PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR GAMMA IMAGING INSPECTION SYSTEMS

U.S. Customs and Border Protection

DEPARTMENT OF HOMELAND SECURITY
BUREAU OF CUSTOMS AND BORDER PROTECTION
APPLIED TECHNOLOGY DIVISION

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR

Gamma Imaging Inspection Systems

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Executive Summary

The United States (U.S.) Customs and Border Protection (CBP), an agency within the Department of Homeland Security (DHS), helps to guard the borders of the U.S. CBP's mission is to ensure all goods and persons entering and exiting the U.S. do so in compliance with all U.S. laws and regulations. CBP has the responsibility to regulate and control the borders against illegal entrants, terrorist entry, drugs and other contraband. This mission is accomplished primarily through physical inspection of cargo, conveyances, and persons as they enter the country. To improve the inspection process, CBP continuously seeks technological solutions that are cost effective and are safe for both humans and the environment.

Historically, cargo entering the United States from any foreign territory has been subject to physical examination by the U.S. Government to verify that it complies with U.S. laws and regulations. After September 11, 2001, a new combined organization of Border Patrol, the Immigration and Naturalization Service, Agriculture Inspection, and the U.S. Customs Service became Customs and Border Protection in the Department of Homeland Security. CBP now assumes a leading position in the defense of Homeland Security to protect the country against terrorists and weapons of mass destruction.[1]

A promising new method of conducting inspections involves the use of Non-Intrusive Inspection (NII) equipment based on technologies such as low-energy X-ray or low-energy gamma radiation sources to "see" into cargo containers and identify potential contraband. The Applied Technology Division (ATD) of CBP has examined gamma-imaging technologies for their suitability as parts of CBP's inspection program.

This Programmatic Environmental Assessment (PEA) documents a top-level evaluation of the potential environmental consequences resulting from deploying, installing, and operating of gamma imaging systems to inspect cargoes at air, sea and land ports of entry (POEs) throughout the U.S. and Puerto Rico. The PEA satisfies the requirements specified in the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality regulations implementing NEPA, and Department of Homeland Security procedures for NEPA compliance. NEPA requires Federal agencies to fully understand, and take into consideration during decision-making, the environmental consequences of proposed Federal actions.

The Vehicle and Cargo Inspection System (VACIS) is a family of gamma-imaging systems developed by SAIC, Inc., which provides a significant NII capability to aid CBP in stemming the flow of contraband into the U.S. CBP plans to deploy four VACIS configurations:

1) A semi-permanent version designed for inspection of motor vehicles and cargo containers at CBP POEs, (VACIS II);

2) A truck-mounted version designed for high-portability inspection of motor vehicles and cargo containers (Mobile VACIS);

3) A fixed version designed specifically for installation along railroad rights of way, for the inspection of railroad cars (Rail VACIS) and

4) A fixed pallet (Pallet VACIS) system designed for inspection of items stored on pallets and in boxes or crates.

[1]From the Port Activities web page on CBP website; accessed March 4, 2004: http://www2.fpm.wisc.edu/safety/Radiation/2000%20Manual/chapter9.pdf

Each VACIS configuration incorporates a low-energy gamma radiation source of Cesium-137 (^{137}Cs) or Cobalt-60 (^{60}Co) in a shielded enclosure. Each configuration uses a sodium iodide detector array. The cargo is placed between the source and the detector array. A shutter mechanism opens allowing gamma radiation to scan the cargo. The detector array measures any gamma radiation that passes through the cargo. The amount of gamma radiation detected indicates the thickness and/or density of the cargo being scanned. This information is made available at the Customs Inspector's computer display as a shaded image with the denser material appearing darker, and the less dense material appearing lighter. The Customs Inspector, using his/her training and experience, visually evaluates the shaded image using the density, location, and shape of the components of the image to identify possible contraband such as drugs, weapons, or other illegally-imported items.

The PEA considers the environmental consequences of:

- The Proposed Action (fielding and operation of the VACIS),
- The No-Action Alternative, and
- Other Alternatives considered but not carried forward.

A summary of the analysis and mitigation to be implemented in this PEA regarding the potential environmental consequences resulting from the proposed action is detailed below:

Geology and Soils – Implementing the proposed action will not impact geology. Potential impacts related to geology and soils are primarily related to construction of structures in geologically sensitive areas, to geohazards and potential earthquake damage to proposed new facilities, and to possible impacts to soils, depending on facility siting and construction requirements. Potential impacts to soils from construction activities will be minimized through implementing best management practices to minimize sedimentation and provide erosion control.

Hydrology and Water Quality – Construction related to the installation of VACIS has the potential to cause increased runoff and sedimentation during construction, and in the period between construction and vegetation re-establishment. Erosion and sedimentation control plans and a stormwater management plan will be prepared and implemented to limit impacts to water quality from implementing the proposed action. Because of the small scale associated with VACIS, increased surface runoff will be negligible. No impacts to hydrology will occur from the proposed action.

Floodplain – Floodplains are not expected to be impacted by the proposed action.

Wetlands – Wetlands are not expected to be impacted by the proposed action.

Coastal Zone – The Coastal Zone is not expected to be impacted by the proposed action.

Vegetation and Wildlife – No significant loss of habitat will occur by implementing the proposed action. Impacts to wildlife are minimal, limited to those temporary activities related to construction of structures.

Threatened and Endangered Species – Implementing the proposed action will not impact Federal or state threatened or endangered species.

Air Quality – Implementing the proposed action will not have a significant impact on air quality. Construction-related activities may result in a temporary increase in air emissions. Minor impacts to air quality are considered as the combination of temporary construction-related emissions, transportation-related (vehicle idling) emissions, and any system operation-related emissions.

Noise – Minor modifications and improvements to existing structures, and construction of new facilities, may create temporary noise impacts. Noise associated with the operation of

VACIS II, Mobile and Pallet VACIS is within limits established by the Occupational Safety and Health Administration (OSHA). Similarly, noise from the Mobile VACIS is not expected to exceed limits from EPA Noise Control Act regulations in Title 40 Code of Federal Regulations (CFR) Part 205, "Transportation Equipment Noise Emission Controls." Noise associated with Rail VACIS operations will be the loudest of the four VACIS configurations. Although OSHA noise limits are not expected to be measured above the regulatory "action level" (i.e., 85 dBA for an 8-hour work shift), it is possible that transient loud noise from the movement of railroad locomotives and cars may require operators (i.e., Customs Inspectors) to wear acceptable hearing protection equipment during those parts of Rail VACIS operations. None of the VACIS configurations are anticipated to violate local Nuisance Noise ordinances.

Land Use – None of the fielding sites associated with the proposed action are located in prime farmland. Implementing the proposed action is consistent with current and proposed land uses.

Infrastructure/Utilities – Implementing the proposed action at any of the sites is not expected to have a significant impact on infrastructure or affect communities' requirements for public utilities.

Traffic/Transportation – Implementing the proposed action will have a negligible impact on traffic.

Hazardous Wastes/Materials – The proposed action represents a small increase in the amount of hazardous substances currently generated. Any hazardous materials generated will be collected and disposed of in accordance with Federal and state regulations.

Historic and Archaeological (Cultural) Resources – Implementing the proposed action is not expected to have an impact on cultural or historic resources.

Radiological Consequences – As promulgated by the Nuclear Regulatory Commission in Title 10 CFR Part 20, the maximum permissible level of radiation dose to the general public in unrestricted areas is 100 mrem (100,000 μrem) per year. CBP has chosen this same radiation dose standard as the maximum permissible level for Customs Inspectors. Based upon CBP's chosen criterion of 2000 hours per year as the time of exposure, neither Customs Inspectors nor the general public will experience a dose greater than 0.05 mrem (50 μrem) per hour above natural and man-made background radiation. The radiation dose from VACIS will be limited to no more than 0.05 mrem (50 μrem) per hour through the establishment of radiation safety exclusion zones.

Conclusion – After considering all of the aforementioned factors and issues, this PEA concludes that VACIS is not expected to significantly affect the physical, cultural, and socioeconomic environments. Site-specific analyses will be performed for each location in the U.S. or Puerto Rico, where CBP installs VACIS II, Mobile VACIS, Pallet VACIS and/or Rail VACIS. Each site-specific analysis will be reported in a Supplemental Environmental Document, which will tier off of this PEA in accordance with 40 CFR Part 1508.28.

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Section 1

1 Introduction

1.1 Background

The Department of Homeland Security was established in the aftermath of the terrorist attacks of September 11th, 2001. The department has three primary missions:

- Prevent terrorist attacks within the United States,
- Reduce America's vulnerability to terrorism, and
- Minimize the damage from potential attacks and natural disasters.

CBP became an official agency within the Department of Homeland Security on March 1, 2003, combining employees from the Department of Agriculture, the Immigration and Naturalization Service, the Border Patrol and the U.S. Customs Service. As the Nation's principal border agency, the mission of CBP is to ensure goods and persons entering and exiting the U.S. do so in compliance with all U.S. laws and regulations. Of particular concern is the large number of cargo containers which enter the country everyday. As Mr. Henry Bonner, the CBP Commissioner described in testimony:[2]

> *"Because of the sheer volume of sea container traffic and the opportunities it presents for terrorists, containerized shipping is uniquely vulnerable to terrorist attack. Many national security experts believe that a terrorist attack using a container as a weapon or as a means to smuggle a terrorist weapon, possibly a weapon of mass destruction, is likely. These experts have pointed out that if terrorists use a sea container to conceal a weapon of mass destruction and detonate it on arrival at a port, the impact on global trade and the global economy would be immediate and potentially devastating - the economies of all nations could be adversely affected.*
>
> *"Given this vulnerable system, we realized the need to develop and implement a program that would enable us to better secure containerized shipping - the most important means of global commerce - against the terrorist threat. That*

[2] U.S. Customs and Border Protection, "Testimony of Commissioner Robert C. Bonner, U.S. Customs and Border Protection Before the National Commission on Terrorist Attacks Upon the United States, January 26, 2004"; available from http://www.cbp.gov/xp/cgov/newsroom/commissioner/speeches_statements/jan262004.xml; accessed 9 March 2004.

> *program, which Customs proposed in January 2002, is the Container Security Initiative (CSI)."*

The Container Security Initiative has four core elements:

- "First, stationing a team of U.S. Customs targeting personnel at foreign ports to identify "high-risk" containers before they are shipped to the U.S. …
- "Second, pre-screening the "high-risk" containers at the foreign CSI port before they are shipped to the U.S.
- "Third, using technology to pre-screen the high-risk containers. This permits the containers to be inspected rapidly without slowing down the movement of trade. This includes the use of both radiation detectors and large-scale radiographic imaging machines in order to detect potential terrorist weapons.
- "Fourth, using smarter, "tamper-evident" containers. …"

CBP also intercepts large quantities of contraband at our POEs. Mr. Bonner described in testimony: Contraband smuggling is a serious and continuing problem in the United States (U.S.). For example, in Fiscal Year 2002 alone, a total of 1,374,100 pounds of marijuana, 167,800 pounds of cocaine, and 4,100 pounds of heroin were seized nationally by CBP (formerly the U.S. Customs Service (USCS) and the U.S. Border Patrol (now the Office of Border Patrol, or OBP).[3] Mr. Bonner summarized the current OBP mission during a March 3, 2003 speech at the OBP Change of Command Ceremony:

> *"…We need a strong and effective Border Patrol between our ports of entry to enforce the laws of the United States, to apprehend those who attempt to enter the United States illegally or attempt to bring in illegal drugs or other harmful substances…"*

CBP is also responsible for apprehending individuals attempting to enter the United States illegally, protecting agricultural and economic interests from harmful pests and diseases; protecting American businesses from theft of their intellectual property; and regulating and facilitating international trade, collecting import duties, and enforcing U.S. trade laws.

CBP's mission is accomplished primarily through physical inspection of cargo, conveyances, and persons as they enter the country. To improve the inspection process, CBP continuously seeks technological solutions that are cost effective and are safe for both humans and the environment.

A promising new method of conducting inspections involves the use of NII techniques, which employ technologies such as low-energy X-ray or low-energy gamma radiation sources to "see" into cargo containers and identify potential contraband. NII technologies allow Customs Inspectors to inspect for contraband without having to physically enter into or unload motor vehicles or containers. The effective and efficient screening and processing of cargo, conveyances, and persons will allow CBP to focus the bulk of its anti-smuggling and trade enforcement resources on suspected and actual law violators, thereby increasing both the potential and the reality of detection. Strategically placing these systems at ports of

[3] FY02 Cocaine, Marijuana, & Heroin Seizure Stats, from the Performance and Annual Report Fiscal Year 2002, p.14; Customs Website; accessed March 3, 2004 http://www.customs.gov/ImageCache/cgov/content/publications/customs_5fannual_5freport2002_2epdf/v1/customs_5fannual_5freport2002.pdf

entry (POEs) will provide an effective barrier along the borders and will force smugglers to take higher risks to bring contraband into the US, increasing the chance of interception.[4]

As part of this multi-technology approach to combating the smuggling of illicit drugs and contraband into the US, the Vehicle and Cargo Inspection System (VACIS) fulfills the current NII technology requirement for gamma imaging technology identified in the *Ten-Year Counterdrug Technology Plan and Development Roadmap*.

CBP's plan to shield the U.S. borders against drugs and other contraband, by decreasing the probability of smuggling through POEs, is enhanced by the introduction of VACIS. This project provides a vital element in CBP counterdrug and enforcement responsibilities. VACIS increases enforcement effectiveness and efficiency. VACIS augments the capabilities of the Customs Inspector by acting as a force multiplier that enables inspectors to increase the quality, quantity, and scope of their activities. With a projected 160 high confidence inspections per day, VACIS is expected to increase the number of high confidence inspections per day by approximately 615% over that currently performed without an increase in inspection manpower.[5]

1.2 Why A Programmatic Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. 4321-4347, 4372-4375), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508), and U.S. Treasury Department regulations for NEPA compliance (Treasury Directive 75-02) directs CBP to fully understand and take into consideration, during decision-making, the environmental consequences of proposed Federal actions (projects). Therefore, CBP must comply with NEPA before making Federal funds available for the fielding and operation of gamma-ray non-intrusive imaging equipment.

NEPA regulations encourage agencies to "tier" their environmental documents to eliminate repetitive discussions of the same issues and to focus on the issues germane to the decisions at each level of environmental review. Fielding and operating gamma imaging systems at POEs is an undertaking that is nationwide in scope. Some issues associated with fielding and operating the systems are broad and relatively site-independent. They can be discussed and assessed without specific knowledge of the location of the equipment. This document, a Programmatic Environmental Assessment (PEA), fulfills that requirement.

Other issues are comparatively site-specific. These issues depend on local conditions such as proximity to waterways or wildlife migratory routes. For each operating location, site-specific information will be collected and assembled into a site-specific Supplemental Environmental Document (SED). The SED, in combination with the PEA, will assist decision makers in assessing environmental consequences at the local level, as described below.

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[4] Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection *System*; USCS; 29 January 1999; Page 2.

[5] Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection *System*; USCS; 29 January 1999; Page 8.

1.3 Programmatic Process

This PEA covers typical actions that are eligible for CBP funding for the acquisition, fielding, and operation of gamma-ray non-intrusive imaging equipment for use at sea, air, and land POEs. Because actions proposed for funding under this PEA and impacts of these actions can vary based on location and other site-specific criteria, an SED will be prepared for each individual project covered by this PEA. The resulting SEDs will tier off of this PEA in accordance with 40 CFR Part 1508.28. Projects for which it has been determined, during the preparation of each SED, that a more detailed environmental review is required, or projects which contain elements or actions not evaluated in this PEA, will be subject to Categorical Exclusion (CE), an Environmental Assessment, or an Environmental Impact Statement (EIS), as required by NEPA.

1.3.1 Cumulative Impacts

Per 40 CFR 1508.7:

> "*Cumulative impact* is 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."

Cumulative impacts resulting from site-specific fielding of individual gamma imaging systems are not addressed in this PEA because analysis of these impacts requires specific knowledge of other projects occurring within or near the operating area. Cumulative impacts will be addressed in each site-specific SED.

Section
2

2 System Description

CBP plans to deploy four VACIS configurations:

1) A semi-permanent version designed for inspection of motor vehicles and cargo containers (VACIS II);
2) A truck-mounted version designed for high-portability inspection of motor vehicles and cargo containers (Mobile VACIS);
3) A fixed version designed specifically for installation along railroad rights of way for the inspection of railroad cars (Rail VACIS); and
4) A fixed pallet (Pallet VACIS) system designed for inspection of items stored on pallets and in boxes or crates.

Each VACIS configuration incorporates a low-energy radiation fixed gauge comprising a gamma radiation source in a shielded enclosure, and a sodium iodide detector array mounted between 15 feet and 30 feet from the source. The cargo to be scanned is placed between the source and the detector array. The radiation source is housed in a self-contained, fireproof tungsten casing with a motor-driven lead aperture (shutter). Depending on the VACIS configuration, either one shutter or two shutters (primary shutter and secondary shutter) are opened, allowing gamma radiation to scan the cargo. The detector array on the opposite side of the cargo measures any gamma radiation that passes through the cargo. The amount of gamma radiation detected indicates the thickness and/or density of the cargo being scanned. This information is made available at the operator's computer display as a shaded image, with the denser material appearing darker and the less dense material appearing lighter. The Customs Inspector, using his/her training and experience, visually evaluates the shaded image using the density, location, and shape of the components of the image to identify possible contraband such as drugs, guns, or other illegally-imported items.

The radiation source used in all VACIS configurations is Cesium-137 (^{137}Cs) or Cobalt-60 (^{60}Co) with an activity of between 0.5 and 2.0 curies, depending on the VACIS configuration. Each VACIS configuration uses a different amount of source material, based mainly on the speed at which the cargo to be scanned passes through the gamma radiation. Increasing the curie level of the radiation source allows for a higher cargo scan speed. Additionally, increasing the curie level of the radiation source allows for a slightly greater degree of penetration of the cargo. A tradeoff associated with increasing the curie level of radiation is that, as a result, the cargo experiences an increased level of radiation exposure. In all VACIS configurations, the ^{137}Cs source is expected to have an operational life of 15 years[6],[7] and ^{60}Co has an operational life of five years.

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[6] Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; 18 August 2000.

