which is connected to an expansion tank, and an emissions control unit.

The complete destruction of CWM is achieved by detonating explosives in a sealed metal chamber containing an atmosphere of increased oxygen and a measured amount of water. The amounts of explosive, oxygen, and water depend on the type of munition and the amount and type of chemical fill present. (For persistent agents such as mustard, supplemental oxygen is introduced to improve the effectiveness of the detonation process. For non-persistent chemical fill, such as the phosgene and chloropicrin in the CWM at Schofield Barracks, no additional oxygen is needed.)

CWM destruction by the TDC is a three-phase process: (1) munition preparation, (2) munition destruction, and (3) off-gas treatment.

Munition Preparation. The CWM to be destroyed are brought inside the system enclosure and placed on a work table near the vestibule. A measured amount of preformed donor explosive is attached to the CWM.

The package is then moved into the loader and placed on a scissor lift table. The lifting table transfers the package onto a rail-mounted lifting jib, which moves it from the scissors table and places it inside the detonation chamber, without the need for operators to lift the munitions.

A measured number of water bags are placed in the chamber to help absorb blast energy and to produce steam. Electrical firing circuits are connected and the chamber door is closed. The operator is not required to enter the chamber for this operation.

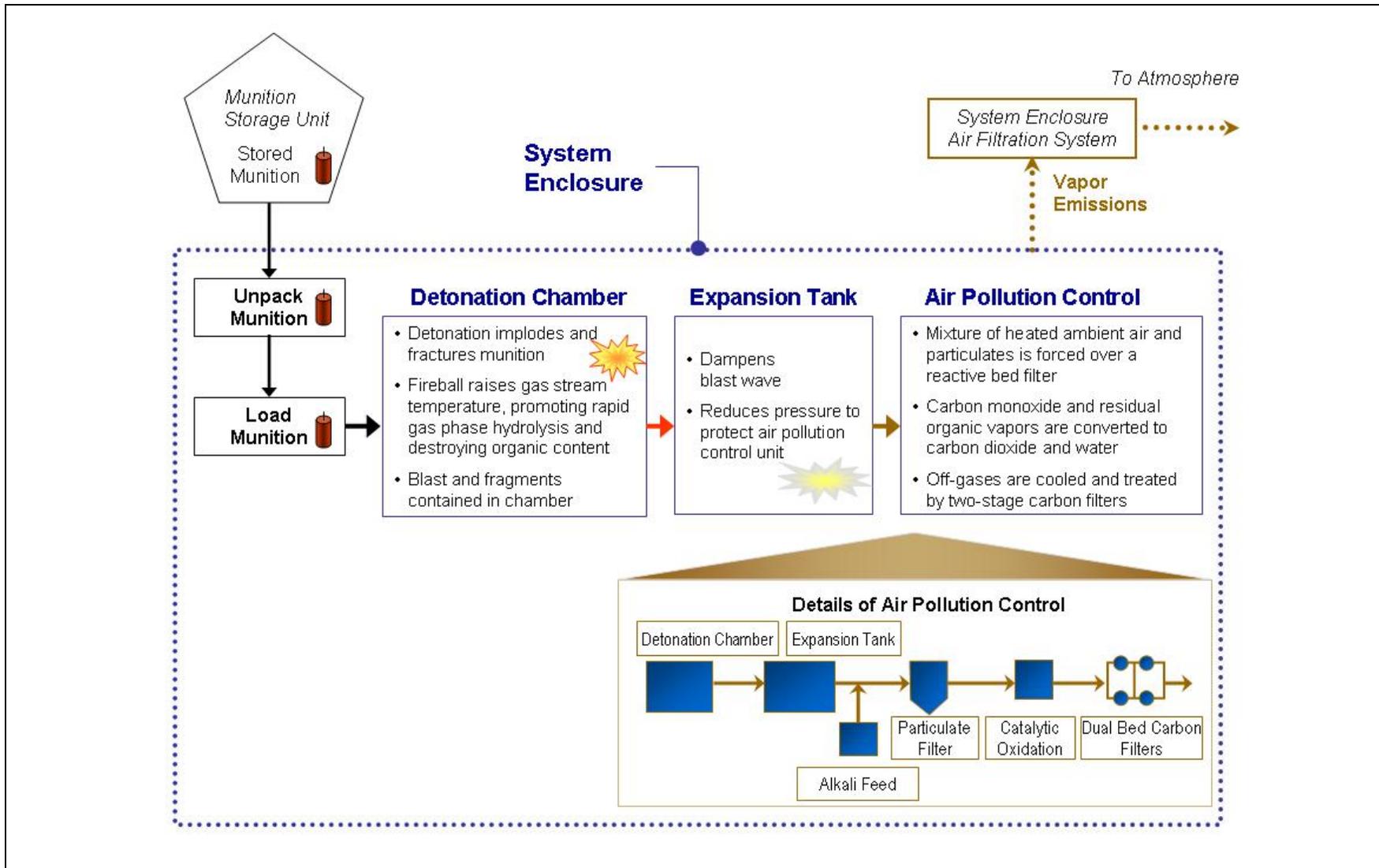


Figure 2-4

TDC Process Flow Diagram

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Munition Destruction. The external portion of the electrical firing system is completed. The explosives inside the chamber are detonated, and the CWM is destroyed. The munition body is destroyed by the detonation and the chemical fill is destroyed by chemical reduction or oxidation as the chemical vapors react with the steam. Some metal fragments will remain; this scrap metal is allowed to accumulate and is removed periodically.

Off-gases from the detonation are fed into an expansion tank before being released into a gas treatment system. A purge blower draws ambient air into the chamber to flush out gases in the detonation chamber, for at least 15 minutes after a detonation event, before the vapor door and inner blast door of the detonation chamber are opened. Each destruction cycle takes approximately 35 minutes.

Off-Gas Treatment System. In the off-gas heater, a propane flame (2 million Btu/hour burner) heats ambient air from outside the TDC system to the normal operating temperature of 800° F. The mixture of heated ambient air, off-gases, and particulates from the detonation chamber is forced over a reactive bed filter consisting of dry solids such as hydrated lime and/or sodium bicarbonate. The acid gases from the CWM destruction react in situ with the dry solids.

Next, a precious-metal catalytic converter is used to convert carbon monoxide and trace organic vapors (i.e., minor levels) to carbon dioxide and water. In the direct air dehumidifier, the off-gas discharged from the catalytic converter is mixed with ambient air and cooled from approximately 800° F to 400° F, then further cooled to 100° F in the closed-loop off-gas heat exchanger.

The two-stage carbon filtration system captures any trace organic compounds that may not have been destroyed in the process. Gas-sampling locations are provided between the carbon filtration system and the process exhaust fan. The process fan conveys gases from the detonation chamber through the off-gas treatment components (reactive bed filtration, catalytic conversion, and carbon adsorption) while maintaining a negative air pressure in the system. The final particulate filter is located after the process fan and is designed to capture particles from the activated carbon filtration system. Air is discharged from the final filter into the system enclosure.

2.2.3.2 Waste Management

The potentially hazardous wastes generated by the TDC would be collected, characterized, and shipped to the continental US for disposal at a permitted treatment, storage, or disposal facility (TSDF), in accordance with applicable laws and regulations. These potentially hazardous wastes would consist of:

- Used lime
- Pea gravel
- Used filters
- Used laboratory solvent
- Decontaminated overpacks, if spills or leaks were detected during unpacking; if not, the overpacks could be reused

-
- Carbon, if contamination were detected in the filters; if not, the carbon could be reused for subsequent TDC operations

The Army also would containerize and store all scrap metal and shell fragments, pending shipment to a permitted TSDF.

Non-hazardous waste and other materials, which would either be recycled, reused or disposed of locally, would include:

- Cooling water, which flows within a closed loop and does not come into contact with chemical fill
- Water used to decontaminate PPE whenever a chamber entry occurs, typically once per week
- Clean sand, which is placed between the walls of the chamber and does not come into contact with chemical fill, would be emptied onto the ground. The sand would be either leveled on the site or removed with a front-end loader and reused elsewhere on Schofield Barracks.
- Used PPE, mask filters, and laboratory wastes such as gloves would be disposed of as solid waste
- Paper, cardboard cartons, packing crates, etc.

2.2.3.3 Safety Plans and Procedures

The Army would prepare a detailed, site-specific Destruction Plan for the selected technology, which would be reviewed and approved by the Hawai'i Department of Health and the US Department of Health and Human Services. A Destruction Plan identifies the munitions to be destroyed, describes the system and its operations, and provides individual plans covering worker safety and emergency response; site-specific air monitoring, sampling, and analysis; quality assurance/quality control; waste management; and closeout.

Plans and procedures would be in place to minimize risk to workers and the environment. Potential safety hazards associated with loading and unloading the CWM would be mitigated or minimized by the following procedures:

- Use of highly trained personnel for loading, unloading, spill containment, and emergency response procedures
- Providing refresher training to the operators and conducting pre-operational inspection after the TDC system is installed
- Adequate clear space for unobstructed movement from the storage or assessment site to the TDC
- Overpacks provide vapor containment for any leaking munitions during movement from the IHF to the TDC.
- Initial inspections of the CWM to ensure that each item is acceptable for TDC operations

- Paired operators (two-person rule) for CWM handling and movement procedures
- Correct selection and use of PPE for all movement, handling, and transfer operations
- Ready access to emergency and safety equipment at the IHF and TDC operation site
- Equipping the operational site with fire extinguishers designed for chemical and electrical fires.
- Staging additional fire safety equipment and support vehicles from the SBMR fire department in the support areas, as necessary.
- Air monitoring to ensure that operations are safely conducted and to detect any conditions that may cause a release of chemical materiel to the environment.

Alternatives

This section presents information on the alternatives for implementing the proposed action discussed in Section 2.0. Section 3.1 describes the alternative EDS technology, compares the TDC and EDS alternatives and presents the Army's rationale for selecting the TDC technology as the preferred alternative. Section 3.2 presents the No Action Alternative. Section 3.3 discusses other alternatives that were considered early in the NEPA process, but were judged to be not feasible.

3.1 Explosive Destruction System Alternative

3.1.1 Overview

Like the TDC, the EDS is a transportable system designed to destroy recovered CWM in a safe, environmentally sound manner. The EDS safely detonates these munitions and neutralizes the chemical agents or chemical fill without releasing the chemicals to the environment. The EDS has a successful history of operations and has been used to destroy munitions containing phosgene, chloropicrin, mustard, and sarin.

The EDS would be installed within a ventilation-controlled system enclosure, with the same features as described in Section 2.2, but with a smaller footprint. The site layout, support equipment, trailers, day storage of munitions and explosives, and utilities brought to the site would be similar to those described in Section 2.2 for the TDC. Site preparation and site closure activities also would be similar, except that lesser or no grading would be required to install the EDS. A team of about 20 personnel would operate the EDS and similar safety plans and procedures would be implemented.

3.1.2 EDS Process and Controls

As illustrated in Figure 3-1, the primary component of the EDS is a stainless steel containment vessel. The EDS is equipped with two 65-gallon supply tanks for reagents and one supply tank for water. Auxiliary equipment includes an air compressor, generators, storage containers, and liquid waste drums.

3.1.2.1 EDS Operation

Figure 3-2 illustrates the EDS operating process.

CWM are taken into the system enclosure and unpacked, put into a fragment suppression system with explosive shape-charges attached and placed inside the containment vessel. Detonation of the charges destroys the explosive components of the munition and opens its outer casing (shell body) to release the chemical fill. This occurs under total containment, so there is no release to the environment.

Neutralizing reagents (neutralents) are then pumped into the sealed containment vessel to chemically react with the chemical fill and contaminated components of the munition.

The pressure generated inside the vessel during the detonation and treatment is vented through a silica filter, which removes any residual reagents and other chemicals from the air stream. The treatment reagent for phosgene or chloropicrin would be sodium hydroxide (20 percent in water). Treatment of phosgene takes about 8 hours.

After allowing the mixture of chemicals to react, a sample is drawn through the vessel door to verify that the fill has been neutralized. After verification, the neutralent is drained into drums for temporary storage.

The fragmented munition body (scrap metal), fragmentation shields, and any residual waste would be decontaminated with neutralizing reagents, collected, placed in containers, characterized, and temporarily stored. The containment vessel would be rinsed, the rinse water would be placed in containers, and the next set of munitions would be brought in for treatment.

3.1.2.2 Waste Management

Wastes generated by EDS operations would include: liquid wastes (neutralents) from neutralization reactions; decontaminated metal munition fragments, pieces of munition casings and fragmentation shield; spent decontamination solutions and rinse waters; spent filter elements; drum filters; O-rings from the containment vessel door; decontaminated overpacks (if spills or leaks were detected during unpacking); and contaminated PPE, if any.

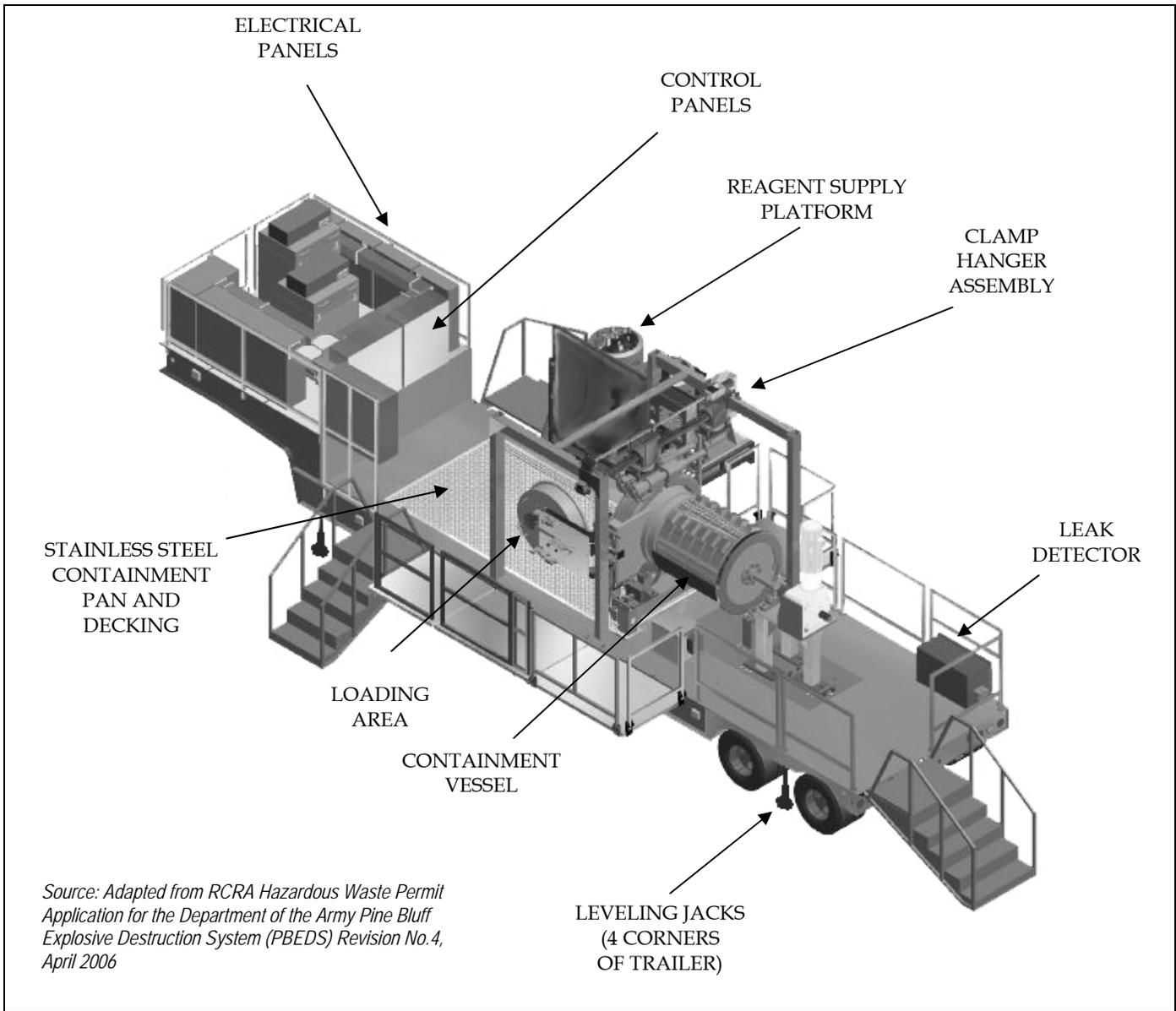
All wastes directly associated with chemical fill (such as the neutralents) and any other wastes that are determined by sampling and analysis to have been contaminated with chemical fill would be managed as hazardous wastes. Wastes that are not classified as a hazardous waste under RCRA may be managed as a non-hazardous waste.

3.1.3 Comparison of Alternative Technologies

The Army's preferred alternative is to destroy the recovered CWM stored on Schofield Barracks using a TDC system.

The primary differences between these alternative technologies, leading to the selection of the TDC as the preferred alternative for the CWM on Schofield Barracks, are:

1. **Throughput:** The EDS has a lower throughput rate of one treatment cycle per day. Because the EDS would take longer to destroy the munitions and chemical fill, the FP-202 site would be diverted from its normal use for a longer period of time.
2. **Waste Minimization:** The EDS generates a much larger volume of hazardous waste, mostly liquid wastes, which could pose a relatively greater risk of spills, that would have to be shipped back to the continental US for disposal.