Based on the aforementioned radiation source characteristics, VACIS II will employ 1.0 curie of ^{137}Cs because it will be used primarily for controlled, low-speed scanning of truck bodies and intermodal containers that are composed of relatively thin metal. Rail VACIS, on the other hand, will be used to scan moving freight train rail cars with a speed ranging from 0.5 to 5.0 miles per hour and whose construction may employ thick metal. Hence, Rail VACIS will employ a 2.0-curie ^{137}Cs radiation source. Mobile VACIS has an essentially "in the middle" radiation source requirement in that it will be used to scan cargo (primarily trucks, intermodal containers, and some rail cars) at a speed not quite as controlled and as slow as VACIS II, but not as variable and as fast as Rail VACIS. Because of this, Mobile VACIS will employ 1.0 curies of ^{137}Cs. The cargo that is normally scanned by the Pallet VACIS tends to be fruits and vegetables that contain higher water content; it was found that the Cesium source was not consistent enough and was replaced with 0.5 curies of Cobalt (the smallest amount of the four VACIS variants). Table I shows the number of curies available offered for use in each VACIS variant.

Table I: Source variants offered for VACIS

VACIS Configuration	Source Isotope	Source Activity (curies)
VACIS II	Cesium-137 Cobalt-60	1.0 0.75
Mobile VACIS	Cesium-137 Cobalt-60	1.0 0.75
Rail VACIS	Cesium-137 Cobalt-60	2.0 1.0
Pallet VACIS	Cesium-137 Cobalt-60	0.5 0.25

(*Source:* SAIC Safety & Security Products; available at http://www.saic.com/products/security; Internet, accessed 19 February 2004)

Radiation safety exclusion zones have been established for the VACIS II, Mobile VACIS, Rail VACIS and Pallet VACIS systems in order to limit the radiation dose to no more than 0.05 mrem (50 µrem) per hour above typical background/man-made radiation. The radiation safety exclusion zones for the four VACIS configurations were established from field measurements conducted by a Certified Health Physicist.[8] People and live animals would not intentionally be allowed in the radiation safety exclusion zones during VACIS operations.

It should be noted that although it is a new application for CBP, the radioactive fixed gauge has been used successfully and safely in industry for many years, including measuring the thickness of paper produced in paper mills and ensuring that bottles are filled to the proper level in mass-production facilities such as beer breweries. Fixed gauges specifically incorporating ^{137}Cs are used in industrial applications including measuring and controlling liquid flow in pipelines, and as a density gauge in determining whether oil wells are plugged by sand.

Detailed descriptions of the four VACIS configurations are provided in the following subsections.

[7] Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; 2 May 2000.

[8] ONDCP International Technology Symposium, 8-10 March 1999.

2.1 VACIS II

2.1.1 Functional Characteristics

A representative photograph of a VACIS II installation is shown in **Figure 1.** A close-up photograph of a typical fixed VACIS II operator station is shown in **Figure 2**. A photograph of a typical VACIS II mobile operator station (e.g., recreational vehicle) is shown in **Figure** 3. VACIS II consists of two 90-foot long tracks that are placed, in parallel, 30 feet apart. On one track is the radiation source (1.0 curie of ^{137}Cs or 0.75 curie of ^{60}Co) and on the opposite track is a 21-foot tall tower containing the sodium iodide detector array sensors. During operation, the motor vehicle to be inspected parks between the two tracks, and the driver exits the vehicle and is escorted to a safe waiting area. The radiation source and the detector array tower begin moving, in synchronized fashion, down the tracks as the scan sequence is begun by the VACIS II operator. The gamma rays are emitted from the source, pass through the vehicle, and are detected by the tower-mounted sensor array. The scan image is processed in the VACIS II operator station and displayed on a monitor for operator identification of cargo density anomalies that may indicate suspected contraband. Images of suspected contraband may be stored on the system computer for potential use as evidence in smuggling prosecution cases. The VACIS II equipment runs on externally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz circuits.

VACIS II incorporates two radioactive source shutters, designated primary and secondary, which are physically aligned so that the secondary shutter is directly in front of the primary shutter. Each shutter, alone, is sufficient to block the source radiation, and the two-shutter system provides redundancy to enhance safety. During operation, the primary shutter is opened and remains open, while the secondary shutter is opened to commence a scan and closed to end the scan. VACIS II has an average scanning time of one foot per second and an average inspection time of 2 to 3 minutes per vehicle. It is capable of scanning objects up to 8.5 feet wide by 70 feet long, with a maximum height of 14 feet. The exposed parts of VACIS II are constructed of stainless steel, providing resistance to rain, high humidity, and moderate wind. The system can operate in temperatures ranging from 0 to 120° F.

At those sites where the weather is often particularly harsh, the entire VACIS II installation may be located in an existing or newly-constructed building. A typical building suitable for use in this application is shown in **Figure 4**.

Photograph Courtesy of SAIC

Figure 1: VACIS II scanning a tractor-trailer

Customs and Border Protection Photograph

Figure 2: Typical VACIS II fixed operator station

Customs and Border Protection Photograph

Figure 3: Typical VACIS II mobile operator station

Customs and Border Protection Photograph

Figure 4: Typical building suitable for housing VACIS II installation

In order to accommodate the radiation safety exclusion zone discussed in Section 6.14.2.3.1, each VACIS II installation will require a rectangular footprint area measuring 110 feet x 65 feet, exclusive of the operator station or any associated buildings.[9]

VACIS II is equipped with several safety features to prevent injury. These consist of flashing lights and an audible alarm indicating when radiation is being emitted; micro-switches and shock absorbers at the end of the track to prevent trolley over-travel; and emergency shut-off buttons located in six different locations. The secondary shutter closes automatically when the source or detector array tower reaches the end of their pre-selected scan distance, and also automatically closes in the event that the source or detector array tower reaches the end of the track. The system operator may also manually close the shutter from the operator station. Both the primary and secondary shutters are of fail-safe designs, whereby each shutter will automatically close upon loss of electric power to the VACIS equipment. The primary shutter is designed so that a padlock may be used to secure the source in the OFF position.

[9] Written comment received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

2.1.2 Operational Procedures

The basic VACIS II operating steps are as follows:

1) A radiation safety exclusion zone is established around the VACIS II installation. The radiation safety exclusion zone is demarcated with rope or barriers and signage.

2) At the start of a shift, the primary shutter is unlocked and the computer system is turned on. A key is needed to operate the primary shutter from the shutter control box located in the operator station.

3) The system operator tests the primary and secondary shutters, and the associated indicating lights located in the operator station.

4) The primary shutter is opened and kept opened throughout a shift.

5) The secondary shutter is opened, and the area is surveyed to verify exposure rates outside the radiation safety exclusion zone are less than 0.05 mrem (50 μrem) per hour. The exposure rate shall be measured by a qualified operator using a calibrated survey meter.

6) Traffic control personnel direct the driver of the motor vehicle to be scanned to drive into the area between the VACIS II source and detector array tower tracks, and to park the vehicle.

7) Traffic control personnel escort the driver/passengers of the vehicle to be scanned to a point outside of the radiation safety exclusion zone area and questions the driver whether there are any remaining persons and/or animals in the vehicle. If the driver indicates that there are, then the vehicle is not scanned and is identified for further detailed manual inspection. If the driver falsely indicates that there are no remaining persons and/or animals in the vehicle when in fact there are, and if the vehicle is subsequently scanned using VACIS II, the remaining persons and/or animals will unintentionally be scanned along with the vehicle. However, they will receive only a very small radiation dose, as described in Section 6.14.2.5 (Effects of Irradiation on Persons).

8) The system operator verifies there are no persons within the radiation safety exclusion zone.

9) The system operator starts the scan from the computer. This opens the secondary shutter on the radiation source, and initiates the synchronous movement of the source and detector array tower along the length of the vehicle.

10) A density map is stored. The system operator inspects the density map to identify any contraband or potential contraband storage locations.

11) After the audible alarm has stopped sounding and the red indicator lights have stopped flashing, indicating that the secondary shutter is closed, the driver is escorted back to the vehicle. The driver is then directed to drive the scanned vehicle out of the radiation safety exclusion zone.

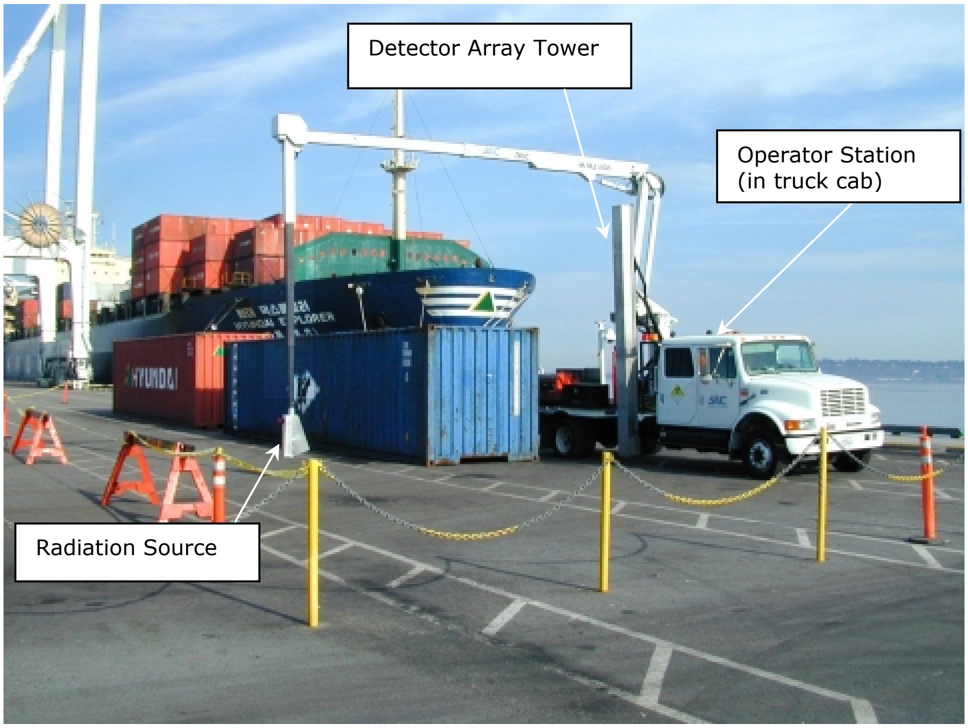
12) Steps 6 through 11 are repeated for each vehicle undergoing a scan.

13) At the end of a shift, both shutters are closed and the computer system is turned off. The key is removed from the shutter control box and the primary shutter is padlocked.

2.2 MOBILE VACIS

2.2.1 Functional Characteristics

A representative photograph of Mobile VACIS is shown in **Figure 5**. Mobile VACIS is similar to VACIS II, except that it is installed on a flatbed straight truck. The radiation source (also similar to that used for VACIS II) is located on a boom extending away from the truck, and the sodium iodide detector array sensors are located on a tower mounted on the truck. Mobile VACIS incorporates one source shutter. The entire system runs on internally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz circuits which are supplied by an onboard generator and rechargeable truck batteries. The operator station is located within the cab of the Mobile VACIS.



Photograph Courtesy of SAIC

Figure 5: Mobile VACIS scanning a cargo container

In order to accommodate the radiation safety exclusion zone discussed in Section 6.14.2.3.2 (Mobile VACIS), each Mobile VACIS will require a square footprint area measuring 50 feet x 50 feet and a height of 17 feet. For storage purposes, a 26 foot long by 8 foot wide area is required, with a 10 foot, 4 inch ceiling clearance.

Mobile VACIS is capable of scanning single rows of cargo containers as well as tractor-trailers at a speed of 88 inches per second (5 miles per hour). The system is equipped with lights to allow it to operate at night and can operate in all types of weather.

Mobile VACIS can scan motor vehicles and cargo containers using two operational modes:

Fixed Scanning Mode - During the fixed scanning mode of operation, the Mobile VACIS parks in one place as motor vehicles to be scanned pull up under the boom between the radiation source and detector array sensors, and stop with the passenger cab just past the radiation source. The VACIS scanning equipment is then turned on, and the driver of the vehicle to be scanned slowly moves forward until the vehicle is through the scan. The scanning equipment is then turned off.

Mobile Scanning Mode – When in the mobile scanning mode of operation, the Mobile VACIS is positioned so that the motor vehicle or cargo to be scanned is lined up under the boom between the radiation source and detector array sensors. The Mobile VACIS is then driven past the vehicle or cargo container to be scanned, while the VACIS scanning equipment is operating. When the Mobile VACIS reaches the end of the vehicle or cargo container being scanned, the scanning equipment is turned off.

In both Mobile VACIS operational modes, the scan images are sent to a monitor located inside the truck cab where the operator is located. The VACIS operator views the images to identify anomalies that should be investigated further. The system computer can store these images for potential use as evidence in smuggling prosecution cases.

At those sites where the weather is often particularly harsh, the entire Mobile VACIS may be located and installed in an existing or newly-constructed building. A typical building suitable for use in this application is shown in **Figure 4**.

Mobile VACIS is equipped with several safety features to prevent injury. These consist of flashing lights and an audible alarm indicating when radiation is being emitted, and emergency shut-off buttons. The shutter closes automatically at the end of a pre-selected scan time. The system operator may also manually close the shutter. The shutter is of a fail-safe design, whereby the shutter will automatically close upon loss of electric power to the VACIS equipment. The shutter is designed so that a padlock may be used to secure the source in the OFF position.

2.2.2 Operational Procedures

Mobile VACIS requires two trained operators. The scanning operator sits in the cab of the Mobile VACIS and operates the scanning equipment. The truck operator drives the Mobile VACIS when in mobile scanning mode, helps with positioning the vehicle or cargo container to be scanned, and helps ensure radiation safety (e.g., keeping persons outside of the radiation safety exclusion zone).

The operating steps provided below are applicable when Mobile VACIS is in fixed scanning mode and motor vehicles are pulling up to be scanned. Comparable steps are followed, as appropriate, during mobile scanning mode operations.

The basic Mobile VACIS operating steps are as follows:

1) A radiation safety exclusion zone is set up around the Mobile VACIS. The radiation safety exclusion zone is demarcated with rope and signage.

2) Pilasters, lane markers, and associated signage are set up and positioned.

3) The Mobile VACIS computer system is turned on and the key is used to energize the control box. A password is required to access system software to open the shutter.

4) The Mobile VACIS diesel engine is started.

5) The shielded storage box that houses the radiation source is unlocked, the radiation source is unlocked, and the locking pin is removed from the radiation source.

6) The radiation source and detector array tower are positioned using the Mobile VACIS hydraulic lifts.

7) The radiation source shutter is opened, and the area is surveyed to verify exposure rates outside the radiation safety exclusion zone are less than 0.05 mrem (50 μrem) per hour. The exposure rate shall be measured by a qualified operator using a calibrated survey meter.

8) An operational checklist is completed to ensure the safety lights and audible beacon are functioning appropriately and that all required signage is in place.

9) The Mobile VACIS operator directs the driver of the motor vehicle to be scanned to drive forward and position the vehicle under the boom between the radiation source and detector array tower.

10) The Mobile VACIS operator asks the driver of the vehicle to be scanned whether there are any remaining persons and/or animals in the vehicle. If the driver indicates that there are, then the vehicle is not scanned and is identified for further detailed manual inspection. If the driver falsely indicates that there are no remaining persons and/or animals in the vehicle when in fact there are, and if the vehicle is subsequently scanned using Mobile VACIS, then the remaining persons and/or animals will unintentionally be scanned along with the vehicle. However, they will receive only a very small radiation dose, as described in Section 6.14.2.5 (Effects of Irradiation on Persons) herein.

11) The Mobile VACIS operator and scanning operator verify there are no persons in the radiation safety exclusion zone.

12) The Mobile VACIS scanning operator opens the radiation source shutter either manually or automatically through system software, and a system operator asks the driver of the vehicle being scanned to pull forward.

13) A density map of the scanned vehicle is acquired and stored.

14) The radiation source shutter is closed either manually, automatically through system software, or by the safety-related timeout.

15) The Mobile VACIS scanning operator inspects the density image to identify any anomalies that may indicate the presence of contraband.

16) Steps 9 through 15 are repeated for each vehicle undergoing a scan.

17) At the end of operations, the radiation source shutter is closed and the key is removed from the control box. The system computer is turned off. The detector array tower and radiation source are returned to their storage locations. The radiation source is secured within the shielded storage box. The radiation source

shutter is secured with the locking pin and padlock. The shielded storage box is locked.

2.3 RAIL VACIS

2.3.1 Functional Characteristics

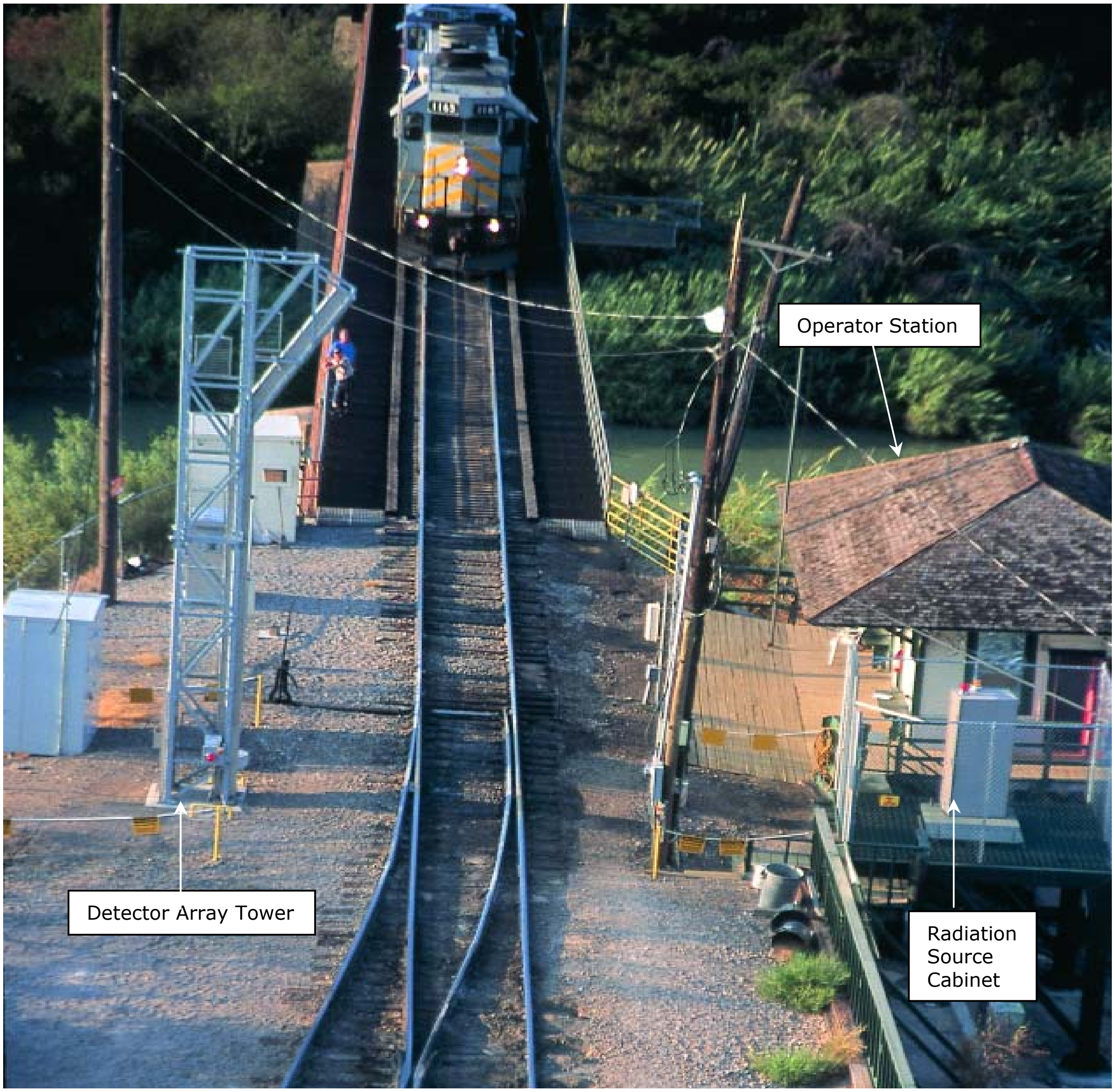
A representative photograph of Rail VACIS is shown in **Figure 6**. The radiation source (2.0 curies of ^{137}Cs or 1.0 curies of ^{60}Co) is located in a cabinet on one side of the railroad track, and the sodium iodide detector sensor array is located on a 32 foot tall tower on the other side of the track opposite from the radiation source.

The installation incorporates track speed sensing devices well in advance of the Rail VACIS equipment, that are used in determining the speed of the freight train to ensure the proper speed for railcar scanning is maintained. As the train approaches, a light beam at the Rail VACIS installation is activated on one side of the railroad track which is directed across the track, and a detector on the opposite side of the track detects the light beam. As each railcar breaks the beam, the Rail VACIS equipment uses this information to identify the discrete railcars being scanned. To aid the Rail VACIS operator in identifying which railcar is being scanned, a radio frequency reader is used to read the standardized identification markings located on the sides of the railcars.

The system includes a video camera to record each railcar being scanned, as well as a closed-circuit TV camera for safety and surveillance. The operator station, which houses the control system and operator positions, can be located in a fixed building, portable building, or mobile vehicle, depending on local site requirements. The Rail VACIS equipment runs on externally-supplied household electrical power, requiring two 120 VAC, 20 A, 60 Hz power circuits.

The area required for the Rail VACIS equipment will vary depending on the installation site. In order to accommodate the radiation safety exclusion zone (discussed in Section 6.14.2.3.3, "Rail VACIS"), each VACIS installation will require a rectangular footprint area measuring 20 feet x 50 feet, exclusive of the operator station and any associated buildings.[10]

[10] National Drug Control Strategy, 2001 Annual Report, Counterdrug Research and Development *Blueprint Update*; Office of National Drug Control Policy; Appendices B and D.



Photograph Courtesy of SAIC

Figure 6: Typical Rail VACIS installation

2.3.2 Operational Procedures

The basic Rail VACIS operating steps are as follows:

1) At the start of a shift, the radiation source shutter is unlocked and the VACIS computer is turned on.

2) Using radio communication, the Rail VACIS operator is alerted of an approaching freight train.

3) As the train approaches the Rail VACIS installation, the speed sensors detect the speed of the freight train and the train crew is directed to adjust the train speed, as necessary, to ensure proper scanning of the railcars.

4) The rail vehicle detection light is illuminated perpendicular to the railroad track.

5) Once the locomotives are past the radiation source, the radiation source shutter is opened, commencing the scan of the railcars.

6) As each railcar breaks the light beam, the Rail VACIS equipment uses this information to identify the discrete railcars being scanned.

7) Using the radio frequency identification system, the Rail VACIS equipment uses the standardized railcar identification markings to aid the system operator to identify which railcar is being scanned.

8) As each railcar is scanned, the Rail VACIS equipment acquires, displays, and stores images of the scanned railcars. The system operator inspects the density image of each railcar to identify any anomalies that may indicate the presence of contraband.

9) Step 8 is repeated for each scanned railcar.

10) After the last railcar has passed, the radiation source shutter is closed.

11) The system operator informs the freight train crew regarding whether any railcars in the train just scanned require detailed manual inspection.

12) At the end of the shift, the VACIS computer is turned off and the radiation source shutter is locked.

2.4 PALLET VACIS

2.4.1 Functional Characteristics

Figure shows a typical Pallet VACIS installation in a warehouse. The radiation exclusion zone (Fig. 11), as defined by the Customs Radiation Safety Officer, is 3 feet behind the radiation source that is enclosed within the cabinet. The footprint for the Pallet VACIS Cabinet and Conveyor is 31 feet long x 14.2 feet wide x 11.10 feet at its highest point. The Command Center is a separate 8 feet x 8 feet office which is linked to the cabinet mechanism by power and data cables that are not to be stationed more than 50’ from the cabinet. The radiation source (0.5 curie of ^{137}Cs or 0.25 curie of ^{60}Co) is mounted within a lead enclosed steel cabinet. The Pallet VACIS system power requirements consist of 208 VAC, 60 Hz, 80 amp, 3 phase. An Uninterruptible Power Supply is installed in the event of a power failure. An external gasoline generator could be used as an emergency power supply.

Each Pallet VACIS contains eight major components: A Command Center, Lift Mechanism, Source Shelf, Detector Shelf, Cabinet, Programmable Logic Controller (PLC) Panel, Electrical Panel, Conveyor and Pallet Sensors. The Command Center is placed in a position that has a full, unobstructed view of the Pallet VACIS equipment. Enclosed in the Command Center are the VACIS operator, a Personal Computer, Closed Circuit Television Monitors, the System Control Panel (SCP) and the control pendant. The Lift Mechanism contains 25 gallons of type AW 32 petroleum oil (hydraulic fluid). The presence of the hydraulic fluid may create the need for a berm to be built around the Cabinet. This berm will eliminate the possibility of spilled hydraulic fluid migrating from the general area of the spill.

The Pallet VACIS is equipped with several safety features to prevent injury. Included in these features are: a Safety Brake system for the conveyor and lift mechanism which will engage if the drive chain breaks; flashing lights that indicate when radiation is being emitted; and emergency shut-off buttons that will automatically actuate the shutter in the closed position at the end of a pre-selected scan time. The system operator may also manually close the shutter. The shutter is a fail-safe design, whereby the shutter will automatically close upon loss of electric power to the VACIS equipment. The shutter is designed so that a padlock may be used to secure the source in the OFF position. The radiation source has a primary and secondary shutter. The secondary shutter will automatically close by spring actuation in the event of a system failure. The primary shutter will close with the use of the back-up battery if power is lost. Other areas of concern are Pinch Point injuries caused by the Conveyor, Electrical safety that encompasses equipment lockout/tag out procedures and electrostatic discharge protection, hydraulic component maintenance safety, moving parts and assemblies, and radiation safety.

Figure 7: Pallet VACIS

2.4.2 Operational Procedures

Prior to operating the Pallet VACIS system, a start-up routine is required to ensure the unit is properly functioning. The start-up checklist is as follows:

1) Energize the Pallet VACIS by inserting and turning the key in the System Enable switch that is on the System Control Panel (SCP).

2) Following system power-up, the Manual Jog function is tested. This consists of pressing the green button located on the Motor Starter to power-up the Hydraulic Power Unit (HPU).

3) Retrieve the handheld pendant and press the RESET button to take the system out of the "E Stop" mode.

4) On the pendant, press and hold the Input Conveyor switch to jog the conveyors. Ensure an audible tone is heard for two seconds prior to the conveyors moving. Also ensure the Load and End sections of the conveyor move at the same speed and that they operate smoothly. While holding the Input Conveyor button, depress the E-Stop button and ensure the conveyor stops.

5) Perform the same procedures for the Output conveyor.

6) Preset the Scan speed switch located on the SCP to MED.

7) Using the pendant, press the Jog Lift switch upward into the UP position. Ensure the Detector Shelves operate smoothly while rising to 2 feet of the top position. Release the switch and verify the shelf stops immediately.

8) Repeat the procedures for the downward direction.

Note: Repeat this procedure several times while viewing from different angles.

It is a requirement for this system to normalize the Detectors once a day or when the imaging becomes noticeably degraded. This process is to be completed only after the Manual Jog procedure has been accomplished.

The Normalizing of the Detectors process is accomplished by:

1) Jog the lift so that the Detector and Source shelves are completely above the conveyor surface.

2) Open the first or second cabinet door on the source side of the system; remove the padlock; if the system is the ^{60}Co, push the plunger in completely and close the doors.

3) Press the Shutters Enable on the SCP and ensure the red light in the button illuminates.

4) On the ^{60}Co system, when the Primary Shutter opens, a light on the SCP should be illuminated. For the ^{137}Cs systems press the button and ensure after several seconds of flashing that the light remains on.

5) Select Normalize from the Acquire menu and verify the Secondary Shutter Open light illuminates and that the warning beacons on the cabinet are flashing. This process should take approximately 15 to 20 seconds. On the computer screen, a detector window opens after the secondary shutter closes.

6) On the computer screen, click the button in the top right hand corner to close the detector array window.

The basic start-up and operating steps for pallet loading and testing are as follows:

1) A forklift operator delivers the target pallet on to the load end of conveyer unit.

2) The Red ENABLE button located in the Shutters section of the SCP is depressed. This command enables remote operation of the source shutters.

3) The OPEN button located on the Primary Shutter portion of the SCP is pressed, which opens the primary shutter and turns on the lasers to assist in positioning the target.

4) The detector and source shelves should have been parked near their scanning position. If this was not done, the Lift Jog Down switch may be used to position the target.

5) The Auto Load button on the Input Conveyors section of the SCP is held until the light stops flashing. This switch moves the target into position within the Cabinet. Ensure the laser lines are visible on the Detector Shelf or are not visible on the target; use the JOG switch on the INPUT CONVEYOR panel to properly position the target.

6) Select the appropriate scanning speed by positioning the Scan Speed Switch on the SCP.

7) Depress the red Start Key located on the Auto Scan section of the SCP.

8) When the lift has reached the required height that was preset during the System Setup, the scan will stop. If the need to stop the scan prior to the auto end is desired, press the Stop button located on the Auto Scan portion of the SCP.

9) The forklift operator may now remove the pallet from the conveyor.

The basic start-up and operating steps for pallet loading and testing are as follows:

1) On the PC located in the Operator's Booth, select either the File: Exit menu and clicking on the Exit icon or by pressing the <Alt> +X on the keyboard.

   Note: If the VACIS software detects unsaved files, a dialogue box will appear on the screen asking for a Yes, No or Cancel decision to be made.

2) At the Windows screen, select start followed by Shut Down.

3) When prompted, select "Shut Down the Computer".

4) Following computer shutdown, ensure:

   a) The Primary and Secondary source shutters are fully closed
   b) The Cabinet warning lights are off
   c) The roll-up doors are fully closed
   d) The Conveyor / Lift Mechanism operating alarm is secured
   e) The Conveyor / Lift Mechanism, video cameras and monitors, UPS and Printer have had the power secured.
   f) Turn the SYSTEM ENABLE keylock switch located on the SCP to the off position.

Warning: Ensure the SCP's SYSTEM ENABLE key is removed and properly secured.

Section 3

3 Purpose and Need for the Action

3.1 PURPOSE

The primary purpose of the proposed action is the fielding and operation of gamma-ray non-intrusive imaging equipment for use at air, sea and land POEs, to meet the need for gamma-ray NII systems identified in the *National Drug Control Strategy*, and the *Ten-Year Technology Development Plan and Development Roadmap.*[11] A gamma imaging detection system will enable the Customs Inspector to perform the effective and efficient NII of cargo vehicles including tanker and trailer trucks, trailer-mounted cargo containers, and railroad cars for contraband such as illicit drugs, currency, and guns. As a part of a multi-technology approach to combating the smuggling of illicit drugs into the U.S., a gamma imaging system directly supports CBP's *Narcotics Strategic Plan*[12] to develop and introduce technologies to identify narcotics and support the goals of the *National Drug Control Strategy*[13] to shield America's air, land, and sea frontiers from the drug threat. Given the seriousness faced by CBP in protecting our nation's borders it is envisioned all POEs are future candidates for the fielding of gamma ray non-intrusive imaging equipment.

3.2 NEED

Created in 1789, U.S. Customs (now part of CBP under DHS) is one of the Federal government's oldest agencies. Customs' original mission was to collect revenue. Now, the unified CBP mission has expanded to include ensuring all goods and persons entering and exiting the U.S. do so in accordance with all U.S. laws and regulations. Even though the mission has changed over time, stifling the drug trade remains a major objective of the organization. As stated in its 2002 annual report:[14]

> *"Although counterterrorism has become the number one priority of the agency since the tragic events of September 11, 2001, Customs still remains a leader in interdicting and investigating drug smuggling activities and organizations. Our heightened state of security along America's borders has, in fact,*

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[11] Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection *System*; USCS; 29 January 1999; Page 2.

[12] National Drug Control Strategy, 2000 Annual Report, Counterdrug Research and Development *Blueprint Update*; Office of National Drug Control Policy; Page 6.

[13] Customs Service: Drug Interdiction Efforts; Briefing Report, GAO/GGD-96-189BR; 26 September 1996; accessed March 3, 2004 (http://www.druglibrary.org/schaffer/GOVPUBS/gao/pdf35.pdf).

[14] http://www.customs.gov/ImageCache/cgov/content/publications/customs_5fannual_5freport2002_2epdf/v1/customs_5fannual_5freport2002.pdf; accessed March 4, 2004

strengthened, not weakened, our counterdrug effectiveness through the deployment of additional manpower and NII technology assets."

CBP's need for non-intrusive inspection technology is based on its responsibilities to operate 301 POEs. Contraband can enter the U.S. by air, land, and sea. Illegal items can be transported by or in people, cargo, and conveyances including cars, trucks, aircraft, and vessels. Customs Inspectors are, therefore, required to perform inspections of cargo and conveyances as a prerequisite for entry into the U.S. In 2002, CBP processed approximately 415 million people, 10 million containers and trucks, 117 million private vehicles, 1 million aircraft and marine vessels, and the collection of $20B in tariffs. This tremendous and growing workload demands a shift from manpower-intensive methods to more efficient technology-based solutions.

The need for CBP to increase its investment in technology is apparent. The effective and efficient screening and processing of low-risk cargo, conveyances, and persons will allow CBP to focus the bulk of its anti-smuggling and trade enforcement resources on suspected and actual law violators, thereby increasing both the potential and the reality of detection. Customs Inspectors need the ability to conduct high-confidence inspections in a non-intrusive manner quickly and efficiently. NII technology provides CBP with the capability of increasing the total number of inspections performed daily, and allows for the examination of very difficult commodities (e.g., tankers and hazardous materials) in a timely and cost effective manner.

The major focus of CBP's current plans for NII technology development and acquisition are based on its *Narcotics Strategic Plan* and its interdiction objective:

- The goal of CBP narcotics strategy is to prevent the smuggling of narcotics into the U.S. by creating an effective narcotics interdiction, intelligence, and investigation capability that disrupts and dismantles smuggling organizations.
- The objective for narcotics interdiction is to develop and introduce technologies and techniques to identify smuggled narcotics, to force smuggling organizations to change to higher risk smuggling methods, and to enlist the participation of other nations in efforts to disrupt the worldwide smuggling of narcotics.

CBP strategy for NII technology development and acquisition is influenced by the reality of its critical enforcement responsibilities with respect to drug smuggling. Drug smuggling is a real and immediate problem for the US; it is not a theoretical problem, nor one of the future. CBP's choices regarding new technology also must recognize today's constraints on time and resources. If there is an available technology that responds to current and foreseeable requirements and priorities, and is both operationally and economically feasible, CBP believes it has an obligation to put that technology into use as soon as possible. CBP cannot afford to wait for the elusive, perfect system that is always just over the horizon; rather, it must acquire effective devices for today's most critical areas as soon as the technology is available and affordable. CBP also realizes that many operational requirements are not satisfied by available technology, and that development must be pursued strenuously to meet these needs. When these efforts produce equipment which meets its criteria, CBP will add it to its arsenal; not because it is new or represents the state-of-the-art, but rather because it is necessary, effective, appropriate, and affordable.[15]

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[15] Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection *System*; USCS; 29 January 1999; Page 7.

Section
4

4 The Proposed Action and Alternatives

4.1 FIELDING AND OPERATION OF VACIS GAMMA IMAGING SYSTEM (Proposed Action)

The proposed action is to field and operate the VACIS gamma-ray non-intrusive imaging equipment for use by CBP at its air, sea and land POEs.

The VACIS program is part of a multi-technology approach to combating the smuggling of contraband into the U.S. VACIS will enable the Customs Inspector to perform the effective and efficient non-intrusive inspection of cargo vehicles including tanker and trailer trucks, trailer-mounted cargo containers, railroad cars and individual pallets or crates. Modular in design and capable of being rapidly deployed among different sites, VACIS will be capable of detecting contraband located in the vehicle body and chassis, tires, gas tanks, and hidden compartments. Complementing other new technologies under the *USCS Five-Year Technology Acquisition Plan for the Southern Tier*, the goals of the *National Drug Control Strategy and the USCS Narcotics Strategy* will be directly supported by the VACIS program.[16]

VACIS uses a low-energy gamma ray source (^{60}Co and ^{137}Cs) to generate images of trucks and cars similar to the images created by x-ray systems. However, VACIS can probe deeper into cargo than low-energy x-ray systems, while emitting minimal radiation. Utilized as an enforcement tool, VACIS will help CBP intercept narcotics shipments, while allowing the rapid processing of lawful international trade and travel.

VACIS was originally developed by Science Applications International Corporation (SAIC), with funding from CBP and the ONDCP, to inspect empty tanker trucks. VACIS is largely a commercial off-the-shelf procurement. Department of Defense sponsored tests for VACIS were conducted at Thunder Mountain Evaluation Center (TMEC), Fort Huachuca, Arizona.[17]

The spending on contraband detection technologies that has occurred since 1990 has been due, in large part, to Congressional direction. Funds for the acquisition of NII technology

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[16] Ten-Year Counterdrug Technology Plan and Development Roadmap; Office of National Drug Control Policy; June 1998.

[17] Investment Review Board, High Technology Sub-Group – Imaging and Re-locatable Inspection *System*; USCS; 29 January 1999; Page 7.

and Automated Targeting Systems have been appropriated by Congress as part of the "Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999 (P.L. 105-77, H.R. 4328, H. Rept. 105-825)".