Source: Adapted from RCRA Hazardous Waste Permit Application for the Department of the Army Pine Bluff Explosive Destruction System (PBEDS) Revision No.4, April 2006

Figure 3-1
EDS Equipment Layout
 EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

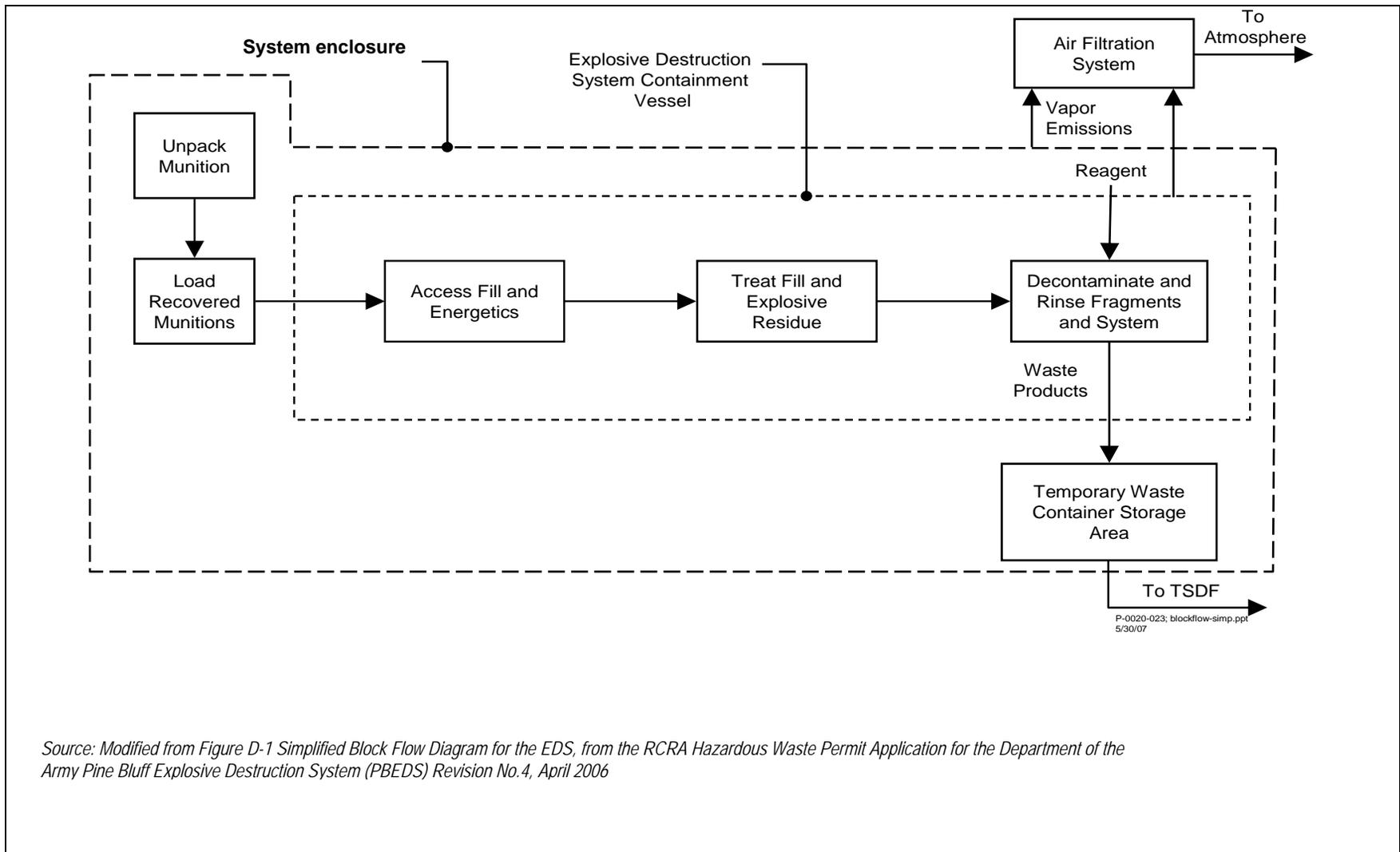


Figure 3-2

Process Flow Diagram

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

However, the EDS is a proven transportable system and it remains a viable option for destroying the recovered CWM stored on Schofield Barracks, should the TDC be found unsuitable for any reason. Before beginning full operations on Schofield Barracks (as well as at other sites where differing chemical fill and munitions are recovered), the TDC must achieve a set of specific performance efficiency criteria during destruction of a limited amount of the recovered CWM. Although the TDC is a proven technology, if for any reason it fails to achieve this, the TDC would be dismantled and shipped back to the continental US, and the EDS would be shipped to Schofield Barracks to complete the destruction of the recovered chemical munitions.

Table 3-1 provides a more detailed comparison between the two alternative technologies and a rationale for why the Army is proposing to use the TDS alternative as the more appropriate alternative for Schofield Barracks.

TABLE 3-1

Comparison of Capabilities and Features of the TDC and EDS

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC Alternative	EDS Alternative
What it treats	75-mm projectiles, 4-inch Stokes mortars, 155-mm projectiles	75-mm projectiles, 4-inch Stokes mortars, 155-mm projectiles
Throughput	Higher throughput rate than the EDS. One treatment cycle (detonation event) lasts about 35 minutes, with up to two munitions in a single detonation event. Better suited for larger amounts of CWM than the EDS.	One treatment cycle for phosgene lasts about 8 hours. Can treat up to six 75-mm projectiles and 4.2-inch mortars at a time, up to two 155-mm projectiles at a time.
Deployment	Larger and has more components; takes longer to deploy and set up than the EDS.	Smaller, easier to transport, and faster to set up than the TDC. Easier to deploy for emergency discoveries of CWM.
Effectiveness	Safely destroys chemical-filled munitions and decontaminates the munition bodies (with no liquid treatment step), without any release of the chemical agent/fill to the environment.	Safely destroys chemical-filled munitions (in two steps, detonation to open the shell and chemical treatment of the fill) without any release of the chemical agent/fill to the environment.

TABLE 3-1

Comparison of Capabilities and Features of the TDC and EDS

EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC Alternative	EDS Alternative
Waste stream	<p>Minimal hazardous liquid waste: several gallons of soapy water from PPE decontamination and 5 gallons of used laboratory solvent.</p> <p>Potentially hazardous solid wastes: ½ ton of used lime, 2 tons of used pea gravel; used pre-filters (18) and HEPA filters (36) from air filtration system.</p> <p>Other wastes that may or may not be classified as hazardous under RCRA: about 2 tons of scrap metal and munition shell fragments; decontaminated overpacks (if spills or leaks detected during unpacking); 1.5 tons of carbon from TDC filters and 800-pound carbon filter bank from system enclosure (if contamination detected in filters - otherwise carbon can be reused).</p> <p>Non-hazardous wastes: 1,000 gallons of spent cooling water; PPE decontamination water; used PPE; less than 1 ton of sand; waste paper, cardboard, etc.</p>	<p>Substantial liquid hazardous waste stream: 74 drums (55-gallons each, total 4,000 gallons) of spent reagent; 250 gallons of water with bleach from PPE decontamination.</p> <p>Potentially hazardous solid wastes in contact with reagents/fill: drum filters; O-rings from the containment vessel door; about 3 tons (25 drums) of metal scrap: munition body, holding device, metal seal, and fragment suppression shield.</p> <p>Other wastes that may or may not be classified as hazardous under RCRA: decontaminated overpacks (if spills or leaks detected during unpacking); any contaminated PPE; 800-pound carbon filter bank from system enclosure (if contamination detected in filters - otherwise carbon can be reused).</p> <p>Non-hazardous wastes: Spent decontamination solutions and rinse waters, if determined to be non-hazardous; used PPE; waste paper, cardboard, etc.</p>
Potable water consumption	1,000 gallons of cooling water; several gallons total for PPE decontamination; drinking water for operators.	4,000 gallons of water for mixing neutralent solution; 2,200 gallons for rinsing the vessel (50 gallons per treatment cycle); 250 gallons total for PPE decontamination; drinking water for operators.
Overall size, assembled onsite	5,800 ft ² (system enclosure currently used is 83 x 70 ft)	500 to 800 ft ² (typical system enclosure)
System size	60 x 60 ft area when assembled onsite (within the system enclosure)	8.5 ft wide x 40 ft long x 9.7 ft high; 19 ft wide with fold-out supply platforms deployed onsite
Chamber size	8 ft wide x 12 ft long x 8 ft high chamber internal dimensions	29-in diameter x 57 in long chamber internal dimensions; 22 ft ³ chamber volume
Weight	198,000 lbs (99 tons) total; 120,000 lbs (60 tons) chamber weight	67,200 lbs (30 tons) total; chamber assembly weight 22,000 lbs (11 tons)
Transportation	Total of 16 tractor-trailers: TDC chamber is carried on 1 flatbed trailer, with auxiliary equipment on 7 trailers; 2 trailers for the disassembled system enclosure; 6 trailers for filter systems and other equipment	Total of 7 tractor-trailers: EDS system sits on 1 (40-foot) flatbed trailer; 1 trailer for the (smaller) disassembled system enclosure; and 5 trailers for filter systems and other equipment

TABLE 3-1
 Comparison of Capabilities and Features of the TDC and EDS
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC Alternative	EDS Alternative
History	<p>Demonstration/Validation (DEM/VAL) test to destroy munitions containing mustard successfully conducted at the Porton Down Test Facility in the United Kingdom between December 2005 and May 2006. (DoD conducts DEM/VAL testing to demonstrate scale-up and operability of a proposed process or equipment.)</p> <p>Successfully used by the Belgian government to destroy 3,300 recovered WWI chemical weapons at Poelkapelle, Belgium.</p>	<p>EDS 1 developmental testing at Porton Down, operational validation at Rocky Mountain Arsenal and Aberdeen Proving Ground. After extensive testing, the larger EDS 2 began operations in Arkansas, June 2006, to destroy CWM containing mustard, lewisite, and phosgene. Used to destroy chloropicrin during acceptance testing by Sandia Laboratories.</p> <p>Successfully used to destroy more than 1,000 recovered CWM throughout the US and Europe.</p>

3.2 No Action Alternative

The No Action Alternative would require indefinite storage of the recovered CWM at SBMR.

These munitions are currently stored in empty containers previously used to ship and store propellants for firing artillery projectiles, which are sealed with a metal lid and rubber gasket (referred to as prop cans). These containers are adequate for temporary storage, but are not designed for long-term storage or transportation.

The No Action Alternative would not satisfy the purpose and need for the proposed action because (a) it would violate the Chemical Weapons Convention and (b) over time, it could increase the potential for deterioration of the munitions and incidental leakage of chemical fill.

However, inclusion of the No Action Alternative serves as a benchmark for evaluation of the potential effects of the proposed federal action. Therefore, the No Action Alternative was evaluated in detail for this EA.

3.3 Alternatives Not Considered in Detail

3.3.1 Alternative Sites on SBMR

A comprehensive survey of SBMR was conducted by Army munitions experts. The proposed site (FP202) was selected as the most appropriate location for the TCD for a variety of factors, including its proximity to the IHF where the recovered CWM is stored and the relative ease of access for large tractor-trailers to bring in the TDC system. Accordingly, other alternative locations within SBMR were not further evaluated in this EA.

3.3.2 Open Detonation

The *Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction* (Chemical Weapons Convention) prohibits open-pit burning of chemical weapons. The Chemical Weapons Convention was ratified by the US Congress and entered into force in April 1997. In October 1998, the US Congress enacted the *Chemical Weapons Convention Implementation Act of 1998* (Public Law 105-277).

The CWM's Annex on Implementation and Verification ("Verification Annex"), Part IV (A) "Destruction of Chemical Weapons and its Verification Pursuant to Article V" states:

Each State Party shall determine how it shall destroy chemical weapons, except that the following processes may not be used: dumping in any body of water, land burial or open-pit burning.

To clarify how this prohibition on open-pit burning applies to open detonation of recovered CWM unearthed on a range, the DoD developed policy stating that open detonation of chemical weapons is only acceptable where an item is determined to be unsafe for handling or movement (*Guidelines for Determination of Chemical Weapons Convention Requirements for the Destruction of Recovered Chemical Weapons*, Assistant Secretary of Defense, 2006).

The Army has used and will continue to use open detonation to destroy any chemical munitions discovered at SBMR that cannot be safely moved to a storage location for later disposal. Safety precautions such as placing sandbags over the munitions will continue to be employed. However, this practice is not considered appropriate for chemical munitions that are safe to move, because of the potential for increased risks to human health and the environment associated with open detonation operations.

For these reasons, open detonation is not considered to be a viable alternative to the proposed action. Accordingly, open detonation was not further evaluated as an alternative for this EA.

3.3.3 Fixed-Site Destruction Facilities

Transporting the recovered CWM from Schofield Barracks to one of the fixed-site destruction facilities in the continental US is not feasible.

The Army has several fixed-site destruction facilities in the continental US, which were built to destroy stockpiled CWM that had been stockpiled in the states where the facilities are located. Congress has passed legislation that places limits and restrictions on the movement of chemical munitions and agents (Public Law 91-121 and Public Law 103-337).

Additionally, the states with stockpile facilities passed their own legislation, prohibiting receiving recovered CWM from outside the state for storage and treatment.

Therefore, this alternative was not further evaluated for this EA.

Affected Environment and Environmental Consequences

4.1 Introduction

This section describes the existing environmental conditions potentially affected by the proposed action, as well as the potential environmental impacts of implementing the proposed action or alternatives. In compliance with NEPA, CEQ guidelines, and 32 CFR Part 651, et seq., the description of the affected environment focuses on those resources and conditions potentially subject to impacts. Table 1-1 identifies the resources that would not be affected by the proposed action and therefore are not discussed in this section.

After describing the affected environment, each resource subsection presents the analysis of the environmental effects that would likely occur with the proposed action or alternatives and identifies any adverse environmental effects that cannot be avoided through project design. Cumulative effects are evaluated in section 4.13.

4.1.1 Direct versus Indirect Effects

The terms “effect” and “impact” are synonymous as used in this EA. Effects may be beneficial or adverse and may apply to the full range of natural, aesthetic, historic, and cultural resources within the project area and also within the surrounding area. Definitions and examples of direct and indirect impacts as used in this document:

Direct impact. A direct impact is one that would be caused directly by implementing an alternative and that would occur at the same time and place. For direct impacts to occur, a resource must be present.

Indirect impact. An indirect impact is one that would be caused by implementing an alternative and that would occur later in time or farther removed in distance, but would still be a reasonably foreseeable outcome of the action.

Relationship between direct and indirect impacts. For example, if highly erodible soils were disturbed as a direct result of the use of heavy equipment during construction, there could be a direct effect on soils resulting from erosion. This could indirectly affect water quality if stormwater runoff containing sediment from the construction site were to enter a stream.

4.1.2 Short-Term versus Long-Term Effects

Effects are also expressed in terms of duration. The duration of short-term impacts is considered to be 1 year or less. For example, the construction of a building would likely expose soil in the immediate area of construction. However, this effect would be considered short-term because it would be expected that vegetation would re-establish on the disturbed area within a year of the disturbance. Long-term impacts are described as lasting beyond

1 year. Long-term impacts can potentially continue in perpetuity, in which case they would also be described as permanent.

The anticipated duration of the proposed action is less than 6 months onsite, with operations for 90 days or less, and no permanent change would be made to the project site other than minimal grading; the majority of the effects would be considered short-term.

4.1.3 Intensity of Effects

In accordance with CEQ regulations and implementing guidance, impacts are also evaluated in terms of whether they are significant. Both short-term and long-term effects are relevant to the consideration of significance. Significance, as defined in the CEQ regulations for implementing NEPA at 40 CFR 1508.27, requires consideration of context and intensity.

Context requires that significance may be considered with regard to society, the affected region, affected interests, and the locality. The scale of consideration for context varies with the setting and magnitude of the action. A small, site-specific action (such as the proposed action evaluated in this EA) is best evaluated relative to the location rather than to the entire world.

Table 4-1 presents a summary and comparison of the anticipated effects of the proposed action and alternatives. The following terms (symbols) are used to portray the magnitude of impacts:

- No Impact The action does not cause a detectable change
- ⊙ Negligible The impact is at the lowest level of detection
- ⊖ Minor The impact is slight but detectable
- Moderate The impact is readily apparent
- Major The impact is severely adverse or exceptionally beneficial
- + Beneficial

TABLE 4-1
Summary of Potential Environmental Consequences
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC Alternative	EDS Alternative	No Action Alternative
Air Quality	⊙	⊙	○
Noise	⊙	⊙	○
Geology and Soils			
Geology/Topography	○	○	○
Soils	⊙	⊙	○
Prime Farmland	○	○	○

TABLE 4-1
 Summary of Potential Environmental Consequences
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	TDC Alternative	EDS Alternative	No Action Alternative
Water Resources			
Surface Water	⊕	⊕	○
Hydrogeology/Groundwater	⊕	⊕	○
Potable Water	⊕	⊕	○
Floodplains	○	○	○
Wetlands	○	○	○
Stormwater	⊕	⊕	○
Biological Resources			
Vegetation	⊕	⊕	○
Wildlife	⊕	⊕	○
Sensitive Species	○	○	○
Cultural Resources			
Architectural Resources	○	○	○
Archaeological Resources	○	○	○
Native Hawai`ian	○	○	○
Transportation	⊕	⊕	○
Hazardous Materials and Waste Management			
Hazardous Wastes	⊕, +	⊖, +	○
Wastewater	⊕	⊕	○
Solid Wastes	⊕	⊕	○
Petroleum, Oils, etc.	⊕	⊕	○
Human Health and Safety			
Ranges and Munitions	⊕	⊕	○
Munitions and Explosives	⊕	⊕	●
Environmental Justice	○	○	○

4.2 Air Quality

4.2.1 Affected Environment

The US Environmental Protection Agency (EPA) established national ambient air quality standards (NAAQS) for criteria pollutants under the Clean Air Act (CAA). The Clean Air Branch of DOH is responsible for implementing air pollution control in the state and has

established Hawai`i ambient air quality standards (HAAQS). These state and national ambient air quality standards are listed in Appendix B.

The CAA general conformity rule requires that federal actions occurring in nonattainment and maintenance areas to be consistent with the applicable State Implementation Plan. Because Hawai`i is and always has been in attainment for all pollutants, a general conformity analysis is not required for the proposed action.

4.2.1.1 Existing Air Quality Conditions

The proposed action would occur in the area known as Schofield Barracks Military Reservation, or SBMR, in the Wahiawa District of central O`ahu.

Air quality in the state of Hawai`i is in general some of the highest in the nation. The relatively small size of the islands, the almost constant trade winds (flowing from east to west), and the limited types of emission sources all contribute to the state's clean air. Data collected from monitoring stations throughout Hawai`i indicate that there have not been any recent exceedances of ambient air quality standards (State of Hawai`i, Department of Health [DOH], 2007a; DOH, 2007c).

4.2.1.2 Existing SBMR Air Permits

Schofield Barracks and Wheeler Army Air Field currently have a covered source permit No. 0226-01-C, granted in accordance with Hawai`i Administrative Rules Title 11, Chapter 60.1, Air Pollution Control (DOH, 2007d). The covered source permit was originally issued on November 29, 1994 and most recently revised on August 20, 2007.