Specifically, the two sections in this appropriation are:

1) Omnibus Crime Bill Initiatives – (Non-Intrusive Inspection Technology and Automated Targeting Systems) for $54M

2) Emergency Supplemental Appropriations – (Additional Non-Intrusive Inspection Technology to Augment the $54M) for $80M.

Gamma-ray imagers (e.g., VACIS) are identified by specific line items, and account for $20.8M of the $134M appropriations as identified.[18]

4.2 ALTERNATIVES TO THE PROPOSED ACTION

The CEQ regulations for the preparation of Environmental Assessments for major Federal actions require an investigation and evaluation of alternatives to the proposed action as part of each assessment.

4.2.1 No Action Alternative

Inclusion of a "No Action" alternative in this PEA is required under NEPA. The No Action alternative maintains the status quo and evaluates the effects of not fielding VACIS or any other alternative action, thus providing a benchmark against which project alternatives may be evaluated. The No Action alternative is in conflict with CBP's mission of drug interdiction, the objectives of the *National Drug Control Strategy*, the *USCS Five-Year Technology Acquisition Plan for the Southern Tier* and the scope of the *Ten-Year Technology Development Plan and Development Roadmap*. Therefore, it is not a viable alternative.

4.2.2 Field a Gamma Imaging System other than VACIS

The ONDCP, Counterdrug Technology Assessment Center (CTAC) is responsible for coordinating Federal counterdrug technology research and development. The *Ten-Year Technology Development Plan and Development Roadmap* has been prepared to satisfy the technology objectives within the five goals of the *National Drug Control Strategy*. The Plan concentrates on the counterdrug technology needed by all Federal agencies with drug control missions. Federal agencies such as CBP are consulted within the technology research and development decision process, and will ultimately carry out implementation of the *Ten-Year Technology Development Plan and Development Roadmap*.

The acquisition and fielding of gamma imaging technology is a priority need in NII technology for which CTAC has solicited advanced concepts. The identification of VACIS to meet the gamma imaging technology need is a result of the technology assessment / research and development process outlined in the *Ten-Year Technology Development Plan and Development Roadmap.*[19] There are no other gamma imaging systems currently

[18] Ten-Year Counterdrug Technology Plan and Development Roadmap; Office of National Drug Control Policy; June 1998.

[19] Telephone conversation with Carolyn Whorton, Program Manager, USCS, 24 January 2001.

available. Therefore, fielding a gamma imaging system other than VACIS is not a viable alternative, and is not discussed further in this PEA.

On 19 March 1999, the Department of the Army, Fort Huachuca, Arizona posted a Sources Sought notice in the Commerce Business Daily *CBDNet* identifying a requirement for CBP to procure NII systems similar to VACIS II, and requesting responses from vendors able to provide commercial off-the-shelf systems.[20] The only vendor responding with a commercially available product was SAIC.

[20] *CBDNet* Submission No. 306715; 9 March 1999; Gamma-Ray Inspection System, Sources Sought for commercial items.

Section
5

5 The Affected Environment

This section describes the existing conditions for each resource category, including applicable statutes. Some resources have more, or less, information than others concerning the existing conditions and regulatory background. The difference between resources depends on the nature of the resource, and is not an indicator of the resource's importance. For example, resources such as climate, geology, soils, hydrology, and flora and fauna species, are impossible to describe in a document that considers installation of systems in 12 states and Puerto Rico. A more detailed description of the affected environment will be provided in a Supplemental Environmental Document (SED), as necessary, to evaluate project impacts.

5.1 CONSULTATIONS

As part of the process of determining whether a VACIS installation may significantly impact the resources located at or near the installation site, CBP may be required to conduct consultations with Federal, state, and local agencies. CBP will typically provide the agencies with VACIS installation details such as location, excavation/construction requirements, site photographs, and anticipated vehicular traffic flow for use by the agencies in determining whether there are any significant natural resource or socioeconomic impacts that must be precluded or minimized. The typical types of consultations that are required, as well as guidance in conducting these consultations, are described in the following subsections.

5.1.1 Coastal Zone Protection

The Coastal Zone is defined in 49 CFR Part 194 as "All United States waters subject to the tide, United States waters of the Great Lakes and Lake Champlain, specified ports and harbors on inland rivers, waters of the contiguous zone, groundwaters, and ambient air proximal to those waters."

The Coastal Zone Management Act (CZMA) requires CBP to ensure their operations, activities, projects, and programs that affect the Coastal Zone in or on coastal lands or waters are consistent, to the maximum extent practicable, with the Federally approved Coastal Zone Management Plan for the state. The CZMA authorizes states to administer approved coastal nonpoint pollution programs. Advance concurrence from the state Coastal Commission is required prior to taking an action affecting the use of land, water, or natural resources in the Coastal Zone. In their Coastal Zone management programs, states must list activities which affect the Coastal Zone and, therefore, require a consistency determination. CBP will review these lists to identify activities applicable to the installation of VACIS which are likely to require a consistency determination.

5.1.2 Protection of Wetlands, and Floodplain Management

Executive Order (EO) 11990 "Protection of Wetlands" and EO 11988 "Floodplain Management" address the Federal agency actions required to identify and protect wetlands and floodplains, minimize the risk of flood loss and destruction of wetlands, and preserve and enhance the natural and beneficial values of both floodplains and wetlands. In a Federal Register notice of 24 May 1978 (43 FR 22311), the Department of the Treasury advised, as a general rule, that it does not engage in activities that would impact on floodplains or wetlands. Department of the Treasury procedures implementing these EOs are incorporated in U.S. Treasury Directive 75-02, *Department of the Treasury's National Environmental Policy Act Implementing Procedures.*

CBP will evaluate the potential effects of actions in floodplains, according to procedures outlined in U.S. Treasury Directive 75-02. If required, CBP will obtain permits from the U.S. Army Corps of Engineers (USACE) prior to discharging dredged or fill material into waters of the US, including wetlands, in compliance with Section 404 of the Clean Water Act.

5.1.3 Endangered Species Protection

Section 7 of the Endangered Species Act of 1973 requires CBP to consult with the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) if proposed CBP-funded projects may affect threatened and endangered species and/or their suitable habitat. CBP will consult with the USFWS or the NMFS, as appropriate, on any CBP action(s) that may affect any Federally listed threatened or endangered species or their critical habitat, in order to ensure such actions are not likely to jeopardize the continued existence of the species or result in the destruction or adverse modification of the habitat. Such consultations may be either formal or informal. When necessary, CBP will prepare a biological assessment of the effects of a proposed action on listed species to assist the USFWS or NMFS in issuing a biological opinion regarding whether the action will jeopardize the continued existence of the species. Consideration of state-listed species is not required by the Endangered Species Act of 1973. However, state laws and regulations may govern the possession, propagation, sale, or taking of such species.

5.1.4 Historic and Archaeological Resources Protection

Section 106 of the National Historic Preservation Act of 1966 (NHPA) requires a Federal agency with jurisdiction over a Federal, Federally assisted, or Federally licensed undertaking to take into account the effects of the agency's undertaking on properties included in, or eligible for, the National Register of Historic Places (NRHP) and, prior to approval of an undertaking, to afford the applicable State Historic Preservation Officer (SHPO) an opportunity to consult on the undertaking. Prior to initiating consultation, CBP must determine whether cultural properties are present in the Area of Potential Effect (APE), evaluate the property to determine the eligibility for listing in the NRHP, and evaluate the potential effects of the proposed undertaking on any NRHP-eligible property located in the APE.

Similarly, CBP is required to comply with Section 110 of the Act. Section 110 requires "all Federal agencies shall assume responsibility for the preservation of historic properties which are owned or controlled by such agency." CBP's preservation-related activities will be carried out in consultation with other Federal, State, and local agencies, Indian tribes, Native Hawaiian organizations, and with notification to the interested Public.

5.2 GEOLOGY AND SOILS

Potential impacts related to geology and soils are primarily related to construction of structures in geologically sensitive areas, to geohazards and potential earthquake damage to proposed new facilities, and to possible impacts to soils, depending on facility siting and construction requirements.

To avoid potential impacts to unique geologic resources, the relevant county and city general plans should be consulted before siting new facilities.

5.3 AIR QUALITY

5.3.1 Air Quality Management

Air quality is managed through the Clean Air Act Amendments as well as various state Clean Air Acts. The Federal and State Clean Air Acts are implemented through a three-point strategy:

1) Local controls for managing stationary, non-vehicular sources and permitting;
2) State controls for setting emissions for motor vehicles, fuels, and consumer products; and
3) Federal controls for interstate pollutants.

To further support the goal of reduced emissions, State Implementation Plans (SIPs) have been adopted as an approach to reduce air pollution, region by region, in future years. SIPs contain measures that allow each region to reach attainment status (meet the primary standard for all air quality criteria). Although Federal and state governments play a role in managing the nation’s air quality, the acts are implemented primarily at the local level.

At the state and county levels, air quality is managed through numerous Air Quality Management Districts (AQMDs). Each AQMD is responsible for controlling air pollution within the district to meet all state and Federal air quality standards. Using regional air quality data, each AQMD adopts it own statutes to deal with the air quality problems associated with that region, including setting emission limits for stationary sources such as factories and power plants. In addition, each district develops its own clean air plan and enforces local pollution control laws.

5.3.2 Applicable Air Quality Statutes

Several statutes exist to manage air quality, and many may apply to a particular project; however, one statute in particular is, perhaps, the most applicable to potential Federal projects: the New Source Review (NSR) permitting process statutes. Under this permitting process, any new potential source of emissions may have to be permitted by the AQMDs. Even temporary sources, such as increased particulate matter less than 10 micrometers in diameter (PM_{10}) due to construction, may require a permit, depending on the district and its air quality. In most cases, a permit may not be required for temporary, small-scale construction measures. However, the AQMD associated with the project must be contacted to ultimately determine regulation applicability, regardless of project scale.

5.3.3 Air Quality for the Criteria Air Pollutants

The Environmental Protection Agency (EPA) defines ambient air in 40 CFR Part 50, as "that portion of the atmosphere, external to buildings, to which the general public has access." In compliance with the 1970 Clean Air Act (CAA) and the 1977 and 1990 Amendments (CAAA), the EPA has promulgated ambient air quality standards and regulations. The National Ambient Air Quality Standards (NAAQS) were enacted for the protection of the public health and welfare, allowing for an adequate margin of safety. To date, the EPA has issued NAAQS for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), particles with a diameter less than or equal to a nominal 10 micrometers (PM_{10}), ozone (O_3), nitrogen dioxide (NO_2), and lead (Pb). The health and welfare effects of the applicable criteria pollutants are listed in Table II.

There are two types of air quality standards: primary and secondary. Primary standards are designed to protect sensitive segments of the population from adverse health effects, with an adequate margin of safety, which may result from exposure to criteria pollutants. Secondary standards are designated to protect human health and welfare and, therefore, in some cases, are more stringent than the primary standards. Human welfare is considered to include the natural environment (vegetation) and the man-made environment (physical structures). Carbon monoxide is generated from motor vehicles and wood burning, and is considered a human health risk. Nitrogen dioxide is a product of combustion and can be seen as a brown haze. Organic gases react with nitrogen dioxide to form ozone, which causes low visibility and health effects including respiratory disease and eye irritation. Particulate matter is a component of smoke and can have a variety of health effects, depending on its chemical composition. Sulfur dioxide, which is generated from burning fossil fuels, causes damage to vegetation and reduces the health of humans and animals. Airborne lead, which is generally produced by automobiles, can cause blood-related effects and may also affect the central nervous and reproductive systems.

Exceeding a concentration level is a violation and constitutes a nonattainment of the pollutant standard. If an air quality control region violates the NAAQS for a pollutant, this region is defined as a nonattainment area for that pollutant.

Table II: National Ambient Air Quality Standards

POLLUTANT	STANDARD VALUE *	STANDARD TYPE
Carbon Monoxide (CO)		
8-hour Average	9 ppm (10 mg/m^3)	Primary
1-hour Average	35 ppm (40 mg/m^3)	Primary
Nitrogen Dioxide (NO_2)		
Annual Arithmetic Mean	0.053 ppm (100 µg/m^3)	Primary & Secondary
Ozone (O_3)		
1-hour Average	0.12 ppm (235 µg/m^3)	Primary & Secondary
8-hour Average **	0.08 ppm (157 µg/m^3)	Primary & Secondary
Particulate (PM_{10}) *Particles with diameters of 10 micrometers or less*		
Annual Arithmetic Mean	50 µg/m^3	Primary & Secondary
24-hour Average	150 µg/m^3	Primary & Secondary
Particulate ($PM_{2.5}$) *Particles with diameters of 2.5 micrometers or less*		
Annual Arithmetic Mean **	15 µg/m^3	Primary & Secondary
24-hour Average **	65 µg/m^3	Primary & Secondary

POLLUTANT	STANDARD VALUE *	STANDARD TYPE
Sulfur Dioxide (SO_2)		
Annual Arithmetic Mean	0.03 ppm (80 μg/m^3)	Primary
24-hour Average	0.14 ppm (365 μg/m^3)	Primary
3-hour Average	0.50 ppm (1300 μg/m^3)	Secondary
Lead (Pb)		
Quarterly Average	1.5 μg/m^3	Primary & Secondary

(Source: U.S. Environmental Protection Agency [EPA] Office of Air Quality Planning and Standards website http://www.epa.gov/air/criteria.html; accessed March 9, 2004)

* Parenthetical value is an approximately equivalent concentration.

Hazardous air pollutants (HAPs), or toxic air contaminants, have no established air quality standards, but have potential cancer and noncancer health effects that are evaluated on a case-by-case basis. Hazardous air pollutants are emitted from several sources including fossil fuel burning, paints, and thinners. HAPs expected during the Proposed Action include volatile compounds emitted during construction- and maintenance-related painting operations (e.g., xylenes, toluene, methyl ethyl ketone, etc.) and from gasoline- or diesel-powered engines (benzene).

5.4 HYDROLOGY AND WATER QUALITY

Federal statutes and Executive Orders, state statutes, and state agency regulations and directives protect water quality and the beneficial uses of water. EO 11988 (Floodplain Management) and EO 11990 (Protection of Wetlands) mandate control of activities that indirectly impact water quality. Applicable Orders and other directives are described in various sections of this PEA, where relevant.

5.4.1 Federal Requirements

The Clean Water Act (CWA) regulates water quality of all discharges into "waters of the United States (U.S.)." Both wetlands and "dry washes" (channels that carry intermittent or seasonal flow) are considered "waters of the U.S." Many states have adopted equivalent or more stringent statutes than those found in the Federal directives, which are enforced by State Water Resources Control Boards (SWRCBs) and Regional Water Quality Control Boards (RWQCBs). USACE may need to be contacted under Section 404 of the CWA if a VACIS installation requires the discharge of dredged or fill materials into the waters of the U.S.

5.4.2 State Requirements

The SWRCBs and RWQCBs work together to protect state water resources, and are responsible for establishing water quality standards and objectives that protect the beneficial uses of different waters. RWQCBs are responsible for protecting the surface, ground, and coastal waters from pollution originating from point sources (e.g., sewage treatment plant discharge) and nonpoint sources (e.g., runoff from urban paved areas). Modifications and/or new construction of a facility may require one or more of the following permits:

- National Pollution Discharge Elimination System (NPDES) General Permit

  This Permit may be required as a facility is constructed or moved and if the facility discharges any waters other than to the sanitary sewer.

- NPDES Stormwater Construction Permit

  This permit is required for any construction activity that will affect 1 acre or more, unless local restrictions impose a smaller acreage threshold. Specifically excluded is construction activity that includes "routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility."

- NPDES Stormwater Industrial Permit

  Stormwater permits are currently required for most industrial properties. If modifications are made or if an industrial facility is relocated, the permit must be modified to reflect these changes.

Some state Departments of Fish and Game regulate alterations made to natural waterways. Modifications or new construction of facilities that may impact the volume or quality of water entering a natural waterway (such as a culvert discharging into a "dry wash") may be required to obtain a Streambed Alteration Permit.

5.4.3 County and City Requirements

Counties and cities have developed general plans that include county-specific or city-specific descriptions of existing surface and groundwater resources. Some urbanized counties and municipalities have county-wide or area-wide stormwater permits that offer guidelines and restrictions to new development that may impact modifications or construction of new facilities. Additionally, some municipalities have adopted Watershed Management Plans that may regulate or restrict modification and/or construction of facilities that discharge into waters within their plan area.

5.5 FLOODPLAINS

The term "floodplain" generally refers to the 100-year floodplain. The 100-year floodplain designates the area subject to inundation from a flood having a 1 percent chance of occurring in any given year. This flood is referred to as the "100-year flood" or "base flood" and may occur more or less often than once every 100 years. In circumstances known as "critical actions", the regulated flood-prone area is defined by the 500-year floodplain. The 500-year floodplain designates the area subject to inundation from a flood having a 0.2 percent chance of occurring in any given year.

Floodplains are designated on National Flood Insurance Rate Maps (FIRMs) or Flood Hazard Boundary Maps (FHBMs) for communities that are members of the National Flood Insurance Program (NFIP). The NFIP and its implementing regulations (44 CFR Parts 59 through 77) stipulate minimum standards for floodplain development in communities that participate in the program. Local governments incorporate these standards, or in some cases more stringent standards, into their floodplain ordinances. In addition to showing the locations of the 100-year and 500-year floodplains, many FIRMs and FHBMs show the base flood elevation (BFE), which is the estimated elevation of the 100-year flood. FIRMs and FHBMs delineate floodplains with other descriptors; the most important of these are the floodway and the 100-year coastal, high hazard floodplain. The floodway is the channel of a river or other watercourse and adjacent land areas that are required to remain free from development to discharge the base flood without cumulatively increasing the water-surface elevation. The coastal floodplain incorporates storm surges and has more stringent statutes for development than the normal 100-year floodplain, because of the velocity of waves associated with coastal flooding.

The NEPA compliance process requires Federal agencies to consider direct and indirect impacts to floodplains that may result from Federally funded actions. EO 11988 requires Federal agencies to take action to minimize occupancy and modification of floodplains. Furthermore, EO 11988 requires that Federal agencies proposing to site a project in the 100-year floodplain must consider alternatives to avoid adverse effects and incompatible development in the floodplain. If no practicable alternatives exist to siting a project in the floodplain, the project must be designed to minimize potential harm to, or within, the floodplain. Furthermore, a notice must be publicly circulated explaining the project and the reasons for the project being sited in the floodplain.

5.6 THREATENED AND ENDANGERED SPECIES

The Endangered Species Act of 1973 (16 United States Code [USC] Sections 1531 to 1534) requires Federal agencies to determine the effects of their actions on threatened and endangered species of fish, wildlife, plants, and their habitats, and take steps to conserve and protect these species. This PEA assumes that CBP has requested consultations under Section 7 of the Endangered Species Act, as amended, for the installation of VACIS.

5.7 CULTURAL RESOURCES

In addition to review under NEPA, consideration of impacts to cultural resources is mandated under Sections 106 and 110 of the National Historic Preservation Act (NHPA) and implemented by 36 CFR Part 800. Requirements include identifying significant historic properties and districts that may be affected by the proposed actions or alternatives. Historic properties are defined in 36 CFR Part 60.4 as archaeological sites, standing structures, or other historic resources listed on, or determined potentially eligible for, the NRHP.

5.8 SOCIOECONOMICS

Impacts related to socioeconomic resources include changes to demographics, housing, employment, the local economy, and public safety hazards.

The U.S. Department of Commerce Bureau of the Census provides much of the relevant data on demographics and housing. Although only conducted once every 10 years, the U.S. census provides the most accurate and detailed information for the years that data were acquired. In addition, the census provides the basis for most projections and estimates prepared by national, state, local, and private organizations. State, county, and city information provide census data for political subdivisions of the country, for example. In addition, census data are provided by statistical subdivision that includes (in order of decreasing size) tracts, block-numbering areas, block groups, and blocks. These statistical subdivisions of counties were delineated to be homogeneous with respect to demographics, economic status, and living conditions. Most local governments have basic demographic, economic, and employment data based on these political subdivisions.

EO 12898 requires Federal agencies to make achieving environmental justice part of their mission by identifying and addressing disproportionately high and adverse public health or environmental effects of its programs, policies, and activities on minority and low-income populations. EO 12898 also tasks Federal agencies to ensure public notifications regarding environmental issues are concise, understandable, and readily accessible.

5.9 LAND USE AND ZONING

Generally, land use refers to the existing function of real property. Examples of the most common land use categories include residential, commercial, industrial, public (or institutional), recreational, agricultural, and open (or undeveloped). Many of these categories are further subdivided, for example, high-, medium-, and low-density residential or light and heavy industrial. Land uses are frequently regulated by management plans, policies, ordinances, and statutes that determine the types of uses that are allowable or that protect specifically designated or environmentally sensitive uses. Virtually every level of government regulates land use. At the Federal level, for example, land-use statutes range from the U.S. Department of Agriculture restrictions to avoid soil erosion, to the designation of wilderness areas. State Planning and Zoning Laws designate areas to be protected because of scenic and scientific value, forest and agricultural importance, and potentially hazardous conditions.

Land use regulation is most common at the local level. This local land use regulation, or zoning, is the designation given by a governmental unit to classify and regulate development. These zones generally use the same terms listed above for land uses. Most incorporated cities and the incorporated areas of many counties are subject to zoning ordinances. In addition to geographically defining these zones, zoning ordinances prohibit development that is inconsistent with land uses in the given district. For example, building an industrial facility in a low-density residential district would be prohibited in most city or county zoning ordinances. Compliance with zoning ordinances is enforced by local governments as part of the building permit process.

5.10 PUBLIC SERVICES AND PUBLIC SAFETY

This section considers the impacts to services provided by political jurisdiction, including police, fire, recreation, and education. Although usually provided by the private sector, medical services and utilities (including water, sewage, electricity, telephone, and natural gas) are considered public services when assessing a community's ability to handle infrastructure or demographic changes.

Guidelines and statutes regarding these resources are found at the local level. Local jurisdictions frequently establish building codes and other construction standards, and prescribe requirements for local police and fire protection. Many components of utility services are also regulated at the Federal and state level; however, these regulations do not generally apply to impacts caused by CBP actions considered in this PEA.

5.11 TRANSPORTATION

State Departments of Transportation are responsible for the design, construction, and maintenance of the state highway systems, including that portion of interstate highways within each state's boundaries. The U.S. Department of Transportation Federal Highway Administration (FHWA) provides funding and oversight of projects involving Federal highways. Transportation planning agencies of local governments are responsible for the design, construction, and maintenance of county and local roads. Public transportation is managed by private, public, and quasi-governmental agencies at the local level. Description of local transportation networks and impacts to traffic conditions caused by the installation and operation of VACIS will be addressed in individual SEDs.

5.12 NOISE

The Occupational Safety and Health Administration (OSHA) noise standard is the regulatory reference for hazardous occupational noise exposures. Other consensus standard organizations such as the American Conference of Governmental Industrial Hygienists (ACGIH) and the National Institute of Occupational Safety and Health (NIOSH) have equivalent recommended limits.

The OSHA standard for occupational noise exposure is found at 29 CFR 1910.95.[21] This standard requires personal dosimeter testing and the establishment of an effective hearing conservation program and additional testing if exposure levels to noise are at or above the "action level" of 85 dBA as an 8-hour time weighted average (TWA) exposure. 85 dBA is 50% of the OSHA permissible exposure limit (PEL) of 90 dBA as an 8-hour TWA. To determine the potential for high noise exposure and compliance with the OSHA noise standard, area sampling of noise at potential high noise sources are taken with a calibrated sound level meter (SLM) in an attempt to find areas with potential noise pressure generation of 85 dBA or greater. An SLM is a device that provides a reading of sound intensity at any given moment and location. If areas are found greater than 85 dBA, additional study and determination of actual employee exposure to the noise source is needed to determine an employee's full shift, 8-hour average exposure, with comparison of the results to the OSHA standard requirements. Noise levels that do not exceed 85 dBA are below the level of consideration and are acceptable occupational sound pressure levels. Below 85 dBA is a level where nearly all individuals may be repeatedly exposed without adverse effects on the ability to hear and understand normal speech.

The A-weighted scale of measurement (dBA – decibels measured on an A-weighted scale) represents sound level measurement of a wide range of frequencies in a manner representative of the human ear's response. This scale reduces the overall weight of the low and high frequencies with respect to the medium frequencies, to simulate the response and relative damage of human hearing to noise. Noise measurements for occupational exposure are primarily expressed in dBA.

The Noise Control Act (P.L. 92-574) and its implementing regulations at 40 CFR Parts 201 through 211 limit noise exposures to the human environment. Construction activities, the movement of rail equipment, and the operations of heavy trucks and truck mounted equipment are required to meet noise limits of the Noise Control Act regulations. In addition, local ordinances may require noise controls specific to their particular locales.

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[21] 29 CFR 1910.95, Occupational Noise Exposure

5.13 HAZARDOUS MATERIALS AND WASTES

Hazardous materials and wastes are regulated via a combination of Federally and state mandated laws. A hazardous substance is defined as:

- Any substance designated pursuant to Section 311(b)(2)(A) of the Clean Water Act, as amended (33 USC Section 466 et seq.)
- Any toxic pollutant listed under Section 307(a) of the Clean Water Act, as amended (33 USC Section 466 et seq.)
- Any element, compound, mixture, solution, or substance designated pursuant to Section 102 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended (42 USC Section 9601 et seq.)
- Any hazardous air pollutant listed under Section 112 of the Clean Air Act, as amended (42 USC Section 1857 et seq.)
- Any imminently hazardous chemical substance or mixture with respect to which the EPA has taken action pursuant to Section 7 of the Toxic Substance Control Act, as amended (15 USC Section 2601 et seq.)
- Any substance subject to management under Subtitle C of the Resource Conservation and Recovery Act (RCRA) as administered by the EPA Office of Solid Waste
- Any substance as defined by a State Code for Hazardous Waste Control.

Hazardous substances should be disposed of in accordance with all Federal and state hazardous waste regulations.

6 Environmental Consequences

For each specific VACIS installation, a site-specific SED will be prepared by CBP as described in Section 1.3 herein. Therefore, the potential impacts and mitigation measures described in this section would be augmented by a discussion of environmental consequences in each SED based on a specific project area.

6.1 GEOLOGY AND SOILS

6.1.1 No Action Alternative

Under the No Action alternative, current CBP inspection operations will continue as normal. There will not be a requirement for the facility construction or modification that may be associated with VACIS installation. Consequently, there will be no impact to geology or soils.

6.1.2 Fielding and Operation of VACIS

Preparing and installing the VACIS family of equipment will typically require minimal construction at CBP border crossings and POEs. Construction will typically occur on already-disturbed areas, is consistent with current land uses, and will be in accordance with all building codes and special earthquake provisions.

VACIS II and Mobile VACIS sites will typically be located at already-developed port and border stations that are paved with asphalt or concrete. The VACIS II operator station will be located in a permanent structure, semi-permanent structure, or mobile van. At those sites where the weather is often particularly harsh, entire VACIS II and Mobile VACIS systems may be located in an existing or newly-constructed building. In these cases, existing warehouse buildings may be used or the construction of prefabricated buildings on a concrete foundation may be preferred. In either case, excavation or removal of soil will typically be minimal.

Rail VACIS sites may be located at already-developed port and border stations that are paved with asphalt or concrete, or may also be located along railroad rights-of-way. These sites will typically require the construction of a small concrete pier extending into the ground at least 20 feet deep for installation of the detector array tower, the construction of a concrete pad for installation of the radiation source, and a small cleared site for the operator station. The operator station may be located in a permanent structure, semi-permanent structure, or mobile van, depending on local site requirements.

The proposed Pallet VACIS sites may already have established covered loading docks that will accommodate the equipment installation and elemental protection for the equipment and the operators. At a minimum, the Pallet VACIS will require a concrete pad large enough to accommodate the Pallet VACIS, Operator's Booth and maneuvering room for a forklift. The proposed location at the commercial loading docks will require electrical power for the Pallet system and Operator's booth.

Construction may cause potential short-term erosion and soil loss; however, applying appropriate best management practices (BMPs) during construction can mitigate these impacts. Impacts to geological resources and impacts from geo-hazards can be minimized by appropriate siting of facilities and by applying appropriate geo-technical construction. Furthermore, building design in compliance with EO 12699, "Seismic Safety of Federal and Federally Assisted or Regulated New Building Construction" and local codes and standards, can minimize effects of seismic activity.

6.2 AIR QUALITY

6.2.1 No Action Alternative

Under the No Action alternative, as congestion and traffic increase, air quality at POEs and border crossings will likely worsen as more trucks wait longer to pass through the inspection process. It should be noted, however, that the fielding and operation of VACIS systems will typically result in an increase in the number of vehicles inspected once inside the port facility, but will not typically affect the amount of time required for vehicles to cross the border or enter POEs.

6.2.2 Fielding and Operation of VACIS

In deploying VACIS, minimal quantities of fugitive dust (PM_{10}) may be produced as a result of construction activities. Other short-term impacts to air quality from construction activities include carbon monoxide and nitrogen oxides emissions resulting from fossil-fuel-burning construction vehicles and equipment, and emissions of reactive organic gases (ROGs) and hazardous air pollutants from paints, thinners, and other solvents used at construction sites. The implementation of BMPs during construction can keep emissions to negligible levels. Examples of BMPs for construction activities include watering disturbed areas, siting of staging areas to minimize fugitive dust, and keeping construction vehicle engines tuned properly. Quantities of these pollutants will likely be negligible.

6.2.3 Idling Vehicle Emissions Calculations

Air quality impacts resulting from motor vehicle emissions will primarily be the result of idling. As with driving emissions, idle emissions are affected by a number of parameters. For analyses not requiring detailed specific emission estimates tailored to local conditions, the summary of idle emission factors found in Tables III and IV can be used to obtain first-order approximations of emissions under idle conditions.

The following acronyms and abbreviations are used in the tables:

- CO: Carbon monoxide
- GVW: Gross vehicle weight
- NOx: Oxides of nitrogen (mostly NO and NO_2)

- PM_{10}: Particulate matter, diameter ≤ 10 microns
- psi: Pounds per square inch
- RVP: Reid vapor pressure, a common method of expressing the volatility (tendency to evaporate) of gasoline; RVP is vapor pressure measured at 100° F (38° C)
- VOC: Volatile organic compounds (for vehicles, this refers to exhaust emissions from incomplete combustion of gasoline, which is composed of a blend of hydrocarbon compounds).

Additionally, the following vehicle types are used in the tables:

- LDGV: Light-duty gasoline-fueled vehicles, up to 6000 lb Gross Vehicle Weight (GVW) (gasoline-fueled passenger car)
- LDGT: Light-duty gasoline-fueled trucks, up to 8500 lb GVW (includes pick-up trucks, minivans, passenger vans, sport-utility vehicles)
- HDGV: Heavy-duty gasoline-fueled vehicles, 8501+ lb GVW (gas heavy-duty trucks)
- LDDV: Light-duty diesel vehicles, up to 6000 lb GVW (passenger cars with diesel engines)
- LDDT: Light-duty diesel trucks, up to 8500 lb GVW (light trucks with diesel engines)
- HDDV: Heavy-duty diesel vehicles, 8501+ lb GVW (diesel heavy-duty trucks)
- MC: Motorcycles (only those certified for highway use; all gasoline-fueled)

The tables present emission factors, in grams per hour (g/hr) and grams per minute (g/min) of idle time, for volatile organic compounds (VOC), carbon monoxide (CO), and nitrogen oxides (NOx). Idle emissions of particulate matter (PM_{10}) are provided for heavy-duty diesel vehicles only; PM_{10} emissions from gasoline-fueled vehicles are negligible, especially when the elimination of lead in gasoline and reductions of sulfur content are considered. Emission factors are provided for both summer and winter conditions for VOC, CO, and NOx. These idle emission factors are from EPA's MOBILE5b highway vehicle emission factor model (VOC, CO, NOx) and EPA's PART5 model (PM_{10} for heavy-duty diesel vehicles only). These emission factors are national averages for all vehicles in the in-use fleet of 1 January 1998 (winter) or 1 July 1998 (summer). PM_{10} idle emission factors for heavy-duty diesels are as of 1 January 1998.

Table III: Idle emission factors, winter conditions (30° F, 13.0 psi RVP gasoline).

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	g/hr	21.1	30.7	44.6	3.63	4.79	12.6	20.1
	g/min	0.352	0.512	0.734	0.061	0.080	0.211	0.335

CO	g/hr	371	487	682	10.1	11.5	94.6	388
	g/min	6.19	8.12	11.4	0.168	0.191	1.58	6.47
NOx	g/hr	6.16	7.47	11.8	6.66	6.89	56.7	2.51
	g/min	0.103	0.125	0.196	0.111	0.115	0.945	0.042

Source: EPA420-F-014, Emission Facts, Idling Vehicle Emissions, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

Table IV: Idle emission factors, summer conditions (75° F, 9.0 psi RVP gasoline).

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	g/hr	16.1	24.1	35.8	3.53	4.63	12.5	19.4
	g/min	0.269	0.401	0.597	0.059	0.077	0.208	0.324
CO	g/hr	229	339	738	9.97	11.2	94.0	435
	g/min	3.82	5.65	12.3	0.166	0.187	1.57	7.26
NOx	g/hr	4.72	5.71	10.2	6.50	6.67	55.0	1.69
	g/min	0.079	0.095	0.170	0.108	0.111	0.917	0.028

Source: EPA420-F-014, Emission Facts, Idling Vehicle Emissions, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

6.2.3.1 Particulate Matter Emissions

The only vehicle category for which EPA has idle PM_{10} emission factors is heavy-duty diesels. Particulate emissions are also observed to be relatively insensitive to temperature, and so "winter" and "summer" emission factors for idle PM_{10} are the same. These emissions are summarized in Table V.

Table V: Particulate matter emission factors

Engine Size	Emissions
Light/Medium HDDVs (8501-33,000 lb GVW)	2.62 g/hr (0.044 g/min)
Heavy HDDVs (33,001+ lb GVW)	2.57 g/hr (0.043 g/min)
HDD buses (all buses, urban and inter-city travel)	2.52 g/hr (0.042 g/min)
Average of all heavy-duty diesel engines	2.59 g/hr (0.043 g/min)

Source: EPA420-F-014, Emission Facts, Idling Vehicle Emissions, United States EPA, Air and Radiation, Office of Mobile Sources, April 1998

6.2.3.2 Potential Vehicle Idling Emissions Resulting from the Operation of VACIS

Tables VI, VII, and VIII represent the idling vehicle emissions likely to result from the operation of VACIS. The shaded data in each table identify the worst-case scenario for each pollutant. Calculations were made based on the following assumptions:

1) VACIS processes 10 vehicles per hour;

2) VACIS will be operated during two 8-hour work shifts (16 hours) equaling 160 inspections per day;

3) At any given time during each work shift, one vehicle will be undergoing inspection by VACIS, and five vehicles will be queued for inspection;

4) The vehicle undergoing inspection and all queued vehicles will be idling; and, therefore

5) Calculated emissions are equivalent to six vehicles of each type shown idling simultaneously over a period of 16 hours per day.

Table VI: Idling emissions, winter conditions (30° F 13.0 psi RVP gasoline), January-June

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	lb/hr	0.282	0.408	0.588	0.048	0.066	0.168	0.264
	lb/day	4.512	6.528	9.408	0.768	1.056	2.688	4.224
	lb/half yr	823.44	1191.36	1716.96	140.16	192.72	490.56	770.88
	lb/yr	1646.88	2382.72	3433.92	280.32	385.44	981.18	1541.76
	tons/half yr	0.408	0.594	0.858	0.066	0.096	0.240	0.384
	tons/yr	0.816	1.188	1.716	0.132	0.192	0.480	0.768
CO	lb/hr	4.908	6.444	9.024	0.132	0.150	1.254	5.130
	lb/day	78.528	103.104	144.384	2.112	2.400	20.064	82.080
	lb/half yr	14331.36	18816.48	26350.08	385.44	438.00	3661.68	14979.60
	lb/yr	28662.72	37632.96	52700.16	770.88	876.00	7323.36	29959.20
	tons/half yr	7.164	9.408	13.170	0.192	0.216	1.830	7.488
	tons/yr	14.328	18.816	26.340	0.384	0.432	3.660	14.976
NOx	lb/hr	0.084	0.096	0.156	0.090	0.090	0.750	0.036
	lb/day	1.344	1.536	2.496	1.440	1.440	12.000	0.576
	lb/half yr	245.28	280.32	455.52	262.80	262.80	2190.00	105.12
	lb/yr	490.56	560.64	911.04	525.60	525.60	4380.00	210.24
	tons/half yr	0.120	0.138	0.222	0.126	0.126	1.092	0.048
	tons/yr	0.240	0.276	0.444	0.252	0.252	2.184	0.096

Table VII: Idling emissions, summer conditions (75° F 9.0 psi RVP gasoline), July-December

Pollutant	Units	LDGV	LDGT	HDGV	LDDV	LDDT	HDDV	MC
VOC	lb/hr	0.210	0.318	0.474	0.048	0.060	0.168	0.258
	lb/day	3.36	5.088	7.584	0.768	0.960	2.688	4.128
	lb/half yr	613.20	928.56	1384.08	140.16	175.20	490.56	753.36
	lb/yr	1226.40	1857.12	2768.16	280.32	350.40	981.18	1506.72
	tons/half yr	0.306	0.462	0.690	0.660	0.084	0.240	0.372
	tons/yr	0.612	0.924	1.380	1.320	0.168	0.480	0.744
CO	lb/hr	3.030	4.482	9.762	0.132	0.150	1.242	5.754
	lb/day	48.48	71.712	156.192	2.112	2.400	19.872	92.064
	lb/half yr	8847.60	13087.44	28505.04	385.44	438.00	3626.64	16801.68
	lb/yr	17695.20	26174.88	57010.08	770.88	876.00	7253.28	33603.36
	tons/half yr	4.422	6.540	14.250	0.192	0.216	1.812	8.400
	tons/yr	8.844	13.080	28.500	0.384	0.432	3.624	16.800
NOx	lb/hr	0.060	0.078	0.132	0.084	0.090	0.726	0.024
	lb/day	0.960	1.248	2.112	1.344	1.440	11.616	0.384
	lb/half yr	175.20	227.76	385.44	245.28	262.80	2119.92	70.08
	lb/yr	350.40	455.52	770.88	490.56	525.60	4239.84	140.16
	tons/half yr	0.084	0.108	0.192	0.120	0.126	1.056	0.030
	tons/yr	0.168	0.216	0.384	0.240	0.252	2.112	0.060

Table VIII: Particulate matter emissions (PM10), January-December

Pollutant	Units	Light/Medium HDDV	Heavy HDDV	HDD Buses	Average of all Heavy Duty Diesel Engines
PM10	lb/hr	0.036	0.036	0.036	0.036
	lb/day	0.576	0.576	0.576	0.576
	lb/half yr	105.12	105.12	105.12	105.12
	lb/yr	210.24	210.24	210.24	210.24
	tons/half yr	0.048	0.048	0.048	0.048
	tons/yr	0.096	0.096	0.096	0.096

6.2.4 Worst Case Idling Vehicle Emissions

Using an equal split of 6 months per "winter" and "summer" emissions factors, analysis of the data provided shows that the worst-case scenario (operating only that vehicle type with the highest emission rate) would result in the impacts as shown in Table IX.