Most equipment at Schofield/Wheeler is classified as insignificant activities, including the following: liquefied petroleum gas (LPG) fired boilers, other LPG fired equipment with heat input of less than 1 million British thermal units per hour (MMBtu/hr), diesel fired boilers and diesel engine generators with less than 1 MMBtu/hr heat input, emergency diesel engine generators, gasoline engines less than 25 horsepower (hp), and several woodworking shops. Emissions from insignificant activities alone account for more than 100 tons of NO_x and CO emissions per year, resulting in the facility being subject to covered source permit requirements.

4.2.2 Consequences

4.2.2.1 Impact Methodology

The potential air quality impacts were evaluated using the proposed action's associated air pollutant emissions. The emission sources associated with the proposed alternatives are fugitive dust from constructive activities and exhaust emissions from generator operation and process equipment. The details of the emission calculations associated with operation of the proposed alternatives are in Appendix B.

The following factors were used to determine whether a project alternative would have a significant impact on air quality:

- The 100 ton per year CAA conformity *de minimis* threshold does not apply to Hawai`i because it is in attainment. However, the *de minimis* thresholds were used as a basis of comparison in analyzing air quality impacts. Therefore, net increases in annual criteria

emissions for the proposed action and alternatives were compared to the conformity *de minimis* thresholds.

- Whether or not emissions of ozone precursors would occur in quantities or locations that may reasonably cause a violation of federal or state ambient air quality.
- Whether or not emissions of hazardous air pollutants would exceed state standards.

4.2.2.2 Air Permits Required for TDC and EDS Alternatives

The generators associated with the proposed action would have a heat input capacity of less than 1 MMBtu per hour. Generator operating requirements for the EDS Alternative would be similar; permitting requirements are based on the TDC generators, because the EDS would use a smaller generator (see Section 4.2.2.4). Under DOH regulation 11-60.1-82(f)(2), the combination of fuel-burning equipment operated simultaneously having a total heat input capacity of less than 1 MMBtu per hour would be classified as insignificant activities. The Army will incorporate applicable requirements for these insignificant activities into the Schofield/Wheeler covered source permit, in accordance with regulation 11-60.1-88.5.(11-60.1-82(e) (DOH, 2007e).

DOH has established limits for ambient air emissions of hazardous air pollutants from major stationary sources (DOH, 2007f). Because the generators associated with the proposed project are classified as insignificant sources and not major sources, the generators are exempt from Rule 11-60.1-179, *Ambient air concentrations of hazardous air pollutants*.

4.2.2.3 TDC Alternative (Proposed Action)

Emissions from Site Preparation Activities. Minimal site preparation would be required for the TDC Alternative. Fugitive dust may be generated while installing the TDC system and other equipment on the site, but this would be temporary and last less than a month. Less than ¼ acre ground-disturbing construction activities would be conducted and the minimal dust generated by setting up the system enclosure (temporary shelter), chamber system, and trailers would be temporary. Therefore, the TDC Alternative would have negligible impacts on air quality as a result of site preparation.

Emissions from Generators. One 455kW diesel-powered generator would be used to provide the electricity needed for TDC operations, running continuously for less than 3 months. An emergency backup generator of the same size would be available in case the main generator fails, and would be test-run approximately one hour per week. In addition, one 230kW backup generator would be available for the various ancillary support trailers, lab, and filter systems associated with the TDC and would also be test-run about 1 hour per week.

The annual emissions associated with operation of the generators are compared to the general conformity *de minimis* thresholds in Table 4-2. As shown in Table 4-2, the annual generator emissions are much less than the general conformity *de minimis* thresholds. Given the duration and quantity of ozone precursors that would be emitted, it is not anticipated that the generators would cause or contribute to a violation of an air quality standard.

TABLE 4-2
TDC Alternative, Air Pollutant Emissions
Criteria Pollutants

Source	Pollutant (tons / year)				
	NOx	SOx	VOC	CO	PM10
Generators Total	20.82	1.38	1.69	4.49	1.48
Transportable Detonation Chamber	0.172	0.109	1.10	0.026	0.026
Total Emissions	21.16	1.60	4.29	4.54	1.53
<i>De Minimis</i> Thresholds	100	100	100	100	100

Hazardous air pollutant emissions associated with the operation of the generators under the proposed alternative would be less than 61 pounds per year (Table 4-3). Because the heat input of the generators is less than 1 MMBtu per hour, the generators are considered insignificant sources.

TABLE 4-3
TDC Alternative, Generators Air Pollutant Emissions
Hazardous Air Pollutants

Pollutant	Emission Rate (lb / yr)
Benzene	8.77
Tolene	3.85
Xylene	2.68
Propylene	24.26
1,3-Butadiene	0.37
Formaldehyde	11.09
Acetaldehyde	7.21
Acrolien	0.87
PAH	1.58
Total Emissions	60.7

Consequently, the emissions of hazardous air pollutants from the generators during operations would be expected to have a negligible impact on annual air emissions at SBMR and on regional air quality.

Emissions from TDC Operations. Under the TDC Alternative, the munitions shells and energetic components would be detonated in a sealed metal chamber. The complete destruction of the phosgene and chloropicrin within the munitions is achieved by

hydrolysis reaction with the water vapor (steam), generated during the explosion from the measured water bags that are hung in the chamber.

Emissions of criteria pollutants are generated when munitions are detonated within the TDC chamber. Off-gases from the detonation are fed into an expansion tank before being released into a gas treatment system. A purge blower introduces ambient air, which cleans the detonation chamber and downstream components. The design incorporates continuous air purging that discharges directly into the off-gas treatment system. The TDC would be installed in a ventilation-controlled system enclosure, which would provide secondary air filtration, in case chemicals were accidentally released outside the detonation chamber.

During previous operation of the TDC, air samples were collected and tested to quantify the emissions produced during detonation of munitions. Most of the energetic material is converted into simple gaseous products such as carbon dioxide, carbon monoxide, water vapor, nitrogen gas, nitric oxide, and nitrogen dioxide. Previous test results of the TDC showed emission quantities to be very low and containing only trace amounts of hazardous components (AST Environmental Inc. (AST), 2006).

The annual emissions associated with operation of the TDC are compared to the general conformity *de minimis* thresholds in Table 4-2. As shown in Table 4-2, the annual TDC emissions are 1 percent or less of the general conformity *de minimis* thresholds. (Details of the emission calculations associated with operation of the TDC are in Appendix B.) Consequently, the emissions of air pollutants from the TDC during operations would be expected to have a negligible impact on air quality.

Table 4-3 shows the emission rate for hazardous air pollutants associated with the generators.

4.2.2.4 EDS Alternative

Emissions from Site Preparation Activities. Similar to the TDC Alternative, minimal site preparation would be required for the EDS Alternative. Less than $\frac{1}{4}$ acre of ground-disturbing construction activities would be conducted and the minimal dust generated by site preparation would be temporary. Therefore, the EDS Alternative would result in negligible impacts on air quality as a result of site preparation.

Emissions from Generators. A 230kW generator would be used to power the EDS, with a backup generator in case the primary generator fails; similar to the TDC Alternative, the main generator would run continuously, but for a somewhat longer operating period. Because it is not anticipated that the TDC Alternative would cause or contribute to a violation of an air quality standard, it is not anticipated that the smaller generator used for the EDS Alternative would cause or contribute to a violation of an air quality standard either.

Emissions from EDS operations. The EDS would be installed in a ventilation-controlled system enclosure, similar to the TDC. Chemical neutralization is used to treat the chemical fills following the rupture of munitions in the EDS vessel. Based on previous operations of the EDS, emission quantities are very low and only contain trace amounts of hazardous components (PMNSCM, 2001, 2003, 2004).

Overall, the emissions of air pollutants from the generators and EDS operations at SBMR would be expected to have a negligible impact on annual air emissions at SBMR and regional air quality.

4.2.2.5 No Action Alternative

Under the No Action Alternative, munitions would require indefinite storage and would not be destroyed. No direct impacts to air quality would occur. However, indefinite storage could increase the chance of munition deteriorating over time and the potential for accidental release of phosgene or chloropicrin, which would volatilize and disperse, resulting in a temporary impact on air quality in the vicinity of the release and no effect on regional air quality.

4.3 Noise

4.3.1 Affected Environment

4.3.1.1 Regulatory Setting

Under the Army's Environmental Noise Management Program (ENMP, formerly known as the Installation Compatible Use Zone or ICUZ Program), the Army evaluates the impact of noise that may be produced by ongoing and proposed Army actions and activities (Department of the Army, 1997).

The ENMP characterizes noise into three primary noise zones. Noise Zone I is typically suitable for all types of land uses and is located the farthest from the noise source. Noise Zone II and Noise Zone III are generally considered incompatible for noise-sensitive land uses, such as housing, schools, and medical facilities. (See Appendix C for additional information.)

The 2004 EIS for Stryker Brigade Combat Team Transformation provides a detailed explanation of how sound is measured and the environmental and health effects of noise; Appendix C of this EA presents a summary from that EIS, including the regulatory setting and common noise sources for comparison to the levels discussed below.

4.3.1.2 Environmental Setting

The closest on-post residences are approximately 2,000 feet east of FP-202, the proposed project area. The distance to the closest base boundary is more than 1 mile away and the closest off-post residences (in the Kunia Drive area) are approximately 2.5 miles southeast of FP-202 (Figure 1-1).

The dominant noise sources at SBMR include military and personal vehicle traffic, small arms and heavy weapons firing, and helicopter flight activity. A large portion of the family and troop housing on SBMR is exposed to undesirable noise levels under baseline conditions.

Existing noise contours indicate that Zone II conditions affect all but the easternmost portion of the cantonment area. Zone III conditions affect the western edge of the cantonment area, including some of the westernmost housing areas at SBMR. The Zone III contour

extends east of Kahoolawe Avenue in the northwestern portion of the cantonment area and east of Beaver Road in the southwestern portion of the cantonment area.

Off-post residential areas in the Wahiawa, Mililani Mauka, and Mililani Town areas are considered Zone I areas and therefore not affected by current ordnance-firing noise conditions.

Short-term noise monitoring in the western part of the cantonment area was conducted in 2002 (Y. Ebisu & Associates, 2002). The average noise level at a distance of 69 feet from Beaver Road was 59 dBA (decibels, A-weighted). Noise sources identifiable during these monitoring periods included vehicle traffic, helicopter flight activity, and artillery firing. Noise levels generally varied from slightly lower than 50 dBA to about 70 dBA, with occasional noise events exceeding 70 dBA. Maximum noise levels for the loudest vehicles and helicopters were typically between 70 and 80 dBA. Maximum noise levels from artillery firing were generally less than 70 dBA at these locations.

The 2002 noise study also summarized data from an April 1993 noise-monitoring program. During periods of 155-mm howitzer firing, peak noise levels at a location near FP-202 were typically between 89 and 96 dBC, with a maximum of about 108 dBC. The peak noise levels measured during the 1993 study did not indicate any blast noise exposure problems because the measured peak levels were below the threshold normally associated with a moderate rate of complaints about blast noise (US Army CHPPM, 2001).

4.3.2 Consequences

4.3.2.1 TDC Alternative (Proposed Action)

The major noise sources associated with project alternatives are controlled detonation within a detonation chamber and expansion tank, associated off-gas treatment equipment, which consists primarily of various fans and motors, and the electrical power generators.

The proposed munitions destruction activities are anticipated to occur during daytime hours only, over a period of 90 days or less, with active operations for up to 3 weeks during that time. Based on noise monitoring during previous operation of the TDC, the average noise level associated with the operation of the TDC Alternative is anticipated to be less than 90 dBA at a distance of 100 feet, or less than 65 dBA at the closest on-post housing about 2,000 feet away from FP-202. This is considered suitable for all land uses per the Army's ENMP (Zone I) (Misko, 2003; Department of the Army, 1997).

Operational noise generated from the TDC would be quieter than existing noise associated with the adjacent firing ranges. Given the moderate noise levels, predominately daytime activities, and limited duration of the TDC Alternative, no changes to the existing ENMP Noise Zones would result. Hearing protection would be required for TDC operators, but not for other personnel working outside the safety distance of 200 feet from the TDC system. Therefore, noise from the TDC Alternative would result in a temporary, negligible adverse impact.

4.3.2.2 EDS Alternative

Noise levels associated with the EDS Alternative are anticipated to be less than the TDC Alternative, because the EDS only detonates explosives once a day. However, the EDS

would operate for a longer time period than the TDC. Hearing protection would be required for EDS operators, but not for other personnel working outside the safety distance from the EDS system. Noise from the EDS Alternative would result in a temporary, negligible adverse impact.

4.3.2.3 No Action Alternative

Under the No Action Alternative, no additional noise would be generated because there would be no controlled destruction.

4.4 Geology and Soils

4.4.1 Affected Environment

FP-202 is located south centrally within the firing range area of the SBMR Main Post (Figure 1-1). The area has been cleared of vegetation and is currently used for storing the donor explosives that are used in clearing ordnance from the range impact areas.

The soil at FP-202 is predominantly Kunia silty clay at a 0 to 3 percent slope. Kunia soils are well-drained and have moderate permeability. Runoff is slow, and erosion hazard is slight. The surface layer is dark reddish-brown silty clay about 2 feet thick, grading to a blocky silty clay loam to a depth of about 6 feet, and underlain by gravelly silty clay (Foote, et al. 1972). Approximately one quarter of the site in the northwestern corner is comprised of Kolekole silty clay loam at a 1 to 6 percent slope.

The gullies in which the Kiikii Stream runs through to the north and south of FP-202 consist of Helemano silty clay at a 30 to 90 percent slope. The north fork of the Kiikii Stream is the closest surface water body to the site, running as near as 165 feet to the north. The next closest surface water location is the south fork of the Kiikii Stream, which runs approximately 380 feet south of FP-202.

4.4.2 Consequences

4.4.2.1 TDC Alternative (Proposed Action)

Installing the TDC system, trailers, and other equipment at FP-202 could potentially cause soil erosion at the site, on which the vegetation consists primarily of grass with areas of bare soil. At FP-202, the slope of the land is gradual; therefore, the erosion potential from temporary TDC placement in the area would be minimal. In addition, only a small area (less than $\frac{1}{4}$ acre) would require grading to support the chamber and system enclosure.

Soil contamination from destruction of the recovered CWM is not a concern, because the TDC process provides complete containment and wastes will be collected and taken off-post, leaving no remnants of TDC activity in the area (see Section 4.9, Hazardous Substances and Waste Management).

The TDC Alternative would have no impact on geologic resources and soils.

4.4.2.2 EDS Alternative

Impacts from installing and operating the EDS would be essentially the same as for the TDC. The potential for soil contamination if reagent or other liquid wastes were spilled would be minimized by secondary containment in the system enclosure.

The EDS Alternative would have no impact on geologic resources and soils.

4.4.2.3 No Action Alternative

The No Action Alternative would not affect soils at FP-202. The current use of the site for temporary storage of explosives would continue. The recovered CWM would continue to be stored in the IHF.

4.5 Water Resources

4.5.1 Affected Environment

FP-202 is situated south centrally within the Kaukonahua inland watershed. There are two wetlands on the east and west edges of Schofield Barracks property, the closest of which is nearly 2.5 miles to the east of FP-202. Average rainfall in the area is approximately 1.57 inches in the summer and 3.94 inches in the winter (25th ID [L] and US Army Hawai`i [USARHAW] and Guernsey, 2002). According to the State of Hawai`i Office of Planning, SBMR is not located in a flood hazard area (DFIRM, 1996).

Approximately 1,800 feet east of FP-202, the Kiiiki Stream splits and continues to the north and south. The south fork ends directly south of FP-202, at a distance of approximately 380 feet. The north fork is the closest surface water body to the site, running as near as 165 feet to the north and ending approximately 2,345 feet to the west of the site. All streams within the Kaukonahua watershed flow north into the Pacific Ocean at Waialua (25th ID [L] and USARHAW, 2002-2006).

The State of Hawai`i classifies this watershed as second tier Category I under the Hawai`i Unified Watershed Assessment. The classification of the Kaukonahua watershed was based largely on the fact that the coastal receiving water, Kaiaka Bay, is classified as an impaired water body based on pathogens, nutrients, ammonium, algal growth, and turbidity. Kaukonahua Stream is not identified as an impaired water body (DOH, 2004).

All streams on SBMR are somewhat degraded, especially those drainages affected by erosion. Stream quality on the installation is also affected by non-point agricultural pollution from adjacent pineapple and other crop lands.

Groundwater beneath SBMR resides in the Schofield High Level Water Body, a diked aquifer system, which is the major source of potable water to SBMR. There are 120 million gallons of water available per day from the central aquifer system within the water body, 5.455 million gallons/day of which is allocated to the military, but only 4.71 million gallons/day are used (25th ID [L] and USARHAW and Guernsey, 2002; USACE and Nakata Planning Group, 2000).

Groundwater quality within SBMR has been affected by contaminants from industrial activities. SBMR was placed on the National Priorities List in August 1990, primarily as a

result of elevated trichloroethylene and carbon tetrachloride concentrations in the groundwater beneath the installation as a whole. Following remedial actions, which reduced the concentrations in groundwater to below applicable regulatory thresholds, SBMR was officially de-listed (removed) from the National Priorities List in August 2000 (25th ID [L] and USARHAW, 2004).

4.5.2 Consequences

4.5.2.1 TDC Alternative (Proposed Action)

The low erosion potential at FP-202, and the fact that only a small area (less than ¼ acre) of ground disturbance is planned for installing the TDC system, would minimize the potential for erosion to adversely affect the Kiikii stream.

Water contamination from destruction of the recovered CWM is not a concern, because the TDC system provides complete containment and all wastes will be collected and taken off-post for proper disposal (see Section 4.9, Hazardous Substances and Waste Management).

Potable water requirements would be limited to drinking water for about 20 operators and support personnel; decontaminating PPE (several gallons per week); and 1,000 gallons used in the closed-loop cooling process. No appreciable increase to the military's water allocation from the Schofield High Level Water Body would result from these quantities.

Overall, deployment and operation of the TDC at FP-202 is expected to result in negligible impacts to water resources.

4.5.2.2 EDS Alternative

The impacts of deploying the EDS would be similar to deploying the TDC Alternative.

Although the EDS produces considerably more liquid wastes than the TDC, contamination of surface water bodies or groundwater is not anticipated because the wastes would be stored in drums with secondary containment for leaks and would be shipped off the island for proper disposal (see Section 4.9, Hazardous Substances and Waste Management).