Table IX: Worst case idling vehicle emissions

Pollutant	Units (tons/yr)	Vehicle Type
VOC	1.548	HDGV
CO	27.420	HDGV
NOx	2.148	HDDV
PM_{10}	0.096	All

Table X compares the data presented in Table XI with the conformity criteria for nonattainment areas. This comparison shows that the estimated yearly emissions attributable to idling vehicles are well below the allowable limits set in 40 CFR Part 93.153, *Determining Conformity of Federal Actions to State or Federal Implementation Plans* (the rule). The rule applies to those Federal actions which are located in areas of nonattainment of the NAAQS.

Table X: Conformity criteria for nonattainment areas

Pollutant	Criterion (tons/yr)	Worst Case Idling (tons/yr)
Ozone (VOCs or NOx):		1.548 (VOC); 2.148 (NOx)
- Serious NAAs	50	
- Severe NAAs	25	

Pollutant	Criterion (tons/yr)	Worst Case Idling (tons/yr)
- Extreme NAAs	10	
-Other ozone NAAs outside an ozone transport region	100	
-Marginal and moderate NAAs inside an ozone transport region		
CO: - All NAAs	100	27.420
SO2 or NO2: - All NAAs	100	
PM_{10}:		0.096
- Moderate NAAs	100	
- Serious NAAs	70	
Pb: - All NAAs	25	

Source: 40 CFR Part 93.153, Determining Conformity of Federal Actions to State or Federal Implementation Plans

The rates shown in Table XI are those applicable to maintenance areas. For ease of comparison, the worst case idling emission data from Table IX are also shown.

Table XI: Conformity criteria for maintenance areas

Pollutant	Criterion (tons/yr)	Worst Case Idling (tons/yr)
Ozone (NOx), SO2 or NO2: - All maintenance areas	100	2.148 (NOx)
Ozone (VOCs):		1.548
- Maintenance areas inside an ozone transport region	50	
- Maintenance area outside an ozone transport region	100	
Carbon Monoxide - All maintenance areas	100	27.420
PM_{10}: - All maintenance areas	100	0.096
Pb: - All maintenance areas	25	

Source: 40 CFR Part 93.153, Determining Conformity of Federal Actions to State or Federal Implementation Plans

6.3 HYDROLOGY AND WATER QUALITY

6.3.1 No Action Alternative

Under this alternative, impacts to water quality at existing POEs and border crossings will not change. Hydrology will not be impacted as a result of implementing the No Action Alternative.

6.3.2 Fielding and Operation of VACIS

Construction related to the installation of VACIS has the potential to cause increased runoff and sedimentation during construction, and in the period between construction and vegetation re-establishment. These impacts can be mitigated by implementing stormwater and erosion-control BMPs during construction. In general, construction BMPs include erosion-control and sediment-control techniques to limit the exposure and transport of sediment, methods to minimize contact of stormwater with construction materials and wastes, proper vehicle maintenance and fueling practices, and minimizing off-site tracking of sediment.

A National Pollution Discharge Elimination System (NPDES) General Permit or an NPDES Stormwater Construction Permit may be required for new construction. CBP will confer with Regional Water Quality Control Boards to determine permit requirements.

Due to minimal civil construction requirements associated with VACIS, surface runoff will be negligible. No impacts to hydrology are expected as a result of this alternative.

6.4 FLOODPLAINS

6.4.1 No Action Alternative

The No Action alternative would not result in direct or indirect impacts to floodplains.

6.4.2 Fielding and Operation of VACIS

Under this alternative, structures associated with the installation and operation of VACIS will be built in compliance with EO 11988 and 44 CFR Part 9; therefore, a Federally funded facility cannot be sited in a 100-year floodplain unless there are no reasonable alternatives. Except in these rare circumstances, there will be no impact to the floodplain.

If structures associated with the installation and operation of VACIS are constructed within a 100-year floodplain, the structures will be elevated or flood proofed in compliance with the National Flood Insurance Program and local floodplain ordinances. CBP will analyze and identify potential adverse impacts the VACIS installation might have on the floodplain. CBP would obtain the FEMA Flood Insurance Rate Map (FIRM) the Flood Boundary Floodway Map (FBFM) and the Flood Insurance Study (FIS) for the local site considered for construction of a VACIS facility. If a detailed map (FIRM or FBFM) is not available, CBP will consult an FEMA Flood Hazard Boundary Map (FHBM). The regulatory floodway would be identified, and the VACIS facility would be constructed such that there would be no encroachments upon the floodway, including fill, new construction, substantial improvements of structures or facilities, or other development that would result in any increase in flood levels within the community during the occurrence of the base flood (i.e., 100-year) discharge.

In compliance with 44 CFR Part 9, a notice will be publicly circulated explaining the project and identifying the reasons for the project being sited in the floodplain.

6.5 BIOLOGICAL RESOURCES

6.5.1 No Action Alternative

This alternative will have little or no impacts on biological resources in the project area.

6.5.2 Fielding and Operation of VACIS

Activities associated with this alternative are primarily construction-related and will not typically have an adverse affect on biological resources in the project area. Most of the construction will occur on concrete and asphalt surfaces in industrial sites. Construction of Rail VACIS installations may result in the disturbance of a limited amount of existing vegetation and the loss of associated wildlife habitat within the footprint of the detector array, radiation source, and operator station. Vegetation management within these areas will not have adverse effects on biological resources in the immediate vicinity of the Rail VACIS installation.

Construction and operation of VACIS will not have an impact on wetlands or waters of the U.S. If a project will affect wetlands, CBP will contact the USACE and local authorities to obtain a Section 404 Permit for wetland activities. CBP will mitigate damage to wetlands per the Section 404 Permit, and otherwise comply with EO 11990.

Permits from the USACE will be required if any streams or other watercourses are impacted. Coordination with the USFWS, state, and local authorities as well as compliance with local statutes, will be required.

6.6 THREATENED AND ENDANGERED SPECIES

6.6.1 No Action Alternative

Activities associated with the No Action alternative will not have an impact on proposed or listed threatened and endangered species.

6.6.2 Fielding and Operation of VACIS

Activities associated with this alternative are primarily related to construction and operation of VACIS in industrial settings (border crossings, POEs) and will not have an impact on proposed or listed threatened and endangered species.

Construction of Rail VACIS may disturb the area within the footprint of the detector array, radiation source, and operator station. The probability is low that the ingress and egress of equipment and personnel will adversely affect proposed or listed species present in the immediate vicinity of the Rail VACIS installation. Potential impacts will be short-term and may include disturbance/displacement of individuals, and incidental disruption of suitable habitat.

If Federally listed or proposed threatened and endangered species have the potential to be impacted, CBP will initiate consultation with the USFWS or the NMFS, in compliance with Section 7 of the Endangered Species Act. Potential impacts to Federally listed or proposed threatened and endangered species will be evaluated and documented in an SED.

6.7 CULTURAL RESOURCES

6.7.1 No Action Alternative

Under this alternative, CBP will not fund any alternative action and, as a result, no further cultural resources studies will be required under Section 106 of the National Historic Preservation Act (NHPA).

6.7.2 Fielding and Operation of VACIS

Activities associated with this alternative are primarily related to construction and operation of VACIS in industrial settings (POEs) and will not have an impact on sites which are listed on, or potentially eligible for, the National Register of Historic Places.

Construction of Rail VACIS may disturb the area within the footprint of the detector array, radiation source, and operator station. The probability is low that the ingress and egress of equipment and personnel will adversely affect historical resources in the immediate vicinity of the Rail VACIS installation.

If historical resources have the potential to be impacted, CBP will initiate consultation with the applicable SHPO, in compliance with Section 106 of the NHPA. Potential impacts to historical resources will be evaluated and documented in an SED. Similarly, CBP will examine such areas in compliance with Section 110 of the Act, which requires Federal agencies to assume responsibility for the preservation of historic properties under their purview.

6.8 SOCIOECONOMICS

6.8.1 No Action Alternative

Under the No Action alternative, CBP inspections of vehicles will be conducted as they are today and it is assumed that traffic will increase at POEs. Vehicle backups may worsen, if an increasing number of trucks require inspection, and they will wait longer to pass through the inspection process. This can result in adverse impacts to businesses that depend on the timely flow of goods across the border. As noted in Section 6.2.1 herein, the fielding and operation of VACIS will not typically impact (positively or negatively) the waiting time associated with entry into the U.S.

6.8.2 Fielding and Operation of VACIS

Population will not be impacted because this alternative is not expected to displace persons and business to other locations or attract new population to the project area. Housing resources will not be impacted because the population demand for these necessities is not expected to increase with this alternative. This alternative is not expected to impact property values. Impacts to the local economy, as a whole, will be negligible. Demographic and economic indicators for local residents will be studied to determine whether a disproportionate number (defined as greater than 50 percent) of minority or low-income persons may be adversely affected by the alternative. Potential environmental justice impacts (per EO 12898) will be addressed in each site-specific SED.

6.9 LAND USE AND ZONING

6.9.1 No Action Alternative

No change in land use and zoning will occur under the No Action alternative.

6.9.2 Fielding and Operation of VACIS

The installation and operation of VACIS proposed under this alternative will not impact land use or zoning. Buildings which currently comply with local zoning ordinances are not expected to impact land use or zoning as a result of making improvements. However, improvements are generally prohibited for properties with nonconforming uses unless the structure is brought into compliance. A nonconforming use is one that is currently out of compliance with the zoning ordinance, usually because the structure was built before the current zoning regulation was executed. In such cases, local governments may consider granting variances so that properties with nonconforming uses can be improved without making other structural changes necessary to comply with the zoning ordinance. Otherwise, CBP may seek a variance or an amendment to the zoning designation so that the proposed use complies.

6.10 PUBLIC SERVICES

6.10.1 No Action Alternative

The No Action alternative will not affect communities' requirements for public services.

6.10.2 Fielding and Operation of VACIS

Under this alternative, sufficient public service utility capacity will exist at POEs to adequately handle operation of VACIS installations.

6.11 TRANSPORTATION

6.11.1 No Action Alternative

Under the No Action alternative, it is assumed traffic will increase at POEs.

6.11.2 Fielding and Operation of VACIS

Temporary detours, traffic delays, and congestion may occur during construction activities. These temporary impacts will be mitigated by coordinating detour routes and signs with appropriate cognizant agencies.

6.12 NOISE

6.12.1 No Action Alternative

Under the No Action alternative, CBP-funded alternative actions will not be pursued and, therefore, will not generate any noise in addition to the noise already existing at POEs.

6.12.2 Fielding and Operation of VACIS

In considering the noise associated with VACIS II, Pallet VACIS, and Mobile VACIS operations, the installation of the Mobile VACIS may be considered the noisiest of the three, due to the fact that the Mobile VACIS operators are located physically closer to noise generators (Mobile VACIS and the vehicles being scanned) than in VACIS II and Pallet installations. Noise measurements were obtained for Mobile VACIS using an SLM, and the acquired data are presented in Table XII:[22]

Table XII: Mobile VACIS noise measurement data

Noise (dBA)	Operation	SLM Location
75	Mobile VACIS (truck engine) idling	1 ft from driver's side of Mobile VACIS truck
69	Mobile VACIS (truck engine) idling	22 ft from Mobile VACIS
84	Mobile VACIS equipment on idle mode	1 ft from Mobile VACIS motor
70	Mobile VACIS equipment on idle mode	22 ft from Mobile VACIS motor
70	Mobile VACIS scanning a vehicle	25 ft from Mobile VACIS

Based on the noise measurements, the detected noise level never exceeds the "action level" of 85 dBA for continuous noise, as specified by OSHA. As a result, the fielding and operation of VACIS II, Mobile VACIS and Pallet VACIS will not have a significant noise impact.

In considering the noise associated with Rail VACIS operations, 40 CFR Part 201.12 establishes noise standards for locomotive operations under moving conditions. Specifically, it states that locomotives manufactured on or before 31 December 1979 cannot produce sound levels in excess of 96 dBA measured at 100 feet, and that locomotives manufactured

[22] Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS); USCS; 15 February 2000; Page 4.

after 31 December 1979 cannot produce sound levels in excess of 90 dBA measured at 100 feet. Although Rail VACIS workers' noise exposures are not expected to be measured above the OSHA noise regulatory "action level" (i.e., 85 dBA for an 8-hour work shift), it is possible that transient loud noise from the movement of railroad locomotives and cars may require operators to wear acceptable hearing protection equipment during those parts of Rail VACIS operations.

Noise from the Mobile VACIS will not exceed limits from EPA Noise Control Act regulations in Title 40 Code of Federal Regulations (CFR) Part 205, "Transportation Equipment Noise Emission Controls." None of the VACIS configurations are anticipated to violate local Nuisance Noise ordinances.

6.13 HAZARDOUS MATERIALS AND WASTES

6.13.1 No Action Alternative

Under the No Action alternative, there will not be an increase, or a decrease, in the use of hazardous materials or the generation of hazardous wastes.

6.13.2 Fielding and Operation of VACIS

The construction of VACIS facilities has the potential to result in impacts from hazardous wastes or materials. Construction activities will follow legal requirements for storage, handling, use, and disposal of hazardous materials and wastes. Operation and maintenance of VACIS has little potential impact associated with hazardous materials and wastes. Activities including greasing of VACIS II tracks and refueling of Mobile VACIS will follow legal requirements for storage, handling, use, and disposal of hazardous materials and wastes.

6.14 RADIOLOGICAL IMPACTS

6.14.1 No Action Alternative

Under the No Action alternative, there will be no changes to the radiological consequences associated with current CBP methods for vehicle and cargo inspections.

6.14.2 Fielding and Operation of VACIS

Radiation is measured using units that people seldom encounter. It is important to relate the amount of radiation received by the body to its physiological effects. Two terms used to relate the amount of radiation received by the body are "absorbed dose" and "dose equivalent." The specific units of measurement are:

- rad – The term "rad" (radiation absorbed dose) is the special unit of absorbed dose of 100 ergs per gram.

  Different materials that receive the same exposure may not absorb the same amount of energy. The rad is the basic unit of the absorbed dose of radiation (i.e., alpha, beta, gamma, and neutron) to the energy they impart in materials. The dose of one rad indicates the absorption of 100 ergs per gram of absorbing material. One thousandth of a rad (millirad) is abbreviated "mrad," and one millionth of a rad (microrad) is abbreviated "μrad."

- rem – The term "rem" (Roentgen equivalent man) is a special unit used for expressing dose equivalent.

  Some types of nuclear radiation produce greater biological effects for the same amount of energy imparted than other types. The rem is a unit that relates the dose of absorbed radiation to the biological effect of that dose. Therefore, to relate the absorbed dose of specific types of radiation, a "quality factor" must be multiplied by the dose in rad. One thousandth of a rem (millirem) is abbreviated "mrem," and one millionth of a rem (microrem) is abbreviated "μrem." For the gamma rays used in VACIS, the quality factor is 1, meaning that 1 rad of dose results in 1 rem of dose equivalent.

  Dose equivalent (DE) in rem is the product of the amout of radiation absorbed in tissue, quality factor (QF), and each modifying factor (MF) at the location of interest. The formula for calculating dose equivalent is:

$$DE = rad \times QF \times MF.$$

6.14.2.1 Regulations and Dose Criteria

The Nuclear Regulatory Commission (NRC) promulgates regulations and establishes standards for protection against radiation arising out of activities conducted under licenses issued by the Commission. These requirements are set forth in 10 CFR Part 20.

In 10 CFR Part 20, the NRC identifies two classifications of radiation dose to people. The first classification, "occupational dose", is the dose received by an individual in a restricted area or in the course of employment in which the individual's assigned duties involve exposure to radiation and to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. It does not include the dose received from background radiation, as a patient from medical practices, from voluntary participation in medical research programs, or as a member of the general public. The individuals subject to the occupational dose classification must closely monitor their degree of radiation exposure using dosimeters.

The second radiation dose classification, "public dose", is the dose received by a member of the public from exposure to radiation and to radioactive material released by a licensee, or to another source of radiation either within a licensee's controlled area or in unrestricted areas. It does not include occupational dose or doses received from background radiation, as a patient from medical practices, or from voluntary participation in medical research programs. As promulgated by the NRC in 10 CFR Part 20, the maximum permissible level of radiation dose to individual members of the general public in unrestricted areas (i.e., Public Dose) is 100 mrem (100,000 μrem) per year above the typical 360 mrem (360,000 μrem) per year dose provided by natural background and man-made radiation.

In 10 CFR 20.1003, NRC defines the philosophy of "ALARA":

> "ALARA *(acronym for ''as low as is reasonably achievable'') means making every reasonable effort to maintain exposures to radiation as far below the*

> *dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest."*

As part of its ALARA program, CBP has determined that the radiation dose received by its personnel shall not exceed the allowable dose for individual members of the general public in unrestricted areas. As a result, CBP will establish a physical radiation safety exclusion zone around each VACIS installation, as described in Section 6.14.2.3 (Radiation Safety Exclusion Zones), to equally protect the general public and CBP personnel from radiation emissions in accordance with the maximum dose permitted under 10 CFR Part 20.[23]

6.14.2.2 Exposure Pathways

The radiation exposure pathway for the general public in unrestricted areas is created from exposure to scattered radiation from the radioactive source used in each VACIS configuration, while the shutter is open during cargo scanning operations. However, in all cases, the radiation dose received by the general public will not exceed 100 mrem (100,000 μrem) per year above typical background/man-made radiation, which is the whole body exposure limit for individual members of the general public.[24]

Since CBP has chosen the upper permissible level of radiation dose of its personnel to be the same as that of the general public in unrestricted areas, Customs Inspectors are not designated as occupational radiation workers. CBP has chosen the criterion of 2000 hours per year as the maximum expected exposure time (i.e., 8 hours a day, five days a week, 50 weeks per year)for its personnel (which is considered the worst-case exposure regime for any individual, general public or otherwise). Based on this time of exposure, and based on the Public Dose criterion of 100 mrem (100,000 μrem) per year, a typical Customs Inspector who is assigned at a VACIS operational site cannot experience a radiation dose greater than 0.05 mrem (50 μrem) per hour above typical background/man-made radiation.[25]

6.14.2.3 Radiation Safety Exclusion Zones[26]

In order to limit VACIS radiation dose to no more than 0.05 mrem (50 μrem) per hour above typical background/man-made radiation, CBP has established radiation safety exclusion zones for VACIS II, Mobile VACIS, Rail VACIS and Pallet VACIS. Neither the general public nor CBP personnel will be allowed in the radiation safety exclusion zones during VACIS operations. The radiation safety exclusion zones for the four VACIS configurations were established from field measurements conducted by a Certified Health Physicist, and are described in the following subsections.

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[23] E-mail received from Dr. Siraj M. Khan, Certified Health Physicist, USCS; 23 January 2001.

[24] Radiation Safety Guidelines for Gamma-Ray Imaging Systems; Dr. Siraj M. Khan, Certified Health Physicist, USCS; Page 9.

[25] Written comments received from Michael Terpilak, Certified Health Physicist, 14 August 2000.

[26] *Radiation Dose to Stowaways in Vehicles*; Dr. Siraj M. Khan, Certified Health Physicist, USCS; Dr. Paul Nicholas, USCS; Michael S. Terpilak, Certified Health Physicist, Consultant.

6.14.2.3.1 VACIS II

The radiation safety exclusion zone for VACIS II is 110 feet in length and 65 feet in width, as depicted in **Figure 8**. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.05 mrem (50 μrem) per hour above typical background/man-made radiation. Additional discussions regarding the VACIS II radiation source may be found in *Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; Date – 18 August 2000*, which is included as Appendix A.

6.14.2.3.2 Mobile VACIS

The radiation safety exclusion zone for Mobile VACIS is 50 feet in length and 50 feet in width, as depicted in **Figure 9**. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.05 mrem (50 μrem) per hour above typical background/man-made radiation. Additional discussions regarding the Mobile VACIS radiation source may be found in *Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; Date – 24 August 2000*, which is included as Appendix B.

6.14.2.3.3 Rail VACIS

The radiation safety exclusion zone for Rail VACIS is 50 feet in length and 20 feet in width, as depicted in **Figure 10**. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.05 mrem (50 μrem) per hour above typical background/man-made radiation. A "Registry of Radioactive Sealed Sources and Devices" document that addresses the Rail VACIS radiation source has not yet been issued to the public.

6.14.2.3.4 Pallet VACIS

The radiation safety exclusion zone for the Pallet VACIS system extends 3 feet directly behind the radiation source as shown in **Figure 11**. At the edges of this radiation safety exclusion zone, the radiation dose will not exceed 0.05 mrem (50 μrem) per hour above typical background/man-made radiation.

6.14.2.4 Effects of Irradiation on Cargo

The total radiation dose experienced by cargo subjected to VACIS II scanning is approximately 0.005 mrad (5 μrad) per scan, which is approximately five orders of magnitude less than the typical 360 mrad (360,000 μrad) per year dose experienced as a result of natural and man-made background radiation.

A CBP Memorandum for Record from Dr. Siraj M. Khan, Certified Health Physicist, dated 22 November 1999, addresses VACIS compliance with U.S. Food and Drug Administration regulations regarding irradiation of food. This memorandum states:

> *"Title 21, Part 179, Subpart B, Section 179.21, Paragraph (b) (2) (ii) of the Code of Federal Regulations (CFR) requires that a statement that no food shall be exposed to radiation sources listed in paragraph (a) (1) and (2) of that section so as to receive an absorbed dose in excess of 10 grays (1000 rads) be attached to equipment using these radiation sources.*

The Vehicle and Cargo Inspection System (VACIS) uses a sealed cesium-137 radiation source for the inspection of trucks, cargo containers, railcars and other vehicles. A radiation safety survey was performed in 1996 on a prototype VACIS using a one curie cesium-137 source. Subsequent calculations based on those measurements indicate that the radiation dose to food at the center of the truck is 5 microrad which is a billions [sic] times less than that allowed by this regulation. Details of these calculations are presented in the technical report entitled Radiation Safety Guidelines for a Contraband Detection System dated November, 1996. The radiation dose to food from mobile VACIS and railroad VACIS will be about 8 and 10 microrad, respectively, because they use 1.6 and 2 curie radiation sources.

Based on the above discussion, the VACIS equipment (fixed truck, mobile and railroad) is in full compliance with 21 CFR 179.21."

6.14.2.5 Effects of Irradiation on Persons

As stated in Section 6.14.2.1 (Regulations and Dose Criteria), the NRC has established the maximum allowable value of radiation dose that may be received by individuals in unrestricted areas (individual members of the general public) to be 100 mrem (100,000 µrem) per year above typical background/man-made radiation.