Potable water requirements for the EDS would be less than 5,000 gallons total, including water for mixing the reagent, rinse water, decontaminating PPE, and drinking water for the small number of about 20 operators and support personnel. No appreciable increase to the military's water allocation from the Schofield High Level Water Body would result from these quantities.

4.5.2.3 No Action Alternative

The No Action Alternative would not affect water resources or quality at FP-202. The current use of the site for temporary storage of explosives would continue.

4.6 Biological Resources

4.6.1 Affected Environment

Information on biological resources found within the project area was obtained primarily from the *Integrated Natural Resources Management Plan (INRMP) 2002-2006 and Environmental*

Assessment, Oah`u, Hawai`i (25th ID [L] and USARHAW, 2002-2006) and the *Final Environmental Impact Statement: Army Transformation to a Stryker Brigade Combat Team in Hawai`i* (25th ID [L] and USARHAW, 2004).

The proposed project location, FP-202, is a highly disturbed area that supports ongoing military activities. No special status species or habitats are known to exist in this area or the immediate vicinity. Special status species found at other locations at SBMR have been considered, but are unlikely to occur within this project impact area based on lack of suitable habitat.

4.6.1.1 Flora

The project area consists of a cleared grassy field with earthen berms along the boundaries. Vegetation in disturbed portions of SBMR, such as the project area, tends to consist of weedy species and to have low plant diversity, with non-native plants as the dominant species. Oriental vessel fern (*Angiopteris evecta*), satinalf (*Chrysophyllum oliviformes*), ginger (*Hedychium spp.*), and *Juniperus spp.* are invasive plants found at SBMR (25th ID [L] and USARHAW, 2004) and may occur within the project area.

4.6.1.2 Fauna

Surveys of SBMR within the last 20 years have not identified special status wildlife in the project area or its vicinity and have identified the area as having low potential to support special status species. The Hawaiian hoary bat (*Lasiurus cinereus semotus*), a federally endangered species, is the only indigenous terrestrial mammal in O`ahu. This species was last observed in SBMR in 1976 and does not have suitable roosting habitat within the project area (25th ID [L] and USARHAW, 2004).

Introduced mammals with the potential to occur within the project area are pigs (*Sus scrofa*), goats (*Capra hircus*), cats (*Felis catus*), mongoose rats (*Ratus spp.*) and mice (*Mus domesticus*).

A number of endemic and indigenous birds have been observed at SBMR. Endemic birds include the short-eared owl (*Asio flammeus sandwichensis*) O`ahu `elepaio (*Chasiempis sandwichensis gayi*), O`ahu creeper (*Paroreomyza maculatus*), the `i`iwi (*Vestiaria coccinea*), O`ahu `amakihi (*Hemignathus virens chloris*), and the `apapane (*Himatione sanguinea sanguinea*). Indigenous birds include the koa`ekea/white-tailed tropicbird (*Phaethon lepturus dorotheae*), `auku`u/black-crowned night-heron (*Nycticorax nycticorax hoactli*), and the Pacific golden-plover (*Pluvialis fulva*). Most introduced birds at the SBMR are forest birds, field birds, urban birds, game birds, and one bird of prey.

The disturbed nature of FP-202 limits fauna in the general vicinity to those adapted to highly disturbed environments or those that inhabit the northern periphery of the site (beyond the berm), which has larger trees and shrubs.

4.6.1.3 Special Status Species

A total of 55 rare plant species have been recorded at SBMR, including 33 endangered taxa, 7 candidate species for listing, and 10 species of concern (25th ID (L) and USARHAW, 2002-2006). Nineteen rare animal species have been documented at SBMR, including four endangered taxa and nine species of concern (25th ID (L) and USARHAW, 2002-2006).

No special status species have been recorded in the project area and there is no suitable habitat to support these species (25th ID (L) and USARHAW, 2002-2006; Personal Communication, 2007a).

4.6.2 Consequences

4.6.2.1 TDC Alternative (Proposed Action)

FP-202 is located on highly disturbed, flat parcel of land of bare soil and grass. Special status species are unlikely to occur in the project area and are not expected to be affected by the proposed activities.

Fauna in proximity of FP-202 may be temporarily disturbed by noise related to the installation and operation of the TDC. Birds may be flushed from nearby roosts or may be deterred from foraging in the area. The overall impact is expected to be negligible, however, given the minimal site preparation (less than ¼ acre) of previously disturbed land, the temporary presence of the TDC, and the tolerance which these individuals show to the existing levels of noise and vibration produced by ongoing military activities in the surrounding area.

Low-lying vegetation in the project area, dominated by noxious weeds, would be trampled in certain areas, but this impact would be temporary and is not expected to have any long-term impact on vegetation type or abundance.

In the extremely unlikely event of an accidental release of phosgene or chloropicrin outside the two levels of containment and filtration, chemical vapors could result in fatalities to wildlife in the immediate vicinity. Long-term effects on vegetation would not be expected (See Section 4.11.3, Potential Impacts from Accidents).

The TDC Alternative would have temporary, negligible adverse impacts on biological resources. No impact to sensitive species is anticipated.

4.6.2.2 EDS Alternative

The effects of the EDS Alternative on biological resources would be similar to those of the TDC Alternative. Operating the EDS generates less frequent and lower levels of noise, with less potential for disturbance of fauna in the vicinity. The duration of use of the EDS, however, would be slightly longer than that of the TDS. An accidental release of the chemical reagents used in the EDS treatment process could harm fauna, soils, and vegetation. However, such an event is unlikely because secondary containment would be provided under the tanks where the reagents would be stored.

The EDS Alternative would have negligible temporary adverse impacts on biological resources. No impact to sensitive species is anticipated.

4.6.2.3 No Action Alternative

Under the No Action Alternative, the TDC or EDS would not be deployed to SBMR for detonation and disposal of the recovered CWM. Therefore, there would be no reasonably foreseeable changes to the current level and type of impacts on biological resources.

The No Action Alternative would require the recovered chemical munitions to be indefinitely stored at SBMR, increasing the chance of deterioration and an accidental release of chemical fill, which would volatilize rapidly but could result in fatalities to wildlife in the immediate vicinity.

4.7 Cultural Resources

Cultural resources represent a broad array of assets, including prehistoric and historic archaeological resources, architecturally historic buildings and properties, and Native Hawaiian traditional resources and historic properties, including sacred sites, cultural objects, burial sites, traditional gathering places or other special use sites, areas of traditional importance (ATIs), and traditional cultural properties (TCPs).

4.7.1 Affected Environment

4.7.1.1 Regulatory Setting

Numerous laws require the Army to identify and consider the effects of its actions on cultural resources, including NEPA, the National Historic Preservation Act, the Archeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, Executive Order 13007, DoD guidelines, and – specific to Native Hawaiians – Army Regulation 200-7, which is the Army’s guidelines on Curation of Federally Owned and Administered Collections (36 CFR Part 79).

“Historic Properties” is a term used to describe cultural resources that are eligible for inclusion in the National Register of Historic Places (NRHP); these properties warrant further discussion and analysis to assess the effects a proposed action may have on them.

The area of potential effect for the proposed action is FP-202, one of the firing point areas located along the southeastern edge of SBMR’s west range (see Figures 1-1 and 2-1). As discussed below, no known cultural resources have been located within the area of potential effect.

4.7.1.2 Cultural Resource Context

The first settlers of Hawai`i came from central or eastern Polynesia between AD 100 and 800. Agriculture intensified between AD 1150 and 1400, leading to a population expansion and the establishment of a more-complex cultural structure, including lineages of high chiefs on O`ahu and Hawai`i.

While the high chiefs battled for dominance during the 17th and 18th centuries, the social structure included royal centers, temple complexes, population centers, and agriculture consisting of both dry farming and irrigation. Large villages and extensive agricultural fields were located inland, near SBMR. The main political center was located at the traditional place called Līhu`e. Līhu`e is described in Hawaiian tradition as the residence of the O`ahu chiefs and part of the traditional Hawaiian land unit called Wai`anae Uka, which served as the training grounds for chiefs, the birthing place of elite children, and the location of many important battles.

The arrival of Europeans, first by Captain James Cook in 1778, and more importantly the trade goods the Europeans brought, created significant effects on the Hawaiian Islands' societies. Kamehameha I was able to seize control over all the Hawaiian Islands before his death in 1819. Lihue continued to serve as a place of refuge for Hawaiian chiefs after European arrival.

By 1820, American and European missionaries, settlers, traders, and ranchers began arriving, causing great changes in Hawaiian culture. Sandalwood was intensely harvested to sell to China between 1816 and 1830, resulting in deforestation and leading to animal grazing. Small villages continued to farm along the steam valleys. Commercial cultivation of pineapple and sugar as well as intensive ranching was responsible for bringing an influx of new immigrants from China, Japan, and the Philippines to work in the fields. In 1893 the monarchy was replaced by a revolution that brought changes in the government of Hawai'i.

During the Spanish American War, the United States annexed Hawai'i as a territory and began building up military defenses on the islands. Installations at SBMR were established in 1909 as a base for mobile defense troops. Hawai'i became increasingly important to the United States through World War I and World War II. It became even more prominent after the attack on Pearl Harbor, hosting up to 250,000 soldiers as the war intensified with Japan. By the time Hawai'i became a state in 1959, its strategic location had played host to every major US war, and continued to host military activities through Vietnam.

4.7.1.3 Previous Cultural Resource Investigations

FP-202 is located just outside and to the west of the cantonment area. Historic maps show range activities at this location as early as 1928. FP-202 appears on a 1975 map and surface grading is visible on a 1998 aerial photo. Range Control staff recall the extensive grading of the area several times since the initiation of FP-202. Confirmation and extent of ground disturbance was identified in four test units placed in the proposed location of the blast chamber. These units yielded modern debris within a mixed fill on top of intact sterile substratum (Personal Communication, 2007b).

No known cultural resources have been located within the area of potential effect for this project. In a letter dated 10 December 2007, the US Army Garrison - Hawai'i has initiated consultation with the Hawai'i State Historic Preservation Office and appropriate consulting parties, and has recommended a determination of "no historic properties affected" for this project; a copy of the letter can be found in Appendix A.

4.7.2 Consequences

FP-202 has been subject to surface disturbance through military use, from as far back as 1928 until the present. Despite this disturbance and the on-site testing performed, there remains a potential (similar for all alternatives), for subsurface cultural resources or the presence of ATIs known to Native Hawaiians but whose location is not disclosed.

If subsurface cultural resources were to be discovered during any of the proposed activities, work would cease immediately, the area would be secured and the appropriate personnel would be contacted, including but not limited to the Cultural Resources Manager for SBMR, State Historic Preservation Officer, and the appropriate Native Hawaiian representatives. Work would not continue in the area of the discovery until an appropriate mitigation plan

could be developed and consulted upon, as appropriate, to avoid further impacts or mitigate adverse effects.

4.7.2.1 TDC Alternative (Proposed Action)

This alternative calls for the operation of the TDC and the location of ancillary, modular buildings and temporary structures on FP- 202. The TDC Alternative would not require any permanent structures and less than ¼ acre of ground disturbing activities. At the completion of the project (after 6 months or less), all temporary structures would be removed and the site would be left very much as it was found. Because there are no documented historic properties in the area of potential effect, the TDC Alternative is likely to have no effect on cultural resources.

4.7.2.2 EDS Alternative

This alternative is similar to the Proposed Action, except that it calls for the use of a different transportable technology for the destruction of munitions, the EDS. The effects to cultural resources would be the same as in the TDC Alternative. Because there are no documented historic properties located in the area of potential effect, the EDS Alternative is likely to have no effect on cultural resources.

4.7.2.3 No Action Alternative

The No Action Alternative would have no greater or lesser impact on cultural resources than under the current use or management of the area.

4.8 Transportation

4.8.1 Affected Environment

This section describes the transportation resources near the proposed project site and focuses primarily on roadways. Traffic refers to the movement of vehicles along roadways. Roadways may include paved and unpaved roads or trails.

On O`ahu, the primary urban development is along the southern coastal areas. Urban development extends from `Ewa on the west to Hawai`i Kai on the east. The Transportation for O`ahu Plan 2025 provides an overview of traffic conditions, which are currently operating at acceptable levels on O`ahu. However, traffic tends to back up on the roads to SBMR during times of heightened security.

There are four freeways on O`ahu that provide approximately 55 miles of state roadway:

- H-1 (Lunalilo Freeway) traverses the southern portion of O`ahu and connects the `Ewa areas with Hawai`i Kai. The freeway also provides service to Honolulu International Airport, Pearl Harbor, Hickam Air Force Base (HAFB), and downtown Honolulu.
- H-2 connects the `Ewa area with central O`ahu, where SBMR is located. H-2 ties into H-1 west of Honolulu.
- H-3 is the newest freeway on O`ahu and connects the Pearl Harbor area with Marine Corps Base Hawai`i, which is on the east side of O`ahu.

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- Finally, State Road 78, referred to as the Moanalua Road, provides a bypass for H-1 traffic between the Aiea/Pearl City area and downtown Honolulu.

Of these freeways, only H-1 and H-2 would be traversed by trucks carrying the TDC system and associated equipment. H-2 and Kamehameha Highway connect the city of Honolulu with the central valley, encompassing the towns of Mililani, Wahiawa, Schofield Barracks, and Haleiwa.

The main access routes for the training areas around SBMR are via the `Ewa /Honolulu area: Kamehameha Highway and Kunia Road from the `Ewa District, and Kamananui Road and Wilikina Drive from the North Shore district. Trimble Road, Kolekole Avenue, and Lyman Road are the primary circulation routes through SBMR itself.

After the system is installed on FP-202 and ready to begin operations, the recovered CWM would be moved from the IHF near 20th Street to FP-202 (see Figure 2-1). The route of the CWM transport on SBMR would be from 20th Street, right on Trimble Road and left on Range Road to FP-202. (Safety concerns for transporting munitions on the post are discussed in Section 4.11, Potential Effects of Accidents.)

4.8.2 Consequences

The project-related traffic would not significantly affect operations at the intersections, street segments, and parking in the vicinity of FP-202, and traffic would generally be free-flowing. No traffic impact analysis would be needed to identify the potential impacts from transporting the TDC or EDS and auxiliary equipment on public roads to SBMR. The transport would require one or two trips each way and is considered temporary.

After the system is installed, there would be occasional truck trips to deliver fuel, water, and to service the porta-johns, etc., and daily personal vehicle trips for approximately 20 people. These trips would occur once or twice per week and would be via public and on-post roads.

4.8.2.1 TDC Alternative (Proposed Action)

Because of the size of the TDC and its components, the transport of the TDC would require a permit from the State Department of Transportation and the City and County of Honolulu Department of Transportation Services for Movement of Oversize and/or Overweight Vehicles and Loads. Depending on the permit requirements, the transport may need to travel at reduced speeds, at pre-determined times of the day, and may require an escort. The Army and its contractors responsible for transporting the TDC will coordinate with these agencies regarding permit requirements and timing.

The TDC chamber is 19.7 feet long, 10.8 feet wide, 11.2 feet high, and weighs approximately 120,000 pounds. Permits are required for vehicles and/or loads that are over 65 feet long, 12 feet wide, 14.5 feet high or more than 80,000 pounds. The weight limitations may vary depending on the posted load limitation of the bridges on the route. The components of the system enclosure are within the maximum legal dimensions that are allowed on state, city, and county roadways.

The TDC system, including chamber and auxiliary equipment, would be transported on 8 tractor-trailers or trucks (1 flatbed trailer for the chamber, with auxiliary equipment on 7 tractor-trailers or trucks). Components of the system enclosure, filter systems and other

equipment would be transported on another 8 tractor-trailers, about a week after the TDC. (By comparison, deployment of the 25th ID from Schofield Barracks requires hundreds of trucks.)

The TDC system could be transported at non-peak traffic hours and would be a very short-term action, lasting less than a day for each transport activity (to and from Schofield Barracks). This would result in negligible impacts to state and county transportation routes and circulation.

4.8.2.2 EDS Alternative

The EDS Alternative also requires a transport from the Port of Honolulu to SBMR, but the EDS 2 system fits on one 40-foot tractor trailer, which can be towed, transported via flatbed trailer, or airlifted by commercial carrier, with six additional tractor-trailers carrying the components of the system enclosure, filters and other equipment. Because fewer vehicles would be required than the TDC Alternative, the impacts would also be negligible.

The EDS is 8.5 feet wide, 40 feet long, and 9.7 feet high and weighs 67,200 pounds. A permit for Movement of Oversize and/or Overweight Vehicles and Loads would not be required for the transport of the EDS.

4.8.2.3 No Action Alternative

The No Action Alternative means continued indefinite storage of the recovered CWM, and no transport on public roads would be necessary. There would be no impact on transportation resources.

4.9 Hazardous Substances and Waste Management

4.9.1 Affected Environment

The operation of the TDC at SBMR would produce hazardous wastes and non-hazardous wastes, solid and liquid, during operations. All wastes would be managed, transported, and disposed of in compliance with Army, federal, state, and local regulations.

This section examines the effects of the proposed action and alternatives on hazardous substances and waste management systems, on and off SBMR, that would be affected by these activities and discusses the hazardous materials that will be used during operations, including petroleum, oils, and lubricants (POL) and storage tanks,

This section also examines hazards that could be potentially encountered during operations, such as potentially contaminated locations in the vicinity of FP-202. Munitions and related hazards that potentially could be encountered during operations, including ranges in the vicinity of the proposed site, are discussed in Section 4.10, Human Health and Safety.

4.9.1.1 Waste Management

SBMR is a RCRA large quantity generator and has been issued an EPA identification number (HI-3210022239), but the installation does not have a RCRA permit and is not considered to be a TSDF. SBMR currently manages approximately 12 tons of hazardous waste per year, which are temporarily stored on-site and disposed of off-post, in accordance

with regulatory requirements and SBMR's 2007 Installation Hazardous Waste Management Plan. SBMR's pollution prevention plan regulates the storage and use of hazardous materials at the installation (USARHAW, 2005; Personal communication, 2007e).

Based on the waste and recycling streams generated in 2002, SBMR generates an estimated 1,720 tons of industrial solid waste annually. SBMR's recycling program processes recyclable items from the installation's industrial work areas. Solid waste is collected by private contractors and transported off-post to a City/County-owned co-generation incinerator, HPower, at Campbell Industrial Park (USARHAW, 2005). The facility processes about 2,000 tons of waste per day. Bulk waste from the installation, which includes construction debris, is collected by private contractors and transported off-post for disposal at the Nanakuli Landfill (HPower, 2007; Personal communication, 2007d).

Wastewater generated by SBMR is treated at the wastewater treatment plant (WWTP) at Wheeler Army Airfield, which is operated by a private contractor. The plant was recently upgraded to a capacity of 4.2 million gallons per day and processes an average daily flow of 2.6 million gallons (Personal communication, 2007d; USARHAW, 2005).

4.9.1.2 Petroleum, Oils, Lubricants and Storage Tanks

POL at SBMR, such as engine fuels, motor fuels, motor oils and lubricants, and diesel and kerosene heating fluids, are stored in both underground and aboveground storage tanks. There are no known permanent POL storage tanks in the immediate vicinity of the proposed site. POL are also stored in emergency generators (which contain integrated tanks to store fuel) located throughout the installation. The *Oil and Hazardous Substance Spill Prevention, Control, and Countermeasures Plan* (SPCC plan) provides procedures for spill reporting, containment, cleanup, and disposal of hazardous substances, including POL at the installation (Myounghee Noh & Associates, 2003).

4.9.1.3 Potentially Contaminated Locations

SBMR was placed on the National Priorities List in August 1990, primarily as a result of elevated trichloroethylene concentrations in the groundwater at the installation. Following remedial actions, which reduced the concentrations in groundwater to below applicable regulatory thresholds, SBMR was officially de-listed (removed) from the National Priorities List in August 2000.

The Installation Restoration Program (IRP) is part of an ongoing DoD effort to identify, evaluate, and clean up environmental contamination resulting from past use and disposal practices at DoD facilities nationwide. The Military Munitions Response Program (MMRP) is a comprehensive DoD effort to address the potential health and safety hazards present at munitions response sites, which have been found or are suspected to contain discarded military munitions or munitions constituents.

There are no IRP or MMRP or POL cleanup sites in the vicinity of the proposed FP-202 site (Personal Communication, 2007c).

4.9.2 Consequences

4.9.2.1 TDC Alternative

Hazardous Substance and Waste Management. The Army follows strict protocols in handling, storing, and transporting hazardous materials. By following these protocols, no adverse effects to the environment or to the safety or health of SBMR soldiers, personnel, visitors, or residents are anticipated.

An application for a 90-day emergency RCRA permit from DOH will be submitted for operation of the TDC at SBMR. If needed, the 90-day permit could be renewed by petitioning the issuing agency. The permit would allow the destruction of the recovered CWM containing phosgene and chloropicrin, as an action exempt from RCRA permitting and substantive requirements. The permit process requires a public notice and comment period and a submittal to DOH.

Hazardous wastes generated from TDC operations would be consistent in quantity and waste code to the 12 tons of hazardous wastes typically managed at the installation per year. They would be containerized, characterized, and placed in a less than 90-day waste storage unit at the TDC site, pending shipment off-site to a RCRA-permitted TSDF in the continental US. While on the installation, hazardous wastes would be managed in accordance with the Installation Hazardous Waste Management Plan.

The potentially hazardous wastes generated by TDC operations consist of:

- Used lime (about 0.5 ton)
- Used pea gravel (about 2 tons)
- Used pre-filters (18) and HEPA filters (36) from the air filtration system
- Used laboratory solvent (5 gallons)

The Army also would containerize and store all scrap metal and shell fragments, pending shipment to a permitted TSDF.

If spills or leaks are detected during unpacking of recovered CWM, decontaminated overpacks (prop cans) would be managed as hazardous solid wastes; if not, the overpacks could be reused by SBMR.

If contamination is detected in the TDC system's filters, the carbon (approximately 1.5 tons) would be managed as hazardous waste; if not, the carbon could be reused for subsequent TDC operations. Similarly, the 800-pound carbon filter bank from the system enclosure would be managed as hazardous waste if the filters cannot be reused.

The TDC operations are expected to last for less than 90 days; therefore, the operation would cause a temporary, slight increase in the total amount of hazardous wastes generated annually at Schofield, a negligible short-term impact.

The TDC Alternative also would result in long term beneficial effects to safety and protection of human health and the environment on Schofield Barracks, by destroying the 71 chemical munitions.

Non-hazardous Wastes. Non-hazardous solid wastes generated by the TDC operations (support functions and observers) would include used PPE, mask filters, laboratory wastes

such as gloves, paper, cardboard cartons, packing crates, etc. These materials would either be recycled through the on-post recycling program or disposed of off-post as solid or bulk waste. Considering that the HPower incinerator can process about 2,000 tons of waste per day, the small amount of non-hazardous solid waste expected to be generated by the TDC operations are unlikely to cause disturbance to the current waste management systems.

Non-hazardous liquid wastes generated by the TDC operations include several gallons of soapy water from decontaminating PPE whenever the chamber is entered (typically once per week), and approximately 1,000 gallons, or up to eighteen 55-gallon drums, of cooling water. The cooling water is potable water that flows within a closed loop in the system and does not come into contact with chemical fill; no additives would be added to the water. Prior to disposal, the water would be tested for residual metals, which might be picked up by the circulation of the water through the system.

The TDC Alternative would pose a negligible adverse impact as a result of non-hazardous waste generation.

Petroleum, Oils, Lubricants and Storage Tanks. A 455kW diesel-powered generator would be used to provide the electricity needed for TDC operations and two emergency backup generators would be available in case the main generator fails.

Approximately 4,000 gallons of diesel fuel would be needed for the estimated period of TDC operations and would be brought to the site weekly by truck. The main generator is equipped with a 300-gallon fuel tank that would be filled from one or more 1,000 or 2,000-gallon portable aboveground storage tanks onsite. In accordance with the installation's SPCC plan, the portable storage tanks would be equipped with secondary containment, capable of holding the entire contents of the largest tank within the containment area plus an additional 10 percent to allow for rain infiltration. According to the installation's SPCC plan, only personnel who are trained in properly handling POL and have had the appropriate hazard communication briefing in accordance with the US Occupational Safety and Health Administration (OSHA) guidelines would handle the diesel fuel.

POL handling and storage activities would follow best management practices and the engineering controls, operational procedures, and response guidelines in the SPCC plan to prevent accidental discharges, and to contain and resolve any that might occur. Therefore, the operation of the TDC would have a negligible impact on the handling of POL at the installation.

Potentially Contaminated Locations. There are no IRP, MMRP, or POL cleanup sites in the vicinity of the proposed site. Therefore, the operation of the TDC would have no impact on potentially contaminated locations at SBMR.

4.9.2.2 EDS Alternative

Hazardous Substance and Waste Management. Similar to the TDC Alternative, the EDS would require a 90-day emergency RCRA permit from the state for operation. Hazardous wastes associated with the operation of the EDS would be managed in accordance with the installation's Hazardous Waste Management Plan.

The potentially hazardous wastes generated by EDS operations consist of liquid wastes (neutralents) from neutralization reactions and spent decontamination solutions and rinse waters (approximately 4,000 gallons, or about 74 drums of 55-gallons each); decontaminated metal munition fragments and pieces of munition casings and fragmentation shield (approximately 3 tons); filters used to remove contaminants from gases vented to depressurize the vessel; the 800-pound carbon filter bank from the system enclosure if the filters cannot be reused; and contaminated PPE, if any. Altogether, approximately 11 tons of potentially hazardous wastes would be generated.

Similar to the TDC, if spills or leaks were detected during unpacking the recovered CWM, decontaminated overpacks would be managed as hazardous solid wastes; if not, the overpacks could be reused by SBMR.

Hazardous wastes would be managed, containerized, and transported off-island to the continental US for treatment and disposal at a commercial, RCRA-permitted TSDF.

The EDS would operate less than 90 days and would cause a temporary and moderate increase in the total amount of hazardous wastes generated annually at Schofield, a short-term minor impact.

The EDS Alternative also would result in long-term beneficial effects to safety and protection of human health and the environment on Schofield Barracks by destroying the 71 chemical munitions.

Non-hazardous Wastes. Non-hazardous solid wastes generated by the EDS operations include supplies from non-process areas, such as general trash and debris, that do not contact chemical agent/fill, reagent, or neutralent. Similar to TDC operations, these materials would either be recycled through the on-post recycling program or disposed of off-post as solid or bulk waste, in such small amounts that they are unlikely to cause disturbance to the current waste management systems.

Non-hazardous liquid wastes generated by the EDS operations potentially include about 250 gallons for PPE decontamination and about 2,200 gallons of rinse waters (50 gallons per treatment cycle), if they are found to be non-hazardous after sampling and analysis. These wastes could be transported by truck to the WWTP on Wheeler Army Airfield.

The EDS Alternative would pose a negligible adverse impact as a result of non-hazardous waste generation.

Petroleum, Oils, Lubricants and Storage Tanks. Generator use and fuel storage under this alternative would be similar to the TDC Alternative. Therefore, the operation of the EDS would have a negligible impact on the handling of POL at the installation.

Potentially Contaminated Locations. There are no IRP, MMRP, or POL cleanup sites in the vicinity of the proposed site. Therefore, the operation of the EDS would have no impact on potentially contaminated locations at SBMR.

4.9.2.3 No Action Alternative

Hazardous Substance and Waste Management. Under the No Action Alternative, the 71 phosgene- and chloropicrin-filled recovered munitions would continue to be stored in the

IHF at SBMR. Although not included in the No Action Alternative, these munitions would eventually require destruction and disposal in accordance with the Chemical Weapons Convention. Therefore, taking no action would only postpone the hazardous wastes that would eventually be generated by the destruction process.

Non-hazardous Wastes. No non-hazardous wastes would be generated by the No Action Alternative. Therefore, this alternative would have no impact on non-hazardous waste handling at SBMR.

Petroleum, Oils, Lubricants and Storage Tanks. No POL would be used by the No Action Alternative. Therefore, this alternative would have no impact on POL at SBMR.

Potentially Contaminated Locations. There are no IRP, MMRP, or POL cleanup sites in the vicinity of the proposed site. The overpacks in which the CWM were placed for temporary storage are empty propellant containers (prop cans), sealed with a metal lid and gasket to contain any leaks from the munition. However, prop cans are not designed for indefinite storage of CWM (PMNSCM, 2001). Therefore the potential exists for deterioration of the munitions and incidental leakage of chemical fill over time. Because leaking chloropicrin and phosgene would volatilize, however, it is unlikely that soil or water would be contaminated.

4.10 Human Health and Safety

4.10.1 Affected Personnel

Two groups of workers could be affected by the proposed deployment and operation of the TDC at SBMR. Preparing the site and installing the TDC system, trailers, etc., are normal construction activities that pose no special risks to Army or contractor workers. Therefore, these risks will not be discussed further in this EA. Workers who handle munitions and operate the transportable treatment system are exposed to less-common risks, which are discussed further in this section. An analysis of the risks from an accidental release of chemical fill from the recovered CWM is discussed in Section 4.11, Potential Effects of Accidents.

4.10.1.1 Ranges and Munitions

FP-202 is located on the live-fire range on SBMR. FP-202 is one of four ammunition holding areas on SBMR that are used as temporary storage by the training units. The FP-202 holding area is currently used to store commercial explosives (donor explosives) that are used in the destruction of unexploded ordnance (UXO), which is typically conducted during range sweeps in the impact areas of the live-fire range. Explosives safety quantity distance (or buffer zone) requirements apply to this and other ammunition storage facilities on SBMR for the safety of personnel and supplies. No live firing is currently conducted on FP-202 (25th ID [L] and USARHAW, 2004).

As portrayed on Figure 2-1, the Grenade House, which is used to train soldiers to use hand grenades, pistols, and demolition effect simulators, is adjacent to the western boundary of FP-202. The combat pistol qualification course, which is used for pistol qualification and familiarization, is located to the northeast of FP-202. "OP Mike" (which is used for laser

training) and the Nuclear Biological Chemical (NBC) Chamber are located southeast of FP-202 (25th ID (L) and USARHAW, 2004).

FP-202 is located within SBMR's range area (Figure 1-1). The area supports small arms, mortar, and artillery training, and the direction of fire is generally west to north (USARHAW, 2005).

4.10.1.2 Munitions and Explosives

TDC operations. The proposed transportable treatment system would use its own donor explosives in the CWM destruction process. The recovered CWM are currently stored in an IHF located approximately 0.35 mile southwest of the project location.

4.10.2 Consequences

4.10.2.1 TDC Alternative,

Ranges and Munitions. All explosives currently stored at the ammunition holding area at FP-202 will be removed while the TDC is staged at the site. Therefore, explosives safety quantity distance requirements associated with the current ammunition holding area would not be applicable during the operation of the TDC. No destruction of UXO, which is typically conducted during range sweeps in the impact areas of the live-fire range, would occur in the vicinity of the proposed action. In addition, open detonation of the recovered CWM would not be conducted (see Section 3.3.1).

Soldier training in the nearby Grenade House, as well as operations at OP Mike and the NBC Chamber, would cease during the TDC operations; all other small arms firing will continue.

As a standard operating procedure strictly followed by the Army, all personnel accessing range areas are required to follow OSHA and Army standards and guidelines to minimize potential health and safety impacts from exposure to any ordnance or associated contaminants. The general public is not allowed unescorted into ranges or other areas on the installation where ammunition is stored or used. Likewise, only essential personnel would be allowed in the operational area of FP-202 while the TDC is operating, unless accompanied by Army-trained and certified personnel. Therefore, no adverse effects to the health and safety of TDC operators and support personnel are expected from the ranges and handling of munitions and explosives at FP-202.

The TDC Alternative would result in negligible impacts on range and munition activities because of the need to suspend Grenade House, OP Mike and NBC Chamber training/operations for several weeks (which may not be continuous) during operation of the TDC.

Munitions and Explosives of Concern and Donor Explosives. As previously stated, the commercial explosives (donor explosives) currently stored at the ammunition holding area at FP-202 would be removed while the TDC is staged at the site.

To maintain the explosive safety quantity distance associated with the donor explosives used in the TDC operation, the TDC would be located along the northern berm of FP-202, the farthest away from the road. The recovered CWM and donor explosives used in the

TDC operation would be brought to the site daily in a certified vehicle, and would be held in the separate secure Munitions Storage Unit and day box, respectively, until needed in the destruction process (locations marked IHF and DB on Figure 2-2). No donor explosives or CWM would remain onsite after operations cease for the day. The Munitions Storage Unit and day box for donor explosives would be located within the area where only essential (pre-authorized and trained) personnel would be allowed once operations begin. The office trailers would be set up at a safe distance (at least 200 feet) away from the TDC.

Potential safety hazards are associated with loading and unloading the recovered CWM. These hazards include risk of injury from the unexpected detonation of a munition and potential exposure to the chemical fill. However, these risks are minimized by the use of highly trained personnel and strict adherence to the health and safety procedures developed to support the operation of the TDC, which will be documented in the Destruction Plan being developed by the Army and approved by the state DOH and US Department of Health and Human Services (described in Section 2.2). Munitions and explosives would pose a negligible impact under the TDC Alternative.

4.10.2.2 EDS Alternative

Ranges and Munitions. Range and munitions safety for the EDS would be the same as described for the TDC. Therefore, potential adverse effects to personnel from the ranges and munitions at FP-202 are expected to be negligible.

Munitions and Explosives of Concern and Donor Explosives. The handling and use of the donor explosives and recovered CWM for the EDS would be similar to the procedures described for the TDC. Therefore, the potential adverse effects from munitions and explosives are expected to be negligible.

4.10.2.3 No Action Alternative

Under the No Action Alternative, the 71 recovered munitions would continue to be stored in the IHF on SBMR. These munitions are currently stored in prop cans, which are adequate for temporary storage, but are not designed for long-term storage or transportation.

If these munitions were to be repackaged into containers designed for long-term storage, it could be more dangerous to personnel responsible for handling the munitions than destroying the munitions in the TDC or EDS. The larger the number of movements, the greater the probability the munition would detonate, which could cause serious injury or death to the involved personnel. In addition, the potential for deterioration of the munitions and incidental leakage of the chemical fill, which could expose personnel to the chemicals, are increased with long-term storage.

4.11 Potential Effects of Accidents

Hypothetical incidents and release effects from the proposed action and alternative were examined by analyzing a maximum credible event and modeling a downwind plume. The maximum credible event (though unlikely to occur) is based on the largest munition that would create the most disruptive event and is an ultra-conservative worst-case scenario method used to identify the hypothetical zone of a potential adverse impact.

In calculating the zones of potential impact, the incident analysis assumes that actions, such as fire suppression or population evacuation, would not be taken to control or mitigate the consequences of a release. In the (extremely unlikely) event of an actual incident, of course, all appropriate such actions would be taken. The hypothetical zones of potential impact represent the calculated distances from the proposed action and alternatives where no effects would occur, as well a no-adverse effects area and lastly an adverse-effect area.

4.11.1 Air Dispersion Methodology

To model the downwind plume from the hypothetical release and calculate the potential effect and no effect zones, the D2PC atmospheric dispersion model developed by the US Army Chemical Research, Development, and Engineering Center was used. Modeling was based on a worst-case scenario: release of 11 pounds of phosgene from a 155mm chemical-fill munition, occurring outside the containment provided by the munitions over-packaging, the treatment system (TDC or EDS), and the filtered systems enclosure. The hypothetical release would disperse and dissipate rapidly because of phosgene's volatility.

The prevailing winds of the site are taken into consideration when modeling; prevailing winds for SBMR are northeasterly trade winds in the summer months and light southeasterly winds in the winter months. Also considered are the various locations where an incident could occur (though highly unlikely to occur). The scenario locations examined are the current storage location; the on-post transportation route; and the proposed operation site.

4.11.2 Hypothetical Incidents During Destruction (TDC and EDS Alternatives)

In general, an 11-pound phosgene release could produce a downwind no-effects distance of approximately 5,682 feet (1.08 miles), and a downwind no-adverse effect distance of about 784 feet from the release location.

4.11.2.1 Results of Incident at Storage Location

The storage location (IHF) is located southwest of FP-202. An incident at this location could result in a downwind no-adverse effects distance that is contained well within the nearest SBMR installation boundary (which is greater than 1 mile south of the IHF). Buildings in the cantonment area and all Army housing are located within the no-effects area. The nearest Army housing structure is located 2,000 feet away from the IHF. The nearest off-post residences (Kunia Drive area) are greater than 2.5 miles from the site.