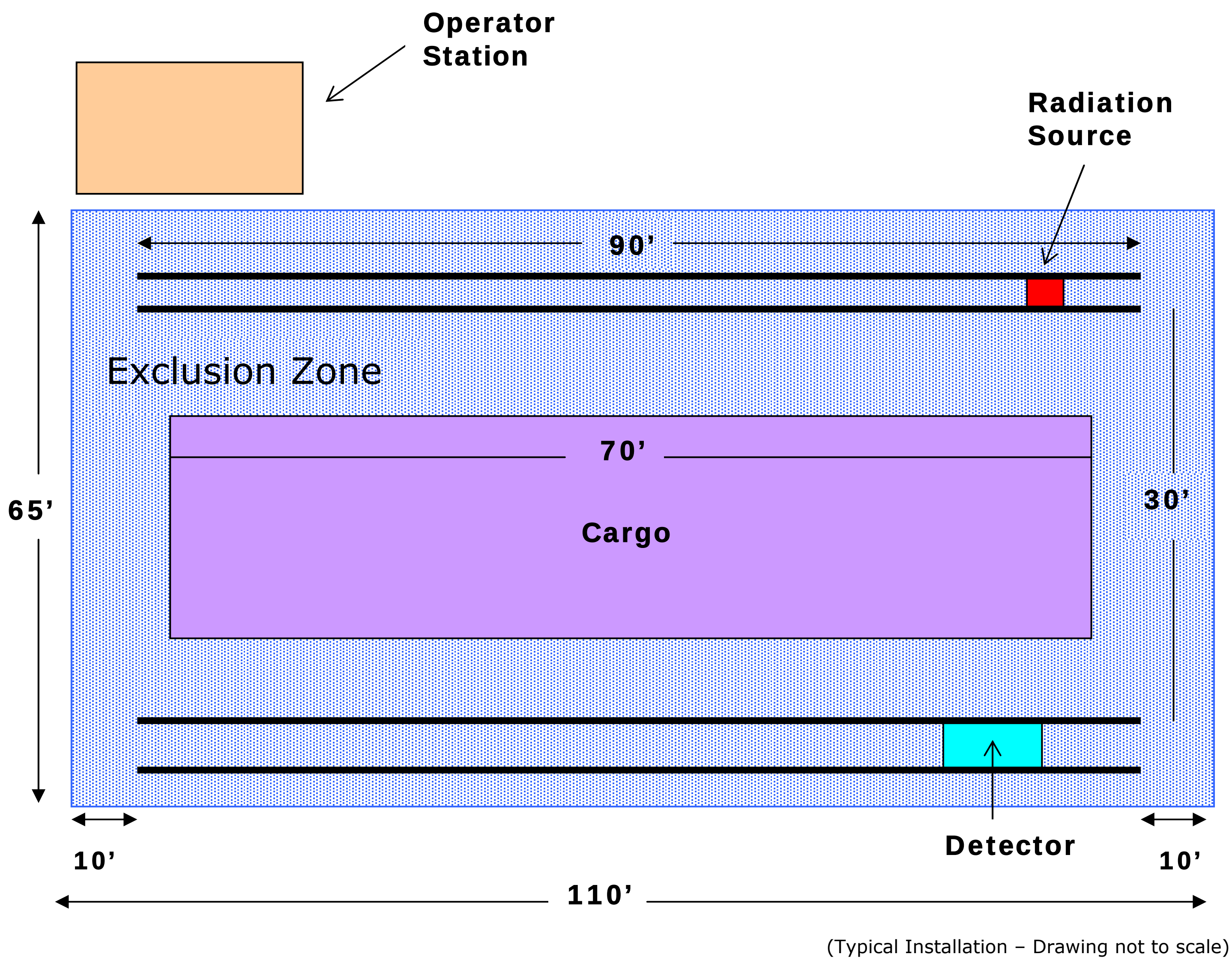

Figure 8: VACIS II radiation safety exclusion zone

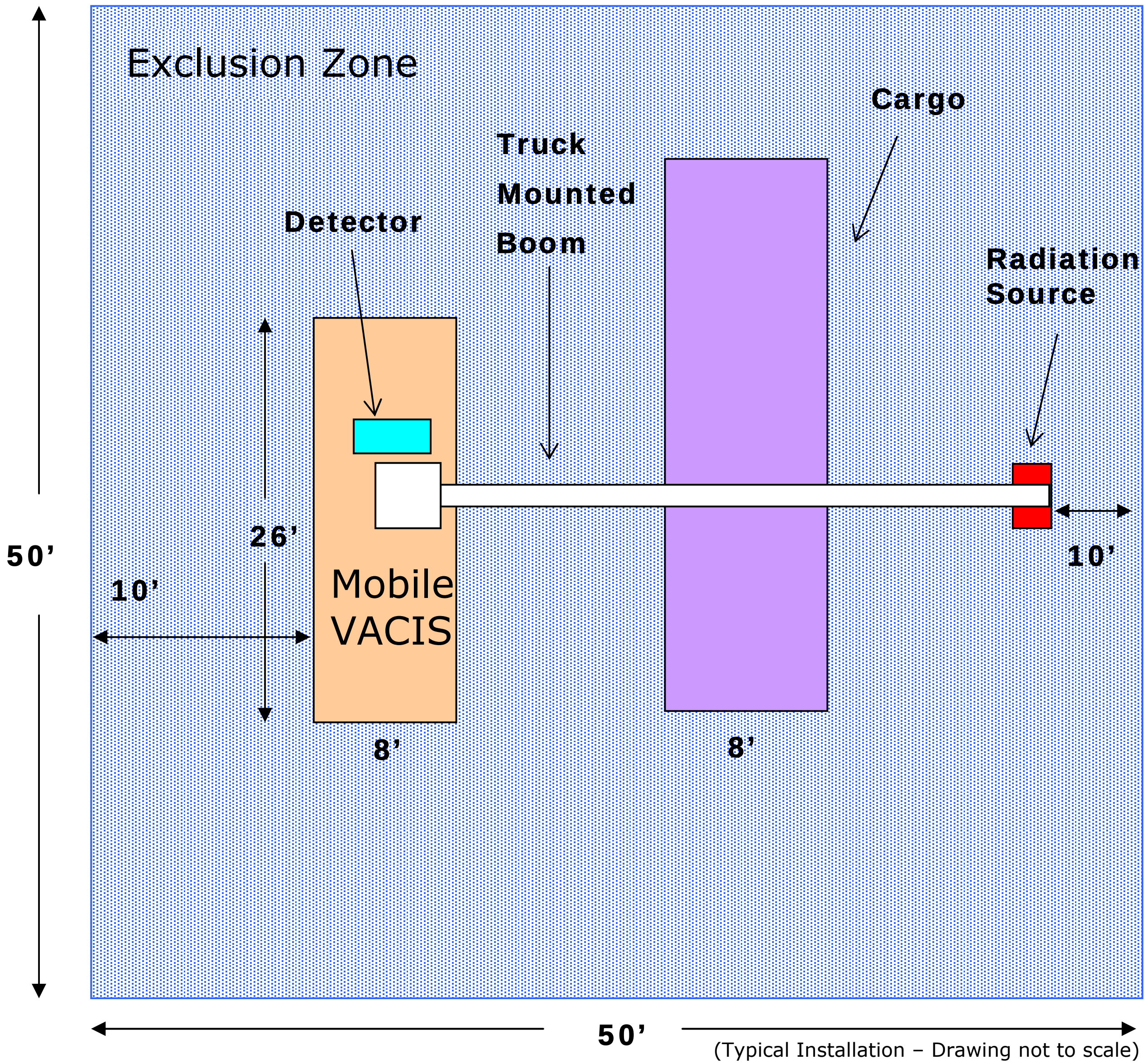

Figure 9: Mobile VACIS radiation safety exclusion zone

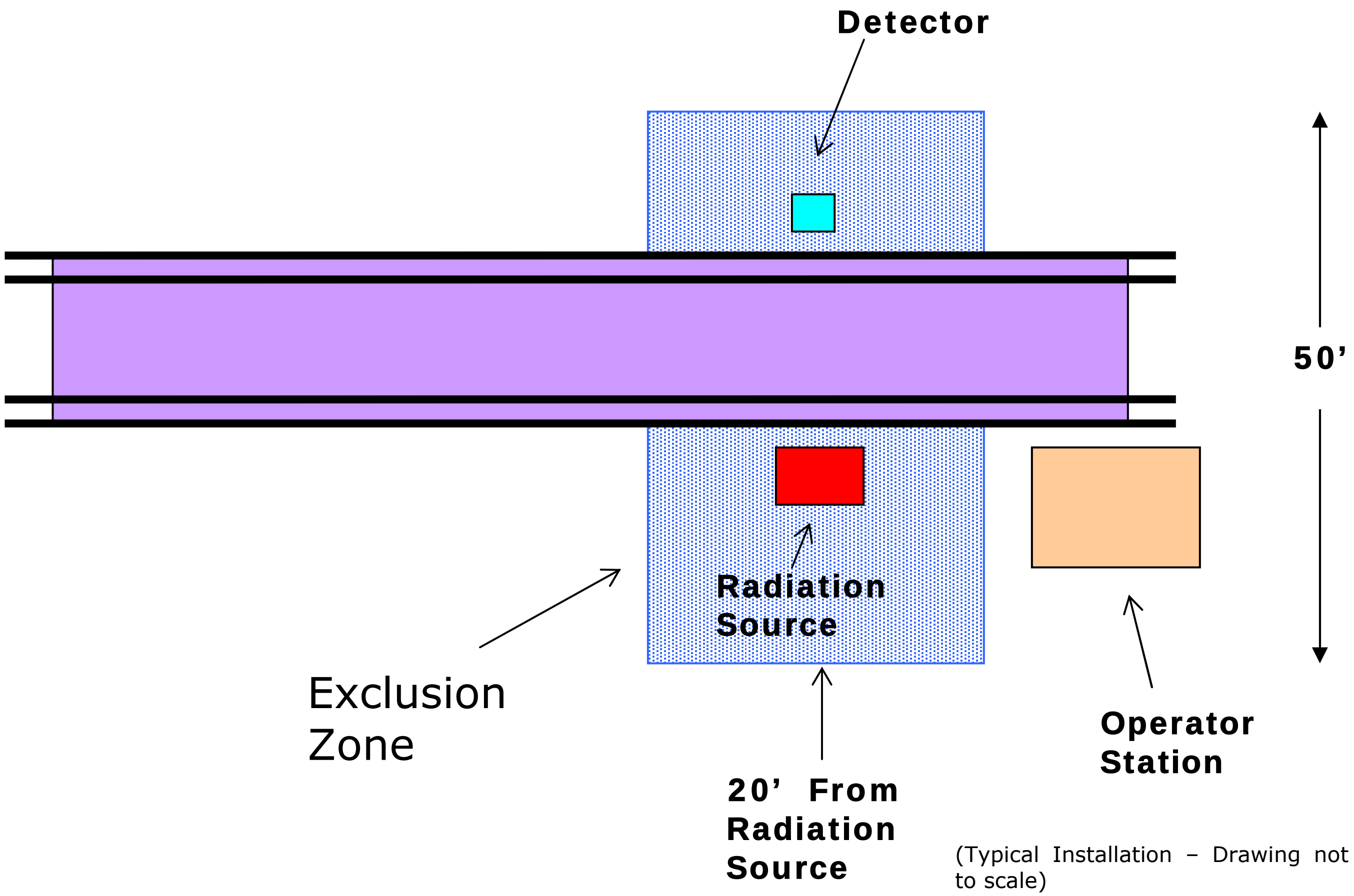

Figure 10: Rail VACIS radiation safety exclusion zone

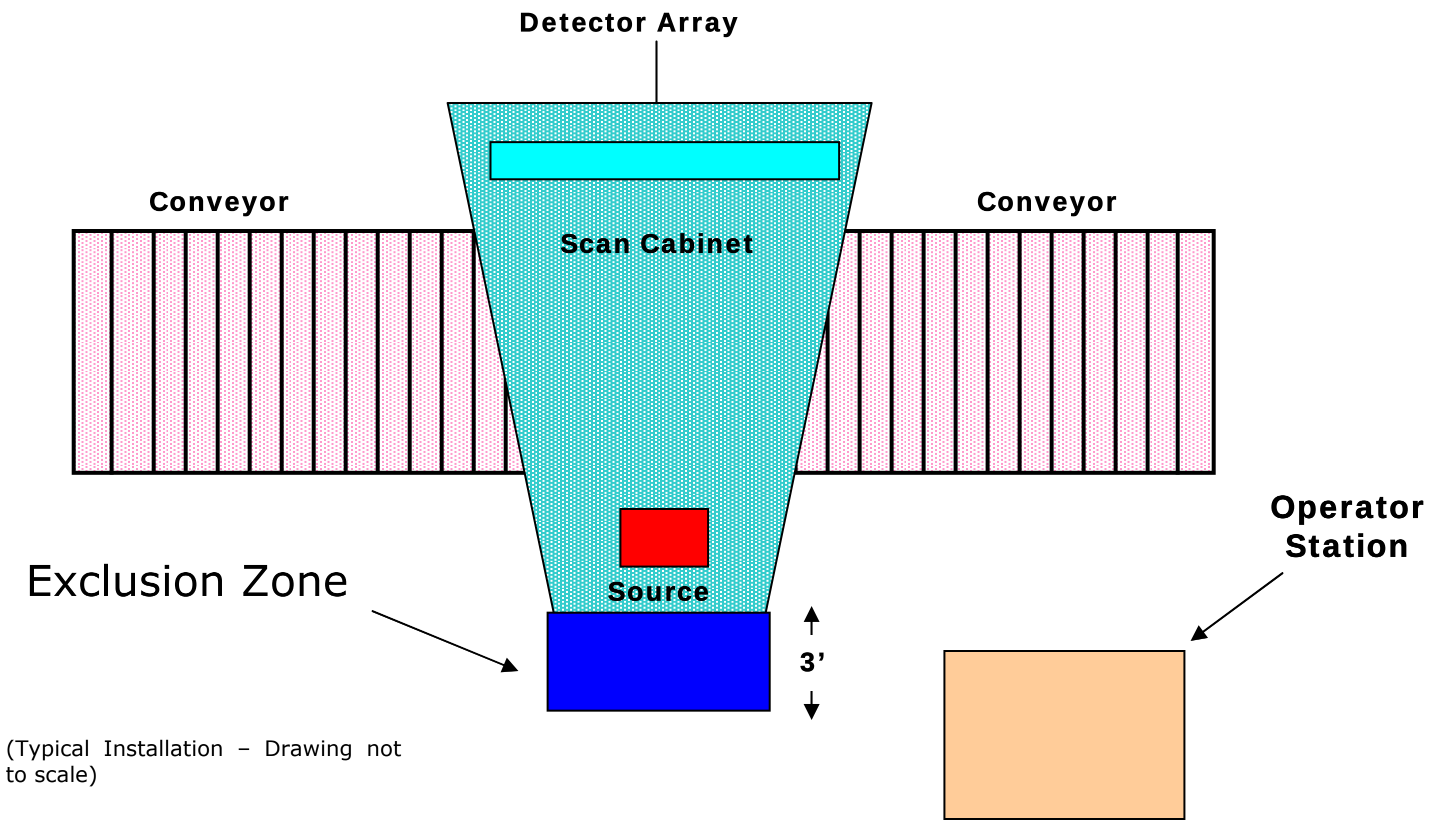

Figure 11: Pallet VACIS radiation safety exclusion zone

CBP conducted testing to determine the dose that a person hidden in cargo would experience during VACIS scanning operations.[27] Currently, this test has not been completed for the Pallet VACIS system. The data from this testing are presented in Table XIII.

Table XIII: VACIS radiation dose measurement data

VACIS Configuration	Maximum Measured Dose (µrem per scan)
VACIS II	5
Mobile VACIS	4
Rail VACIS	2.5

Assuming the worst case scenario (i.e., VACIS II at 5 µrem per scan), to reach the maximum allowable "per year" radiation dose, a person would have to be scanned 20,000 times per year (which equates to approximately 54 scans per day, every day, for one year). Since the chance of this frequency of exposure is extremely remote, it is concluded that VACIS radiation will not have a significant impact on persons located in scanned cargo.

6.14.2.6 Source Material Operations

6.14.2.6.1 Transportation

The VACIS ^{137}Cs radiation source has an effective operational life of 15 years, the ^{60}Co source has an effective operational life of 5 years, and the estimated operational lifetime of each VACIS configuration (exclusive of radiation source) is 30 years.[28],[29] Hence, transportation of the radiation source material separate from the VACIS equipment may only be required during installation at each VACIS site, during replenishment operations (transporting in the fresh source, and transporting out the spent source), and when each VACIS site is decommissioned. In this scenario, a total of four truck shipments per ^{137}Cs VACIS installation and twelve shipments per ^{60}Co VACIS installation would be expected on local and interstate highways over a 30-year time span. Since local roadways going to and from each planned VACIS site are typically heavily traveled by cargo and industrial traffic, four or twelve additional truck shipments over the 30 year timeframe are not expected to be noticeable in existing traffic. In all cases, the shipment of the source material will be in full and total compliance with U.S. Department of Transportation regulations.

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[27] *Radiation Dose to Stowaways in Vehicles*; Dr. Siraj M. Khan, Certified Health Physicist, USCS; Dr. Paul Nicholas, USCS; Michael S. Terpilak, Certified Health Physicist, Consultant.

[28] Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; 24 August 2000.

[29] Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; 18 August 2000.

Additionally, the source material will be transported within the Mobile VACIS equipment as it moves between sites. Though the movement of Mobile VACIS will be conducted at variable intervals, these movements will not have a significant impact on the heavy traffic typically experienced at POEs.

In all cases, the marking, packaging, and transportation of the source material in all VACIS configurations will be in full and total compliance with U.S. Department of Transportation regulations 49 CFR Part 172.310 "Class 7 (radioactive) Materials, Marking"; 49 CFR Part 173.471, "Packaging"; and 10 CFR Part 71, "Packaging and Transportation of Radioactive Material".

6.14.2.6.2 Installation

VACIS II and Rail VACIS components will be shipped individually, and assembled at the location where the system is to be used. No radiation exposure to VACIS personnel or to members of the public will result from either the shipment or assembly of the system because the radiation source will not yet have been installed in the system. Each $^{137}Cs/^{60}Co$ source will each be shipped in a shielded cask to the VACIS site, and will be installed in the VACIS equipment by the vendor, SAIC. Mobile VACIS will be shipped to its initial installation site as a unit with the ^{137}Cs source already installed by the vendor, SAIC.

6.14.2.6.3 Maintenance

CBP personnel will periodically perform limited maintenance on VACIS, such as lubricating the tracks on VACIS II and replacing small components such as light bulbs on all VACIS configurations. Whenever this maintenance is performed, the shutter on the $^{137}Cs/^{60}Co$ source shielded container will be kept in the closed position.

Non-routine maintenance will be performed by the vendor, SAIC. Whenever major disassembly of the VACIS equipment is required, the $^{137}Cs/^{60}Co$ source will be removed from the system and kept in a shielded storage cask.

6.14.2.6.4 Disposal

Each VACIS installation will generate radioactive waste in the form of either reusable or nonreusable ^{137}Cs radiation source material. The disposal of each form of radioactive waste is summarized below:

Radioactive source material not exceeding its useful life, in its sealed container, will be removed under health physics supervision and stored in a separate radiologically controlled location for future use or shipment. Packaging and off-site shipment of the radiation source material will follow U.S. Department of Transportation (DOT) regulations.

Radioactive source material exceeding its useful life, in its sealed container, will be packaged according to DOT specifications and shipped by the radiation source manufacturer to an approved disposal site.

6.14.2.7 Effects of Accidents

Under accident conditions associated with handling, storage, and use of the $^{137}Cs/^{60}Co$ source housing, it is unlikely that any person would receive an external radiation dose or dose commitment in excess of the dose to the appropriate organ as specified in Table XIV:[30]

Table XIV: Body dose accident data

Part of Body	Dose
Whole body; head and trunk; active blood-forming organs; gonads; or lens of eye.	15 rem
Hands and forearms; feet and ankles; localized areas of skin averaged over areas no larger than 1 cm^2 (0.15 in^2).	200 rem
Other organs.	50 rem

The worst Design Basis Accident is the open shutter scenario and the inability to close the shutter on the ^{137}Cs source shielded container. The recommended response for this situation is described in the USCS document *Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS)* dated 15 February 2000, which is included as Appendix C herein.

6.14.2.8 Radiation Safety

VACIS II, Mobile VACIS, Pallet VACIS and Rail VACIS all incorporate redundant safety controls, such as emergency shutoff pushbutton controls at several locations on the VACIS equipment. Additionally, in the event of a power loss, each VACIS configuration has a safe shutoff mode in which the shutter on the $^{137}Cs/\ ^{60}Co$ source shielded container automatically closes.

The personnel assigned to operate VACIS will be specifically trained for safe gamma radiation system operations. Training for the VACIS operators will consist of lectures and courses in basic radiation physics, radiation safety, biological effects of radiation, instrumentation, radiation control, and operating procedures during normal and emergency conditions.

6.14.2.9 Licensing

CBP currently holds an NRC Materials License for $^{137}Cs/\ ^{60}Co$ sealed sources (License number 08-17447-01, Amendment 15) issued on 11 December 2001 and with an expiration date of 31 August 2003. A copy of this license is included as Appendix D. The NRC requires that CBP be in full and total compliance with the Materials License and all of the 28 conditions as specified in the license in addition to all statements, representations, and procedures in the license's application and correspondence as indicated on Page 8 of the

[30] Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; 18 August 2000.

license. Nuclear Regulation (NUREG)-1556, Volume 4, October 1998, entitled *Program-Specific Guidance About Fixed Gauge Licenses*, will then automatically become a condition of CBP's license.

7 Decommissioning Planning

The NRC has established technical and financial regulations for decommissioning licensed nuclear facilities (53 CFR Part 24018, 27 June 1988). These regulations address decommissioning planning, needs, timing, funding methods, and environmental review requirements for public and private facilities having licenses under 10 CFR Parts 30, 40, 50, 70, and 72. The intent of the regulations is to ensure the decommissioning of all licensed facilities will be accomplished in a safe and timely manner, and that licensees will provide adequate funds to cover all costs associated with decommissioning.

The regulations specify that a facility licensee either must set aside money for decommissioning activities or must provide a guarantee, through a third party, that funds will be available. The funds set aside or guaranteed are determined by a Decommissioning Funding Plan (DFP), which the licensee provides. The requirements for financial assurance are specific to the types and quantities of byproduct material authorized on a license, and a licensee does not need to take any action to comply with the financial assurance requirements if the total inventory of licensed material does not exceed the thresholds specified in 10 CFR Parts 30.35(b) and 30.35(d). For ^{137}Cs, this threshold is 100,000 curies. Because CBP's inventory of ^{137}Cs/ ^{60}Co does not exceed the 100,000 curie threshold, the financial assurance requirements do not apply to the VACIS program.

The NRC requires licensees to maintain, in an identified location, records important to facility decommissioning. These records include architectural drawings of structures and equipment where each radiation source was used or stored. In addition, if fixed radiation sources have experienced unusual occurrences (e.g., leaking radiation sources or other incidents that involve spread of contamination), records need to be maintained describing contamination that remains after cleanup or that may have spread to inaccessible areas. CBP will maintain these records for each VACIS installation, in accordance with NRC requirements.

It is difficult to estimate the useful lifetime of a VACIS installation prior to any decommissioning because

1) the degree and duration of user demand for gamma imaging technology is unknown, and
2) all that may be needed to extend the operational life of the VACIS equipment is a replacement radiation source sealed container.

Additionally, future development of gamma imaging technology may enable upgrades to be made to an existing VACIS installation, thereby extending its useful lifetime.

However, it remains worthwhile to consider decommissioning procedures that may be necessary for a VACIS installation approximately 30 years after first operation. Potential decommissioning procedures are summarized below:

- Components such as detector array towers, rails, and Mobile VACIS would be removed to a temporary storage area for possible reuse at another VACIS installation.
- Radiation source material not exceeding its useful life, in its sealed container, would be removed under health physics supervision and stored in a separate radiologically controlled location for future use or shipment. Packaging and off-site shipment of the radiation source material would follow U.S. Department of Transportation (DOT) regulations.
- Radiation source material exceeding its useful life, in its sealed container, would be packaged according to DOT specifications and shipped by the radiation source material manufacturer to an approved disposal site.

Because no parts of building structures or equipment will be contaminated from exposure to radiation, they would be available for reuse. Hardware and equipment would be processed using standard CBP procedures for disposition of excess government-owned property.

Section 8

8. Persons and Organizations Contacted

The following individuals, shown in alphabetical order, were contacted during the development of the VACIS PEA:

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John King
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National Oceanic & Atmospheric Administration
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Section 9

9. Acronyms and Abbreviations

Term	Description
'	Feet
^{137}Cs	Cesium-137
A/amp	Amperes
ACGIH	American Conference of Governmental Industrial Hygienists
ACHP	Advisory Council on Historic Preservation
ALARA	As Low As Reasonably Achievable
APE	Area of Potential Effect
AQMD	Air Quality Management District
B	Billion
BFE	Base Flood Elevation
BMP	Best Management Practice
CA	California
CAA	Clean Air Act
CAAA	Clean Air Act Amendment
CBP	Customs and Border Protection
CE	Categorical Exclusion
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, And Liability Act
CFR	Code of Federal Regulations
cm^2	Square centimeter
CO	Carbon monoxide

Term	Description
^{60}Co	Cobalt-60
CTAC	Counterdrug Technology Assessment Center
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	Audio decibel
DE	Dose Equivalent
° C	Degrees Celsius
° F	Degrees Fahrenheit
DFP	Decommissioning Funding Plan
DNL	Day-Night Average Sound Level
DOT	U.S. Department of Transportation
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
FHBM	Flood Hazard Boundary Map
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FL	Florida
FONSI	Finding Of No Significant Impact
FR	Federal Register
FY	Fiscal year
g/hr	Grams per hour
g/min	Grams per minute
GA	Georgia
GVW	Gross vehicle weight
HDD	Heavy-duty diesel
HDDV	Heavy-duty diesel vehicle
HDGV	Heavy-duty gasoline-fueled vehicle

Term	Description
HPU	Hydraulic Power Unit
Hz	Hertz
in^2	Square inch
LA	Louisiana
lb	Pounds
LDDT	Light-duty diesel truck
LDDV	Light-duty diesel vehicle
LDGT	Light-duty gasoline-fueled truck
LDGV	Light-duty gasoline-fueled vehicle
M	Million
MC	Motorcycle
MF	Modifying Factor
mg/m^3	Milligram per cubic meter
MI	Michigan
mph	Miles per hour
mrad	Millirad (equals 0.001 of a rad)
µrem	Microrem (equals 0.000001 or a rem)
mrem	Millirem (equals 0.001 of a rem)
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standards
NCA	Noise Control Act of 1972
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act of 1966
NII	Non-Intrusive Inspection
NIOSH	National Institute of Occupational Safety and Health
NJ	New Jersey
NM	New Mexico
NMFS	National Marine Fisheries Service

Term	Description
NO	Nitrogen oxide
NO_2	Nitrogen dioxide
NO_x	Oxides of nitrogen
NPDES	National Pollution Discharge Elimination System
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NSR	New Source Review
NUREG	Nuclear Regulation
NY	New York
O_3	Ozone
ONDCP	Office of National Drug Control Policy
OSHA	Occupational Safety and Health Administration
Pb	Lead
PEA	Programmatic Environmental Assessment
PEL	Permissible exposure limit
PLC	Programmable Logic Center
$PM_{2.5}$	Particulate matter less than 2.5 micrometers in diameter
PM_{10}	Particulate matter less than 10 micrometers in diameter
POEs	Ports of Entry
ppm	Parts per million
PR	Puerto Rico
psi	Pounds per square inch
QF	Quality Factor
Rad	Radiation absorbed dose
RCRA	Resource Conservation and Reclamation Act
Rem	Roentgen equivalent man
ROG	Reactive Organic Gas
RVP	Reid vapor pressure
RWQCB	Regional Water Quality Control Board

Term	Description
SAIC	Science Applications International Corporation
SC	South Carolina
SCP	System Control Panel
SED	Supplemental Environmental Document
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLM	Sound level meter
SO_2	Sulfur dioxide
SWRCB	State Water Resources Control Board
TMEC	Thunder Mountain Evaluation Center
TWA	Time weighted average
TX	Texas
$\mu g/m^3$	Microgram per cubic meter
µrad	Microrad
µrem	Microrem
US	United States
USACE	U.S. Army Corps of Engineers
USC	United States Code
USCS	U.S. Customs Service
USFWS	U.S. Fish and Wildlife Service
VA	Virginia
VAC	Volts alternating current
VACIS	Vehicle and Cargo Inspection System
VOC	Volatile organic compounds
yr	Year

Section

10

10. List of Preparers

The following individuals, shown in alphabetical order, prepared the VACIS PEA

Ronald Bentley – Mr. Bentley is a Program Managger and Senior Scientist with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has a Bachelor of Science degree in Chemical Engineering and a Master of Science degree in Aerospatial Engineering.

David Houde – Mr. Houde is a Senior Engineer formally with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has a Bachelor of Science degree in Electrical Engineering.

Scott Matthews – Mr. Matthews is an Environmental Analyst formally with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has a Bachelor of Science degree in Public Affairs / Environmental Science and Management.

Tania McDonald – Ms. McDonald is an Environmental Analyst formally with Veridian Corporation (now General Dynamics – Advanced Information Systems). She has a Bachelor of Science degree in Environmental Science & Management, and a Master of Science degree in Environmental Management.

Thomas "Chico" Nelson – Mr. Nelson is an Environmental Analyst formally with Veridian Corporation (now General Dynamics – Advanced Information Systems).

Steven Samnick – Mr. Samnick is a Program Manager and Senior Scientist with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has a Bachelor of Science degree in Mathematical Physics.

Bill Snow – Mr. Snow is a Program Manager with Veridian Corporation (now General Dynamics – Advanced Information Systems).

Michael Terpilak – Mr. Terpilak is a radiation safety specialist with Ray-Safe Associates, Silver Spring, Maryland. He is a Certified Health Physicist.

Skip Wallace – Mr. Wallace is a Senior Research Analyst with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has Bachelor of Science, Occupational Safety and Health with a minor in Chemistry

David Walls – Mr. Walls is a Program Manager formally with Veridian Corporation (now General Dynamics – Advanced Information Systems). He has a Master of Science degree in Environmental Management.

Richard Whitman – Mr. Whitman is a Radiation Safety Officer with the Bureau of Customs and Border Protection Safety Branch, Indianapolis, Indiana.

Appendix
A

Appendix "A"

Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – VACIS II; No. CA0215D104G; Date – 18 August 2000

Appendix
B

Appendix "B"

Registry of Radioactive Sealed Sources and Devices; Safety Evaluation of Device; Model – Mobile VACIS; No. CA0215D103S; Date – 24 August 2000

Appendix

C

Appendix "C"

Recommended Operating Procedures for the Vehicle and Cargo Inspection System (VACIS)

Appendix
D

Appendix "D"

NRC Materials License for 137Cs/ 60Co sealed sources (License number 08-17447-01, Amendment 15)