4.11.2.2 Results of Incident at On-Post Transportation Route

The on-post transportation route from the storage location to FP-202 operation site keeps the munitions more than 1 mile from the installation boundary and therefore, the no-effects area is within the installation boundary.

4.11.2.3 Results of Incident at FP-202 Operation Site

No-effects and no-adverse effects distances would be contained well inside the SBMR boundary.

4.11.2.4 Safeguards and Controls

It is important to emphasize that the distances for the no-adverse effects and no-effects described above do not reflect the administrative and engineering safeguard controls that would be employed for storage, transport, and destruction operations, of the TDC or EDS, to prevent or minimize any incident. There has never been such an accident in the history of destroying CWM using the EDS or TDC. The following are examples of administrative and engineering controls that would be used:

Storage Site. Munitions are contained in over packaging to contain liquids

- Munitions have been evaluated as safe for storage and transport

Transportation. Munitions are contained in over packaging to contain liquids

- Transportation occurs during daylight in early hours
- Munition overpacks are secured to the transport vehicle
- Munitions are handled by trained explosive and chemical operators
- Transport route will be closed to SBMR traffic
- Transport vehicle speed limited to 15 mph

Site FP-202. Operations will be conducted by trained and experienced personnel using approved procedures

- Destruction units will be located inside a system enclosure that contains air filtration unit to prevent releases to the atmosphere
- Destruction units (TDC or EDS) are designed, tested and validated to contain explosions, liquids and vapors during the destruction process.

As indicated, measures will be in place to prevent or minimize potential incidents.

4.11.3 Hypothetical Incidents During Continued Storage (No Action)

Recovered CWM is currently stored in an IHF in special overpack containers. Although an incident could occur during storage, munition storage is a static activity, meaning very little to no movement or handling is conducted during storage. Therefore, there is little chance of an incident; also, if a release incident occurred the IHF would help to contain any release. As a result, there are a limited number of credible scenarios under which storage incidents might occur and release chemical fill. Any incidents (and associated impacts) arising from continued storage would be similar to those associated with incidents at the storage location under the proposed action; for this reason, incidents during long-term storage are not further quantified or discussed in this EA.

4.11.4 Potential Impacts from Hypothetical Incidents

In general, there would be no long term air quality impacts resulting from a release to the atmosphere, because airborne concentrations of the chemical fill would be reduced to levels below risks (i.e., that do not create lethal doses) to human health and the environment by atmospheric dispersion. However, in the unlikely event of a chemical fill release incident during storage, transport, or the proposed destruction activities, the most serious consequence could be the potential loss of human life.

Because the airborne concentrations of the phosgene or chloropicrin do not create lethal doses at any off-post location, there would be no chance of off-post fatalities during the proposed action.

If a chemical fill release were to occur, TDC or EDS and other on-post personnel located very close to the incident could be subjected to lethal or sub-lethal doses of chemical fill. To prevent or minimize any such effects, the Army would take all necessary action to provide the appropriate protective equipment and to restrict on-post personnel from the immediate vicinity of the storage area, along the transportation route, and/or near the proposed site while conducting the proposed action.

All buildings within the cantonment area, including residences, are within the no-effects distance from FP-202, the IHF, and the transportation route from the IHF to FP-202, with the following exception: Two non-residential buildings in the cantonment area.

Buildings 1686 and 1680 are within the no adverse effects distance for the transportation route. Therefore, some degree of health effects to SBMR workers at those buildings could be possible if an accident were to occur. However, administrative and engineering controls, as described above, would be in place during transportation thus preventing or minimizing any such incidents.

Fatalities to nearby wildlife could occur from a chemical fill release, but are highly unlikely.

Phosgene and chloropicrin are non-persistent, meaning that they disperse and dissipate rapidly after release. Therefore, these chemicals are unlikely to be deposited on vegetation and soils, if a chemical release were to occur. In the unlikely event of an incident, the SBMR Emergency Response Plan would be implemented immediately and procedures followed to clean up any such contamination thus minimizing any impacts. Overall, the potential impact from a hypothetical accident would be moderately adverse, but highly unlikely to actually occur.

4.12 Environmental Justice and Protection of Children

4.12.1 Affected Environment

4.12.1.1 Environmental Justice

EO12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (1994), requires federal agencies to achieve environmental justice “to the greatest extent practicable” by identifying and addressing “disproportionately high adverse human health or environmental effects of... [federal] activities on minority populations and low income populations.” To determine whether low-income and minority populations could be disproportionately affected by the project alternatives, the proportion of minority and low-income persons living on Schofield Barracks and within the off-post area closest to the FP-202 were identified and compared to the population of Honolulu County, the state of Hawai‘i, and the US.

As shown in Table 4-4, 44 percent and nearly 78 percent, respectively, of the population in the Census tract and block group closest to FP-202, were of either Asian or Native Hawaiian/Pacific Islander descent (US Census Bureau 2000). Overall, the minority

population of the adjacent Census block group could be considered meaningfully higher (by 27 percent) than the reference population of the county and state. The adjacent Census tract as a whole meets the 50-percent criteria, but because it is similar to the state and county, it would not be considered a minority population for the purposes of this analysis.

The population of Schofield Barracks (a Census-Designated Place or CDP) more closely resembles the US population, with 52 percent non-Hispanic white and a 48 percent minority population comprising mostly people of African-American and Hispanic or Latino descent (20 percent and 17 percent, respectively, in 2000). The Schofield Barracks CDP approached but did not quite meet the 50 percent criterion for a minority population in 2000; given the steady turnover of troops on Schofield Barracks, this population could be assumed to meet the minority criterion at times.

In 2006, approximately 8.4 percent of Honolulu County residents were classified as living in poverty, lower than the state and national poverty rate. The 2000 poverty rates for the nearby Census tract and block group (5.5 and 0 percent, respectively), and for Schofield Barracks residents (7.2 percent), were lower than the county as a whole (Table 4-4).

4.12.1.2 Protection of Children

EO 13045, *Protection of Children from Environmental Health Risks and Safety Risk* (Federal Register: April 23, 1997, Volume 62, Number 78), requires that federal agencies make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children.

Historically, children have been present on SBMR as residents and visitors, in family housing, schools, and as users of recreational facilities. The health and safety of children is a primary consideration in the planning of any activity, related or unrelated to Army activities. The Army has taken precautions for their safety by a number of means, including fencing, limiting access to certain areas, and providing adult supervision.

At the 2000 Census, 4,575 children under the age 18 lived on Schofield Barracks and another 12 lived in the off-post Census block group closest to the proposed site. Children are not normally present on or near the firing point areas where the proposed action would be implemented. The closest on-post and off-post housing areas are located 2,000 feet and 2.5 miles, respectively, away from FP-202.

TABLE 4-4
Environmental Justice Statistics
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	Block Group 4, Census Tract 86.03 ⁴ (2000)	Census Tract 86.03 ⁴ (2000)	Schofield Barracks CDP (2000)	Honolulu County (2006)	Hawai'i (2006)	United States (2006)
Total population	96	9,882	14,434	909,863	1,285,498	299,398,485
White ¹	0.0%	23.6%	51.7%	21.0%	24.6%	66.2%
Black or African American ¹	0.0%	2.9%	20.1%	2.6%	2.1%	12.2%
American Indian and	0.0%	0.0%	0.5%	0.3%	0.2%	0.7%

TABLE 4-4
Environmental Justice Statistics
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

	Block Group 4, Census Tract 86.03 ⁴ (2000)	Census Tract 86.03 ⁴ (2000)	Schofield Barracks CDP (2000)	Honolulu County (2006)	Hawai'i (2006)	United States (2006)
Alaska Native ¹						
Asian ¹	54.2%	35.1%	3.4%	43.4%	39.0%	4.3%
Native Hawaiian and Other Pacific Islander ¹	24.0%	8.7%	0.8%	7.6%	8.2%	0.1%
Other ^{1,2}	12.5%	19.9%	6.8%	18.2%	18.1%	1.7%
Hispanic or Latino ³	9.4%	9.7%	16.7%	7.0%	7.8%	14.8%
Percent minority	100.0%	76.4%	48.3%	61.0%	57.4%	32.2%
Poverty rate	0.0%	5.5%	7.2%	8.4%	9.3%	13.3%

Source: US Census Bureau, Census 2000 Summary File 3-Sample Data (Table P7. Hispanic or Latino by Race) and 2006 American Community Survey (Table B03002. Hispanic or Latino Origin by Race). 2006 estimates are only available at the city, county and state levels.

¹ Not Hispanic or Latino

² Including "Two or more races" and "Some other race"

³ Can be of any racial category

⁴ A block group is a subset of a Census tract. Tract 86.03 is adjacent to installation boundary, south of FP-202; Block Group 4 is the portion of that tract that is closest to the boundary.

4.12.2 Consequences

Determining whether low-income and minority populations could be disproportionately affected by the alternatives involved two steps:

- Identifying the proportion of low-income and minority population in the areas surrounding the proposed project site. The off-post Census block group closest to the project site meets the criterion for a minority population (meaningfully greater than the reference population). In addition, the on-post residents of Schofield Barracks are very close to meeting the 50 percent criterion, with a different makeup of minority groups. No low-income population was identified in the vicinity of the project site.
- Determining the extent to which an alternative could disproportionately affect the health and safety of children or minority population or the environmental conditions relied upon by a minority population.

Based on the above and on the analysis of the alternatives presented in this EA, summarized below, no disproportionately adverse safety, health or environmental effects on minority or low-income populations or on children are anticipated.

4.12.2.1 TDC Alternative (Proposed Action)

The TDC Alternative would result in negligible increases in existing noise levels from detonations during the operations (< 90 days), less than *de minimis* emissions from electrical power generators, and minimal effects on transportation resources for the few days during

which tractor trailers would be using local roads to deliver and pick up the chamber system. No soil or water contamination is expected to result from TDC operations and the site would be left as it was found.

Site security would be provided at all times during TDC operations, to ensure that no unauthorized persons (including children) would be on or near the site.

Chemical vapors are completely contained and treated inside the TDC system, with secondary containment provided by the system enclosure. The only potential threat to health would be if an accidental release of chemical fill occurred outside the system enclosure, during transportation or unpacking the munitions. Even in such an event, as described in Section 4.11, harmful levels of chemical vapors would not reach the cantonment area (with the possible exception of two non-residential buildings near the transportation route from the IHF to the proposed site on FP-202), much less any on-post or off-post housing areas.

No disproportionately adverse human health, safety, or environmental effects on low-income or minority populations or children would result from the TDC Alternative.

4.12.2.2 EDS Alternative

Potential effects of the EDS Alternative would be essentially the same as the TDC Alternative. Because the EDS produces liquid hazardous wastes (spent reagents), this alternative potentially presents a greater risk of soil or water contamination, in the unlikely event of a spill. However, secondary containment would be provided to contain spills.

No disproportionately adverse human health, safety, or environmental effects on low-income or minority populations or children would result from the EDS Alternative.

4.12.2.3 No Action Alternative

The No Action Alternative would have no direct effect on minority or low-income populations or on children. Over time, the No Action Alternative increases the chance of a leak or other accidental release of chemical fill from the munitions that would be indefinitely stored. However, the location of the interim holding facility is such that harmful levels of chemical vapors would not reach the cantonment area or on-post and off-post housing areas.

No disproportionately adverse human health, safety, or environmental effects on low-income or minority populations or children would result from the No Action Alternative.

4.13 Cumulative Effects

A “cumulative impact” is defined in 40 CFR 1508.7 (CEQ Regulations) as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.”

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Principles of cumulative effects analysis in the CEQ guide *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ, 1997)

states: “For cumulative effects analysis to help the decision maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully.”

Specific projects that have the potential for cumulative effects are identified in Table 4-5, in general chronological order. The geographic boundary for the purposes of cumulative analysis of the short-term Proposed Action on FP-202 is defined as Schofield Barracks (see Figure 1-1) and the temporal boundary is defined as approximately 2006-2011.

Most of the potential impacts of the Proposed Action would be limited to the proposed site, with the exception of air emissions and noise during operations and effects on transportation network on the two days when the TDC system would be transported to and from Schofield Barracks. Any cumulative impacts in combination with other projects elsewhere on O`ahu would be negligible.

Overall, the Proposed Action (TDC and EDS Alternatives) would result in less than significant cumulative impacts for each of the individual resource areas (discussed below) in relationship to the other projects identified. Some of the resource areas would be affected by several or all of the proposed projects, while others would be minimally or not at all affected. (Resource areas, such as Utilities or Socioeconomics, that were eliminated from detailed evaluation for the Proposed Action are excluded from the following discussion for the same reasons; see Table 1-1.)

4.13.1 Air Quality

The proposed action would result in below *de minimis* emissions and would not cause or contribute to violation of an air quality standard, either during minimal site preparation or during operation of the TDC or EDS. Ongoing training activities and periodic prescribed burns generate fugitive dust, particulates and other emissions. Cumulative development projects on Schofield Barracks would result in greater air emissions from construction activities and increased vehicle traffic. However, emissions would be controlled by the installation and other individual project proponents through the planning process, following county and state guidelines and by implementing BMPs on a project-by-project basis.

4.13.2 Noise

Cumulative noise levels on SBMR may increase temporarily during site preparation and operation of the TDC or EDS and during construction activities for the various construction projects on the post. However, with implementation of BMPs such as installation of noise mufflers on construction equipment and limiting most noisy activities to daylight hours, these short-term impacts would be less than significant and would not contribute to the installation’s overall noise impact in the long-term.

4.13.3 Geology and Soils

The Proposed Action’s impact to soils would be negligible and limited to about ¼ acre of the project site. None of the cumulative projects would affect geology or soils in that area, but may temporarily increase soil erosion in the region, which the project proponents would be responsible for minimizing with construction BMPs. No significant cumulative geology and soils impacts are expected.

4.13.4 Water Resources

The Proposed Action would not increase the amount of impermeable surface or increase stormwater quantity over the long term, because the tent-like system enclosure, trailers and other equipment would be removed within 6 months. Cumulative construction projects would increase erosion and sediment flow into receiving streams and could introduce contaminants into surface water or groundwater; however, regulatory requirements and BMPs would minimize adverse effects.

4.13.5 Biological Resources

The Proposed Action would be conducted on a highly disturbed site with little or no wildlife habitat and is not expected to impact any threatened or endangered species or habitat for such species. Because the Proposed Action would result in negligible impacts to biological resources, cumulative impacts are not expected.

4.13.6 Cultural Resources

The Proposed Action involves a previously disturbed site with no known cultural resources and is expected to have no effect on cultural resources. Therefore, no cumulative effects are anticipated.

4.13.7 Transportation

The Proposed Action would involve one-time, round-trip transportation of system components and other equipment by tractor-trailer over state highways and local roads, in coordination with local officials to avoid impacting off-post transportation systems and circulation. On-post transportation impacts would be limited to setup/removal of the system and once-daily movement of CWM and explosives to and from FP-202, briefly affecting a small area of on-post roadways. The recently completed gate realignment projects are expected to reduce existing and future congestion associated with the cumulative projects (increased traffic from projects involving additional personnel and movement of construction vehicles during construction projects). Therefore, cumulative impacts to on-post or off-post transportation are expected to be less than significant.

4.13.8 Hazardous Substances and Waste Management

The majority of cumulative hazardous materials, POL, and wastes would be geographically specific, depending on components of the individual projects. All hazardous wastes generated by the Proposed Action will be disposed of at a permitted TSD in the continental US and therefore will not contribute to hazardous wastes generated by other development projects, on or off the post. Non-hazardous wastes would be a minimal addition to wastes generated by other projects. Cumulative impacts would be less than significant.

4.13.9 Human Health and Safety

Risks to human health and safety would be geographically specific to the sites of the individual projects. The Proposed Action would take place on a site that is used for storage of explosives (and will be afterward) where access is limited to approved personnel, as is the case for the nearby ranges and firing points. Operations by qualified personnel and administrative and engineering controls will minimize or prevent risks to human health and

safety from destruction operations. Construction projects present safety and health risks to workers, which would be minimized or prevented by adherence to regulations pertaining to occupational health and the handling of hazardous materials.

4.13.10 Environmental Justice

The Proposed Action would not disproportionately impact low-income or minority populations or children. Therefore, cumulative environmental justice impacts are not expected.

4.14 Conclusions

Based on the findings of this EA, the proposed action would not result in significant adverse direct, indirect, or cumulative impacts to any environmental, cultural, physical, or socioeconomic resource. No mitigation measures have been determined to be necessary. Therefore, an EIS will not be prepared and a FNSI is warranted for the proposed action.

TABLE 4-5
 Cumulative Projects
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Project Name	Project Description	Location	Project Status	Anticipated Completion
Battle Command Training Center	Constructed to house organizations and functions required to conduct embedded war-fighting simulation operations to support Medium Brigade, Joint, and Combined Army's simulation training.	Schofield Barracks	Complete	2006
Information Systems Facility	Constructed to provide essential communications capabilities.	Schofield Barracks	Complete	2006
Wheeler Army Airfield gate connection with Schofield Barracks	Constructed a direct link between Schofield Barracks's Lyman Gate and Wheeler Army Airfield's Kunia Gate. Signal lights and crosswalks were added to improve traffic safety for both pedestrians and motorists.	Schofield Barracks	Complete	2006
Access Control – Lyman Gate	Road widening at the Lyman Gate entrance and at the north/west corner of Road A and Lyman Road; new concrete curb and paved walkway; two new guard shacks on new concrete pads; relocation of existing signs; associated electrical and telecommunications work.	Schofield Barracks	Complete	2007
Whole Barracks Renewal Program	Upgrade barracks facilities. Includes several individual projects such as barracks construction/renovation, company and battalion headquarters, and supporting infrastructure.	Schofield Barracks, Wheeler Army Airfield (and other installations)	Ongoing	2013
Controlled Burns	Controlled burn of 1,200 to 1,500 acres to reduce vegetation (wildfire fuel load) on ranges, which also facilitates UXO clearance and surveys for cultural sites. The most recent prescribed burn at SBMR was conducted in July 2007.	Schofield Barracks	Ongoing	Seasonal, as needed
Training Activities	Ongoing training activities at the firing point areas, SBMR Range and Schofield South Range areas	Schofield Barracks	Ongoing	Ongoing
Barracks Complex Facilities	Construct a barracks complex to provide troop housing, operations, administration, and supporting facilities for a unit of approximately 440 Soldiers. The proposed barracks complex includes a standard design Headquarters facility, a Company Operations Facility, two five-story, 200-person standard design barracks, an equipment layout area and fire pump house, parking for privately owned vehicles, and supporting utilities and infrastructure.	Schofield Barracks	Scheduled to start in March 2008	2010

TABLE 4-5
 Cumulative Projects
EA for Operation of the Transportable Detonation Chamber (TDC) on Schofield Barracks

Project Name	Project Description	Location	Project Status	Anticipated Completion
Child Development Center	Construct a 195-child capacity, 22,999 square feet facility for children ages 6 to 10.	Schofield Barracks	Scheduled to begin in 2008	2008
Various Units	Two ordnance disposal units, with a total of approximately 80 personnel; military police platoons with a total of approximately 40 personnel; an engineering unit with a total of approximately 100 personnel; and related proposed new facilities.	Schofield Barracks	Anticipated	2009
Combat Support Brigade Motor Pool	Construct a standard-design vehicle maintenance complex.	Schofield Barracks	Scheduled to begin in 2009	2010
Central Vehicle Wash Facility	Construct a central vehicle wash facility: preparation area, two prewash baths, wash stations, and an assembly area.	Schofield Barracks	Scheduled to begin in 2011	2013
Training Support Center (Virtual Fighting Training Facility)	Construction of a state-of-the-art Virtual Fighting Training Facility to support training requirements of the 25th Infantry Division.	Schofield Barracks	Scheduled to begin in 2011	2013
Stryker Brigade Combat Team Transformation	Multiple construction projects and land acquisitions to support the conversion of the 2nd Brigade, 25th Infantry Division to a Stryker Brigade Combat Team.	Various Army installations and training areas in Hawai'i	Currently enjoined; new EIS in progress	2015 (pending completion of Supplemental EIS)

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SECTION 6

Acronyms and Glossary of Selected Terms

Acronym	Spelled out	Definitions and additional information
25th ID	25th Infantry Division	
AMSAA	Army Materiel System Analysis Activity	Agency that conducts independent evaluation of CWM destruction systems during the validation phase.
ATIs	areas of traditional importance	
CAA	Clean Air Act	
CDC	controlled detonation chamber	
CDP	Census-Designated Place	A population center that is not incorporated as a self-governing jurisdiction
CEQ	President's Council on Environmental Quality	
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act, as amended	Commonly known as "Superfund," and amended by the Superfund Amendments and Reauthorization Act (SARA), CERCLA provides for liability, compensation, cleanup, and emergency response for hazardous substances released into the environment and for the cleanup of inactive hazardous waste disposal sites.
CFR	Code of Federal Regulations	
CG	See Phosgene (under "P")	
PS	chloropicrin	Chloropicrin was used in World War I as a chemical weapon. It is used commercially for fumigation to sterilize soil and seed, in fungicides and insecticides, and to exterminate rats. Chloropicrin vapor is highly poisonous if inhaled. It causes tearing and vomiting. Chloropicrin is more toxic than chlorine but less than phosgene. (Wikipedia)
CONUS	the continental United States	
CP	Command post	
CWC	Chemical Weapons Convention	Treaty that prohibits the use of chemical weapons and requires destruction of both stockpile and non-stockpile chemical munitions

Acronym	Spelled out	Definitions and additional information
CWM	chemical warfare materiel	Items generally configured as munitions containing a chemical compound that was intended to kill, seriously injure or incapacitate a person through its physiological effects. CWM includes V- and G-series nerve agents or H-series (mustard); L-series blister agents (lewisite); and certain industrial chemicals (such as phosgene and chloropicrin) when configured as military munitions. CWM does not include riot control equipment (such as tear gas), defoliants and pesticides, industrial chemicals not configured as munitions, or soil, water, and debris contaminated with low concentrations of chemical fill.
DB	day box	Secure unit for short-term storage of explosives
dB	decibel	
dBA	A-weighted decibel scale	
dBC	C-weighted decibel scale	
DEM/VAL	demonstration/validation	
DERP	Defense Environmental Restoration Program	DoD program to investigate and remediate old hazardous waste disposal sites and other areas where historic waste handling, prior to modern controls and procedures, resulted in environmental contamination.
DoD	Department of Defense	
DOH	State of Hawai`i Department of Health	
EA	Environmental Assessment	
EDS	Explosive Destruction System	
EIS	Environmental Impact Statement	
ENMP	Environmental Noise Management Program (Army)	
EPA	US Environmental Protection Agency	
EO	Executive Order	
°F	degrees Fahrenheit	
FP	Firing point	
FNSI	Finding of No Significant Impact	
HAAQS	Hawai`i ambient air quality standards	
	Historic Property	Cultural resources (buildings, structures, archaeological artifacts, and other resources) that are eligible for inclusion in the National Register of Historic Places.

Acronym	Spelled out	Definitions and additional information
IHF	interim holding facility	Buildings that are used to store recovered CWM. The Army has developed portable models for use at locations where a suitable existing facility is not available.
	Industrial chemicals	Chemicals that are manufactured for and used in normal industrial operations or research. These chemicals were not developed primarily for military purposes, but some were used in chemical weapons because of their chemical properties.
IRP	Installation Restoration Program	Part of the DERP
kW	kilowatt	
Ldn	day-night average sound level	
Leq	equivalent noise level	
MMRP	Military Munitions Response Program	Part of the DERP
MRS	Munitions Response Sites	
MSU	Munitions storage unit	A type of interim holding facility for short-term storage of munitions
NAAQS	national ambient air quality standards	
NAGPRA	Native American Graves Protection and Repatriation Act	
NEPA	National Environmental Policy Act	
NHPA	National Historic Preservation Act	
NRHP	National Register of Historic Places	
NSCWM	non-stockpile chemical warfare materiel (also referred to as recovered CWM)	CWM that has been recovered from sites where it had in the past been buried
OPCW	Organisation for the Prohibition of Chemical Weapons	International organization that monitors compliance with the Chemical Weapons Convention
OSHA	Occupational Safety and Health Administration	

Acronym	Spelled out	Definitions and additional information
CG	Phosgene	Also known as carbonyl dichloride, phosgene is a colorless nonflammable gas that has the odor of freshly cut hay. However, odor provides insufficient warning of hazardous concentrations. It was used as a chemical weapon in World War I. It is used today to make plastics, pesticides and pharmaceuticals. The burning of materials such as certain plastics that contain chlorinated hydrocarbons can produce phosgene gas. Phosgene causes choking and severely damages the lungs at high levels; at low levels, it is an eye and skin irritant. Phosgene will react with water and be broken down into other products. It does not stick to the soil and does not stay in the food chain. (ATSDR ToxFAQs, 2002)
PMNSCM	Project Manager for Non-Stockpile Chemical Materiel	
POL	petroleum, oils, and lubricants	
PPE	personal protective equipment	Includes suits, gloves, respirators, hearing protection, goggles
PS	See chloropicrin (under "C")	
RCRA	Resource Conservation and Recovery Act	Enacted to ensure the safe and environmentally responsible management of hazardous and non-hazardous solid waste and to promote resource recovery techniques that minimize waste volumes. RCRA regulations require generators and transporters of hazardous waste and owners and operators of hazardous waste TSDFs to meet specific standards and procedures.
	recovered CWM	CWM that was used for its intended purpose or previously disposed of as waste, which has been discovered during a munitions response or range clearance, or sometimes by an accidental discovery, and which has either been secured in place or placed in an approved storage location or interim holding facility, pending final disposition.
SBMR	Schofield Barracks Military Reservation	Also referred to as the Main Post, SBMR includes the cantonment area and adjacent training ranges to the west and south.
SPCC	Spill Prevention, Control, and Countermeasures	
STEL	short term exposure limit	
TCPs	traditional cultural properties	
TDC	transportable detonation chamber	
TNT	trinitrotoluene	
TS	Technical Secretariat	Part of the OPCW
TSDF	treatment, storage, or disposal facility	A facility permitted under RCRA to treat, store or dispose of hazardous materials and wastes

Acronym	Spelled out	Definitions and additional information
USACE	US Army Corps of Engineers	
USARHAW	US Army Hawai`i	
UXO	unexploded ordnance	
WWTP	wastewater treatment plant	

SECTION 7

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Appendix A
Agency Coordination



REPLY TO
ATTENTION OF :

DEPARTMENT OF THE ARMY
US ARMY INSTALLATION MANAGEMENT COMMAND, PACIFIC REGION
HEADQUARTERS, UNITED STATES ARMY GARRISON, HAWAII
SCHOFIELD BARRACKS, HAWAII 96857-5000

DEC 10 2007

Directorate of Public Works

Laura Thielen
State Historic Preservation Officer
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, HI 96707

Dear Ms. Thielen:

On behalf of the Commander, US Army Garrison, Hawaii (USAG-HI), I am writing to open Section 106 consultation with your office regarding the proposed placement of a temporary Transportable Detonation Chamber (TDC), chamber system (includes TDC) and support structures at Firing Point 202 (FP202), Schofield Barracks (TMK: 7-7-01) (Enclosure 1) for destruction of Chemical Warfare Materials (CWM) discovered during UXO clearance from Schofield West Range Impact Area. The area of potential effect (APE) for this project is approximately 5 acres with a 98.0 by 81.0-foot area marked for ground disturbance to consist of grading and leveling in previously disturbed soils to support the TDC, a surface anchored vapor containment structure (VCS) and a small buffer for assembly.

The proposed chamber system and supporting structures, is anticipated to utilize the entire firing point area for up to 6 months and then be removed. All chamber system components and support structures are to be placed on the existing previously disturbed ground surface with the exception of the TDC and VCS (Enclosure 2). For proper use and safety, the TDC and VCS area requires grading and leveling to support the structure. In an abundance of caution we have considered the entire firing point as the APE; however, ground disturbing activity, i.e., grading, will only occur within the TDC and VCS area. All blast effects from the CWM destruction process will be contained within the TDC. The Army is currently preparing an Environmental Assessment to analyze the environmental impacts of the proposed action and alternatives prior to deciding whether to use the TDC in Hawaii.

No historic properties have been identified at or in proximity to the APE. Historic maps show range activities at this location as early as 1928. FP 202 appears on a 1975 map and surface grading is visible on a 1998 aerial photo. Range Control staff recall the extensive grading of the area several times since the initiation of FP202. Confirmation and extent of ground disturbance was identified in four test units placed in the main blast chamber area. These units yielded modern debris within a mixed fill on top of intact sterile substratum. USAG-HI has therefore made a determination of "no historic properties affected" for this project. In the unlikely event of an inadvertent

discovery, ground disturbing activities in the immediate vicinity will cease and the standard notification and documentation protocols will be followed.

In compliance with Section 106 of the National Historic Preservation Act, as amended, your review and concurrence with this determination is requested. Consultation is also being undertaken with those shown on the attached distribution list (Enclosure 3).

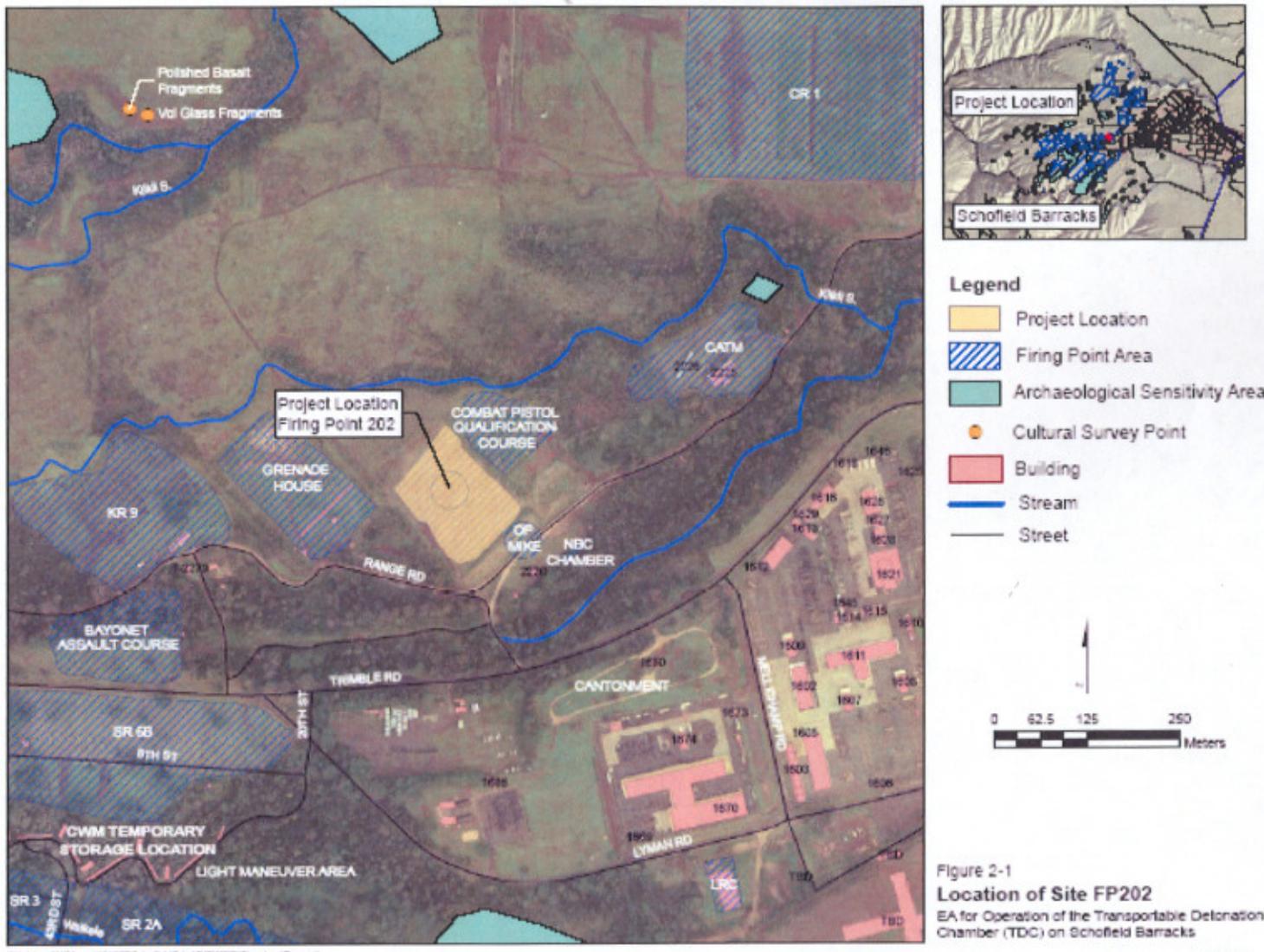
Should you require additional information, the point of contact is Dr. Laurie Lucking, Installation Cultural Resources Manager, at (808) 656-2878 extension 1052 or laurie.lucking@us.army.mil.

Sincerely,



Steven M. Raymond
Director of Public Works

Enclosures



Enclosure 1: Proposed Location for the TDC for CWM Destruction, Firing Point 202, Schofield Barracks (Source: CH2MHill).

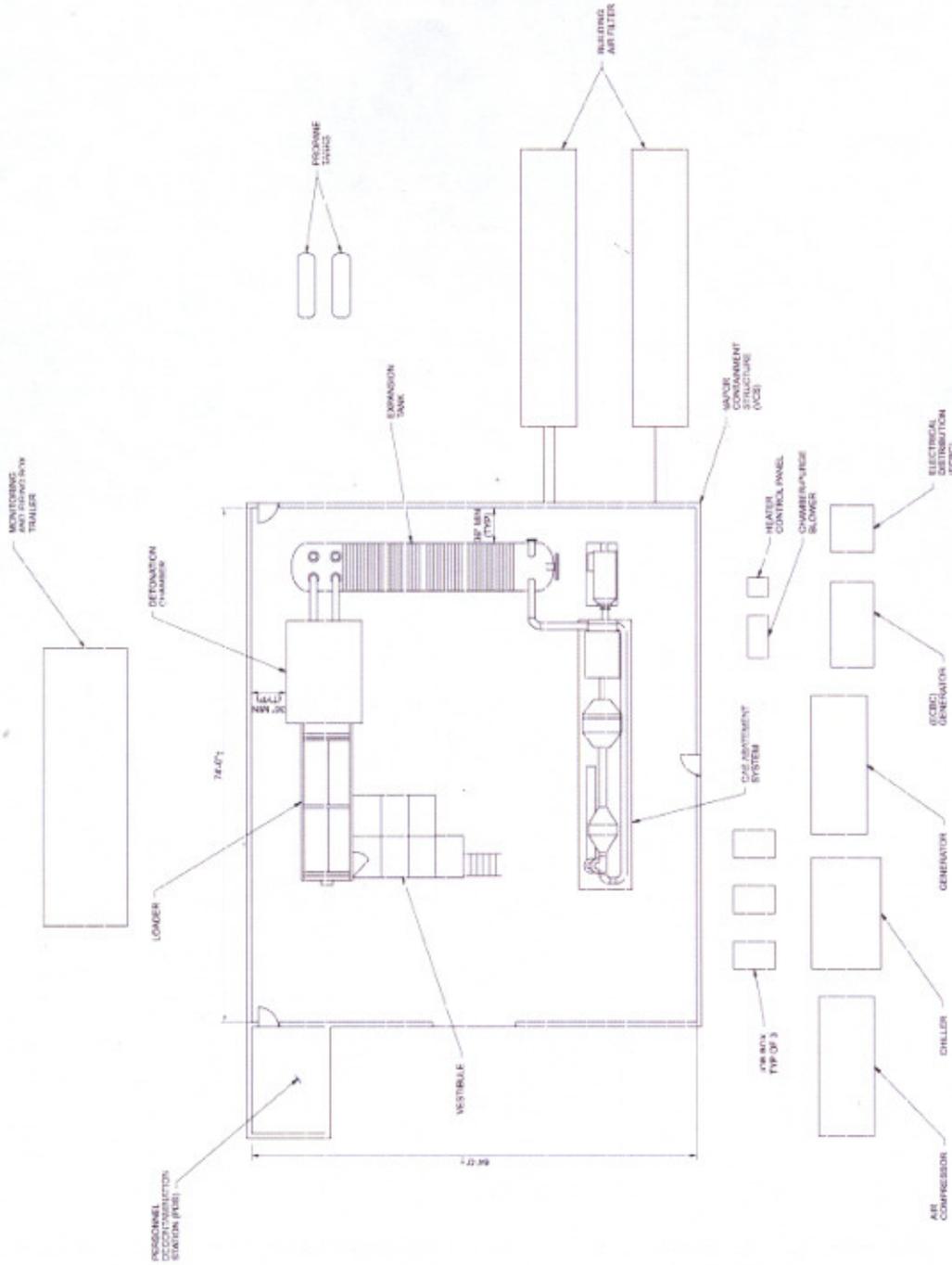


FIGURE 2
ENLARGED PLAN
U.S. ARMY
SCHOFIELD BARRACKS DTOT

PLAN
SCALE: 1/4" = 1'-0"
DATE: 10/11/82

Enclosure 2: Proposed TDC system layout at FP202.

Enclosure 3: Distribution List

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Appendix B

Air Emissions

Table B-1. Estimated Schofield TDC Emissions

	Component	Emission Rate ⁽¹⁾ (lbs/hr)	TPY	Notes
Gaseous Components	Carbon monoxide (CO)	0.02	0.03	
	Nitrogen oxides (NOx as NO ₂)	0.16	0.17	
	Sulfur dioxide (SO ₂)	0.10	0.11	<
	Total Hydrocarbons (THC)	0.04	0.04	
Metals	Particulate Matter	0.02	0.03	
	Iron	0.00	0.00	
VOCs	C1 (Methane)	0.05	0.05	Not included in VOC total ⁽²⁾
	Acetylene	0.09	0.10	<
	C2 (Ethane)	0.11	0.12	Not included in VOC total ⁽²⁾
	Ethene	0.10	0.11	<
	C3 (Propane)	0.05	0.05	
	C4 (Butane)	0.21	0.22	<
	C5 (Pentane)	0.26	0.28	<
	C6 (Hexane)	0.31	0.33	<
	Total VOCs	--	1.10	

Notes:

(1.) Source: ENVIRONMENTAL TEST REPORT FOR THE TC-60 CONTROLLED DETONATION CHAMBER (CDC) DEMONSTRATION/VALIDATION PHASE II. 8 September 2006

Table 3-7: Emission Factors

Actual Hrs of Operations: 2182 per year

(2) Methane and Ethane are not VOC's by rule

<: Emissions calculated at detection limit for these compounds

Table B-2. Anticipated Schofield TDC Ancillary Equipment Specifications & Criteria Pollutant Emissions

Equipment	Make	Model	Fuel Type	Quantity	Rated Capacity (hp)	Actual Hrs of Ops	Criteria Pollutants				
							N0x	SOx	VOC	PM (total)	CO
							Actual (TPY)	Actual (TPY)	Actual (TPY)	Actual (TPY)	Actual (TPY)
Generator	Cat PRIME	455kW	Diesel	1	610.0	2182	20.63	1.36	1.67	1.46	4.45
Generator	Cat PRIME	455kW	Diesel	1	610.0	13	0.12	0.01	0.01	0.01	0.03
Emergency Generator		230 kw	Diesel	1	308.3	13	0.06	0.00	0.01	0.00	0.01
TOTAL TPY:							20.82	1.38	1.69	1.48	4.49

Calculation Example:

Actual Hours of Operation = (24 hrs/day x 7 days/week x 4.33 wk/mo x 3 mo)

Criteria Pollutant Actual (TPY) = [(AP-42 Emission Factor (lb/hp-hr) x Rated Capacity (hp) x Actual Hrs of Operation/yr) / (2000 lb/ton)]

Reference:

Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 3.3 Stationary ISC, Table 3.3-1

Table B-3. Anticipated Schofield TDC Ancillary Equipment Specifications & HAP Emissions

Equipment	Make	Model	Fuel Type	Quantity	Rated Capacity (hp)	Actual Hrs of Ops	Hazardous Air Pollutants				Hazardous Air Pollutants				Hazardous Air Pollutants									
							Benzene		Toluene		Xylene		Propylene		1,3-Butadiene		Formaldehyde		Acetaldehyde		Acrolien		PAH	
							Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)	Actual (TPY)	Potential (TPY)
Generator	Cat PRIME	455kW	Diesel	1	610.0	2182	0.0043	0.0043	0.0019	0.0019	0.0013	0.0013	0.0120	0.0120	0.0002	0.0002	0.0055	0.0055	0.0036	0.0036	0.0004	0.0004	0.0008	0.0008
Generator	Cat PRIME	455kW	Diesel	1	610.0	13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Emergency Generator		230 kW	Diesel	1	308.3	13	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
TOTAL tons per year (TPY):							0.0044	0.0044	0.0019	0.0019	0.0013	0.0013	0.0121	0.0121	0.0002	0.0002	0.0055	0.0055	0.0036	0.0036	0.0004	0.0004	0.0008	0.0008
TOTAL pounds per year:							8.77	8.77	3.85	3.85	2.68	2.68	24.26	24.26	0.37	0.37	11.09	11.09	7.21	7.21	0.87	0.87	1.58	1.58

Calculation Example:

$$\text{HAP (TPY)} = [(\text{AP-42 Emission Factor (lb/MMBTU)} \times \text{Conversion Factor (MMBTU/hp-hr)} \times \text{Hrs of Operation/year}) / (2000 \text{ lb/ton})]$$

Reference:

Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources, Chapter 3.3
Stationary ISC, Table 3.3-2

Air Quality Standards

The US Environmental Protection Agency (EPA) established national ambient air quality standards (NAAQS) for criteria pollutants under the Clean Air Act (CAA). The federal Clean Air Act (CAA) requires EPA to designate areas (counties or air basins) as *attainment*, *nonattainment*, *unclassifiable*, *maintenance*, or *attainment/cannot be classified* for criteria pollutants. An area's classification is based on whether the area meets or has historically met the NAAQS. Unclassified areas are treated as attainment areas for regulatory purposes. The state of Hawai'i is designated as attainment or unclassified for all of the NAAQS.

Criteria pollutants for which the EPA have established NAAQS are the following: ozone, nitrogen dioxide (NO₂), CO, sulfur dioxide (SO₂), particulate matter less than 10 microns (PM₁₀), particulate matter less than 2.5 microns (PM_{2.5}), and lead. The state and national ambient air quality standards are listed in Table B-4.

TABLE B-4
State and National Ambient Air Quality Standards

Air Pollutants		Hawai'i (HAAQS)	Federal (NAAQS)
Carbon Monoxide	1 – Hour	10 mg/m ³ (9 ppm)	40 mg/m ³ (35 ppm)
	8 – Hour	5 mg/m ³ (4.4 ppm)	10 mg/m ³ (9 ppm)
Nitrogen Dioxide	Annual	70 µg/m ³ (0.04 ppm)	100 µg/m ³ (0.05 ppm)
Sulfur Dioxide	3 - Hour	1300 µg/m ³ (0.5 ppm)	-
	24 - Hour	365 µg/m ³ (0.14 ppm)	365 µg/m ³ (0.14 ppm)
Ozone	Annual	80 µg/m ³ (0.03 ppm)	80 µg/m ³ (0.03 ppm)
	1 - Hour	-	235 µg/m ³ (12 ppm)
	8 - Hour	157 µg/m ³ (0.08 ppm)	157 µg/m ³ (0.08 ppm)
PM ₁₀	24 – Hour	150 µg/m ³	150 µg/m ³
	Annual	50 µg/m ³	50 µg/m ³
PM _{2.5}	24 – Hour	-	65 µg/m ³
	Annual	-	15 µg/m ³
Lead	Calendar Qtr.	1.5 µg/m ³	15 µg/m ³
Hydrogen Sulfide	1 – Hour	35 µg/m ³ (25 ppb)	-

µg/m³: Micrograms per cubic meter

mg/m³: Milligrams per cubic meter

ppm: parts per million

ppb: parts per billion

SOURCE: Hawai'i Administrative Rules, Chapter 59 , Code of Federal Regulations, Title 40, Part 50 (DOH, 2007b)

Appendix C Noise

Appendix C — Noise

Introduction

Because the human ear is not equally sensitive to all audible sound frequencies, frequency weighting schemes have been developed to approximate the way the human ear responds to noise levels. The A-weighted decibel scale (dBA) is the most widely used. The A-weighted scale significantly reduces the measured pressure level for low frequency sounds and slightly reduces the measured pressure level for some high frequency sounds. The C-weighted decibel scale (dBC) originally was developed to approximate human hearing sensitivity to high sound pressure levels and often is used to characterize low frequency sounds capable of inducing vibrations in buildings or other structures (25th Infantry Division [ID], 2004).

When sound pressure doubles, the dBA level increases by 3. Psychologically, however, most humans perceive a doubling of sound with an increase of 10 dBA. Sound pressure decreases with distance from the source. Typically, the amount of noise is halved as the distance from the source doubles (EPA 1974).

Equivalent noise levels (Leqs) are used to describe average noise exposure over various periods of time. Average noise exposure over a 24-hour period often is presented as a day-night average sound level (Ldn). Ldn values are calculated from hourly Leq values, with the values for the nighttime period (10 p.m. - 7 a.m.) increased by 10 decibels (dB) to reflect the greater disturbance potential from nighttime noises; this is referred to as the nighttime noise penalty factor (25th ID, 2004).

Tables C-1 through C-3 present Army and State of Hawai'i noise standards.

Table C-4 summarizes typical dBA levels for various noise sources and noise conditions.

Army Regulations

Under the Army’s Environmental Noise Management Program (ENMP, formerly known as the Installation Compatible Use Zone or ICUZ Program), the Army evaluates the impact of noise that may be produced by ongoing and proposed Army actions and activities.

The ENMP characterizes noise into three primary zones, as described in Table C-1. Noise Zone I is typically suitable for all types of land uses and is located the furthest from the noise source. Noise Zone II and Noise Zone III are generally considered incompatible for noise-sensitive land uses, such as housing, schools, and medical facilities.

TABLE C-1
Noise zones defined in Army Regulation 200-1

Noise Zone	General noise sources, A-WTD Ldn Range	Small arms, peak unweighted dB Range	Other impulse noise sources, C-weighted Ldn Range	Percent of population highly annoyed	Acceptability for noise-sensitive land uses
I	Up to 65 dBA	up to 87 dB Pk	up to 62 dBC	less than 15%	Acceptable
II	65 - 75 dBA	87 - 104 dB Pk	62 - 70 dBC	15% - 39%	Normally Unacceptable
III	over 75 dBA	over 104 dB Pk	over 70 dBC	over 39%	Unacceptable

Notes:

Noise levels from all sources should be evaluated in terms of annual averages of the identified noise metric.

Noise from transportation sources (aircraft and vehicles) and common industrial sources should be evaluated using A-weighted Ldn values.

Noise from small arms ranges should be evaluated using peak unweighted dB values until the Z-weighting standard is adopted, at which time peak Z-weighted decibel values should be used.

Noise from other impulsive sources (such as armor, artillery, and demolition activities) should be evaluated using C-weighted Ldn values.

Noise-sensitive land uses include housing, schools, and medical facilities.

Compatibility determinations for existing conditions and proposed actions should be supplemented by descriptions of projected noise increases and potential public reaction where:

- (1) the noise environment is determined by a few infrequent but very high level noise sources (such as blast events over 110 dBC SEL);
- (2) single event noise levels from a proposed action are 10 dB or more greater than existing levels;
- (3) where the A-weighted Ldn is between 60 and 65 dBA and a proposed action would increase the Ldn value by 3 dB or more;
- (4) where the A-weighted Ldn is above 65 dBA and a proposed action would increase the Ldn value by 1.5 dB or more.

Source: Department of the Army. 1997. Army Regulation 200-1: Environmental Protection and Enhancement. Chapter 7: Environmental Noise Management Program. Noise-sensitive land uses.

State Regulations

Hawai'i has adopted statewide noise standards that apply to fixed noise sources, construction equipment, and similar sources. The noise standards are phrased as property line noise limits and vary according to the zoning district of the impacted property. Separate noise standards have been established for non-impulse noise and impulse noise. The standards for non-impulse noise are summarized in Table C-2. The standards for impulse noise are summarized in Table C-3. All of the noise limits are specified as noise levels that can be exceeded no more than 10 percent of the time in any 20-minute period. Given the distance of approximately 2.5 miles from FP-202 to the nearest off-post residences, the proposed action and alternatives would comply with these standards.

TABLE C-2
Hawai'i Community Noise Standards for Non-Impulse Noise

Zoning District Group	Example Zones	Daytime Noise Limit for Non-Impulse Noise (7 AM to 10 PM)	Nighttime Noise Limit for Non-Impulse Noise (10 PM to 7 AM)
CLASS A	Residential Conservation Preservation Open Space Public Space	L ₁₀ less than or equal to 55 dBA during any 20-minute period	L ₁₀ less than or equal to 45 dBA during any 20-minute period
CLASS B	Multi-family Dwellings Apartments Commercial Hotel Resort	L ₁₀ less than or equal to 60 dBA during any 20-minute period	L ₁₀ less than or equal to 50 dBA during any 20-minute period
CLASS C	Agriculture Country Industrial	L ₁₀ less than or equal to 70 dBA during any 20-minute period	L ₁₀ less than or equal to 70 dBA during any 20-minute period

Source: Hawai'i Administrative Rules, Title 11, Chapter 46 (in 25th ID, 2004)

Notes:

L₁₀ = noise level exceeded 10 percent of the time during the specified time interval.

Noise limits are based on the zoning district of the property affected by a noise source.

Class A, Class B, and Class C noise limits apply to any lands having zoning designations equivalent to the listed example zones. For mixed zoning districts, the primary land use designation shall be used to determine the applicable noise limit.

Noise limits apply to any point at or beyond the property line of the noise source.

Noise sources covered by these noise limits include stationary noise sources and equipment used for agricultural, construction, or industrial activities.

Compliance with the non-impulse noise limits shall be based on A-weighted noise level measurements made with the instrument in the slow response setting (1 second integration).

TABLE C-3
Hawai'i Community Noise Standards for Impulse Noise

Zoning District Group	Example Zones	Daytime Noise Limit for Impulse Noise (7 AM to 10 PM)	Nighttime Noise Limit for Impulse Noise (10 PM to 7 AM)
CLASS A	Residential Conservation Preservation Open Space Public Space	L ₁₀ less than or equal to 65 dBA during any 20-minute period	L ₁₀ less than or equal to 55 dBA during any 20-minute period
CLASS B	Multi-family Dwellings Apartments Commercial Hotel Resort	L ₁₀ less than or equal to 70 dBA during any 20-minute period	L ₁₀ less than or equal to 60 dBA during any 20-minute period
CLASS C	Agriculture Country Industrial	L ₁₀ less than or equal to 80 dBA during any 20-minute period	L ₁₀ less than or equal to 80 dBA during any 20-minute period

Source: Hawai'i Administrative Rules, Title 11, Chapter 46 (in 25th ID, 2004)

Notes:

L₁₀ = noise level exceeded 10 percent of the time during the specified time interval. Noise limits are based on the zoning district of the property affected by a noise source.

Class A, Class B, and Class C noise limits apply to any lands having zoning designations equivalent to the listed example zones.

For mixed zoning districts, the primary land use designation shall be used to determine the applicable noise limit. Noise limits apply to any point at or beyond the property line of the noise source.

Noise sources covered by these noise limits include stationary noise sources and equipment used for agricultural, construction, or industrial activities. Compliance with the impulse noise limits shall be based on A-weighted noise level measurements made with the instrument in the fast response setting (125 millisecond integration).

TABLE C-4
A-Weighted Decibel Values For Example Noise Sources

Characterization	Dba	Example Noise Condition Or Event	Other Noise Examples
Threshold of pain	130	Surface detonation, 30 pounds of TNT at 1,000 feet	---
Building damage	120	Mach 1.1 sonic boom under aircraft at 12,000 feet	Air raid siren at 50 feet; B-1 flyover at 200 feet
Threshold for immediate permanent hearing damage	115	F/A-18 aircraft takeoff with afterburner at 1,600 feet	Commercial fireworks (5 lb charge) at 1,500 feet
	110	Peak crowd noise, pro football game, open stadium	Peak rifle range noise, 50 feet behind firing position
	105	Emergency vehicle siren at 50 feet	Pile driver peak noise at 50 feet
	100	F/A-18 aircraft departure climbout at 2,400 feet	Jackhammer at 10 feet; B-52 flyover at 1,000 feet
Extremely noisy	95	Locomotive horn at 100 feet; 2-mile range fog horn at 100 ft	Wood chipper processing tree branches at 30 feet
8-hour OSHA limit	90	Heavy truck, 35 mph at 20 ft; Leaf blower at 5 ft	Person yelling at 5 feet; Dog barking at 5 feet
Very noisy	85	Power lawn mower at 5 feet; City bus at 30 feet	Pneumatic wrench at 50 feet; Jet ski at 20 feet
	80	2-Axle commercial truck, 35 mph at 20 feet	Gas well drilling rig at 50 ft; Table saw at 50 feet
Noisy	75	Street sweeper at 30 feet; Idling locomotive, 50 ft	Beach with medium wind and surf
	70	Auto, 35 mph at 20 ft; 300 ft from busy 6-lane freeway	Stream bank at small/medium waterfall (10 feet)
Moderately noisy	65	Typical daytime busy downtown background conditions	Beach, light wind and surf
	60	Typical daytime urban mixed use area conditions	Normal speech at 5 feet
	50	Typical daytime suburban background conditions	Open field, summer night, insects
Quiet	45	Typical rural area daytime background conditions	---
	40	Quiet suburban area at night	---
Very quiet	30	Quiet rural area, winter night, no wind	Quiet bedroom at night, no air conditioner
Barely audible	10	Audiometric testing booth	---
Threshold of Hearing	0		---

Notes:

OSHA = Occupational Safety and Health Administration

Indicated noise levels are average dBA levels for stationary noise sources or peak dBA levels for brief noise events and noise sources moving past a fixed reference point.

Average and peak dBA levels are not time-weighted 24-hour average community noise equivalent level (CNEL) or Ldn levels.

Decibel scales are not linear. Apparent loudness doubles with every 10 dBA increase in noise level, regardless of the dBA value.

Data compiled from various published sources, monitoring studies, and noise modeling analyses.

Source: *Final Environmental Impact Statement: Army Transformation to a Stryker Brigade Combat Team in Hawaii*. May 2004. Prepared for Headquarters, 25th Infantry Division (Light) and U.S. Army, Hawaii.