Final Programmatic Environmental Assessment for Deployment and Operation of Low Energy X-Ray Inspection Systems at U.S. Customs and Border Protection Operational Areas

April 2012

U.S. Customs and Border Protection

DEPARTMENT OF HOMELAND SECURITY
U.S. CUSTOMS AND BORDER PROTECTION
OFFICE OF INFORMATION AND TECHNOLOGY
LABORATORIES AND SCIENTIFIC SERVICES
INTERDICTION TECHNOLOGY BRANCH

FINAL

Final Programmatic Environmental Assessment for Deployment and Operation of Low Energy X-Ray Inspection Systems at U.S. Customs and Border Protection Operational Areas

DEPARTMENT OF HOMELAND SECURITY
U.S. CUSTOMS AND BORDER PROTECTION
OFFICE OF INFORMATION AND TECHNOLOGY
LABORATORIES AND SCIENTIFIC SERVICES
INTERDICTION TECHNOLOGY BRANCH

April 2012

Lead Agency: U.S. Department of Homeland Security
U.S. Customs and Border Protection
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch
1300 Pennsylvania Avenue, N.W.
Washington, D.C. 20229

Point of Contact: David Duncan
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch
1300 Pennsylvania Avenue, N.W., Suite 1575
Washington, D.C. 20229

U.S. Department of Homeland Security
Washington, DC 20229

U.S. Customs and
Border Protection

April 13, 2012

Subject: Notice of Availability of the Finding of No Significant Impact and Final Programmatic Environmental Assessment for Deployment and Operation of Low Energy X-Ray Inspection Systems at U.S. Customs and Border Protection Operational Areas

Dear Reader,

The U.S. Customs and Border Protection (CBP), Office of Information and Technology (OIT), Laboratories and Scientific Services (LSS), Interdiction Technology Branch (ITB) has prepared a Final Programmatic Environmental Assessment (PEA) to address the potential effects of establishing Low Energy X-Ray Inspection Systems at various CBP operational areas throughout the United States. The purpose of the Proposed Action is to non-intrusively inspect vehicles at CBP operational areas for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. Through the development of the Final PEA, it has been determined that a Finding of No Significant Impact (FONSI) will result from implementation of the Proposed Action.

A Draft PEA was published and made available for 30 days to the public for review and comment beginning January 18, 2012. A notice of availability of the Draft PEA was published in the Federal Register. Comments received were evaluated and incorporated into the Final PEA, if applicable. A notice of availability of the Final PEA and FONSI will be published in the Federal Register.

The Final PEA and FONSI can be obtained from CBP/OIT/LSS/ITB 1300 Pennsylvania Avenue, NW, Suite 1575, Washington, DC 20229, telephone (202) 344-1527, facsimile (202) 344-1418. The PEA can also be viewed and downloaded, via the internet, at the following addresses: http://ecso.swf.usace.army.mil/Pages/Publicreview.cfm or www.dhs.gov/nepa.

FINDING OF NO SIGNIFICANT IMPACT
Programmatic Environmental Assessment
for Low Energy X-Ray Inspection Systems at
U.S. Customs and Border Protection Operational Areas

U.S. Customs and Border Protection
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Background: U.S. Customs and Border Protection (CBP) is charged with the dual mission of securing the Nation's borders while facilitating legitimate trade and travel. This mission is accomplished through CBP's six operational offices: the Office of Border Patrol, the Office of Field Operations, the Office of Air and Marine, the Office of International Affairs, the Office of Internal Affairs, and the Office of International Trade. CBP's Strategic Plan, *Secure Borders, Safe Travel, Legal Trade, U.S. Customs and Border Protection Fiscal Year 2009-2014 Strategic Plan* identifies the agency's progress in protecting the nation from the threats of global terrorism, illegal migration, and trafficking of narcotics and other contraband; protecting the United States economy by enforcing trade laws, intellectual property rights, and collection of revenue on goods imported into the United States; protecting our food supply and agricultural industry from pests and disease; and increasing the security of our air space.

Use of the low energy X-ray inspection systems (LEXRIS) at CBP operational areas directly supports CBP's mission of securing the borders and the homeland from terrorists and other threats.[1] In addition, the operation of LEXRIS will further the mission of CBP by assisting CBP personnel in preventing contraband, including illegal drugs and terrorist weapons from entering the United States, while also facilitating the flow of legitimate trade and travel.

Purpose and Need: The purpose of the Proposed Action is to non-intrusively scan vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. The LEXRIS is a technology employed by CBP to detect contraband hidden within conveyances located at CBP operational areas. LEXRIS systems are needed because they fill a unique capability to detect objects, as well as provide clear, high quality images of organic objects, that are not effectively visualized by other non-intrusive inspection (NII) technologies currently utilized by CBP or that may be more difficult to find by other search techniques used by CBP.

Alternatives: Two alternatives were addressed in the programmatic environmental assessment (PEA):

1. Fielding and Operation of LEXRIS at CBP operational areas in the United States; and
2. The No Action Alternative.

Proposed Action: The Proposed Action consists of the deployment and operation of LEXRIS at CBP operational areas in the United States for the purpose of conducting searches of passenger vehicles and buses (vehicles) for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. Two different models of the LEXRIS are available. One system is mobile, mounted on a truck or van type platform and will be used at CBP operational areas by driving the system along parked vehicles to be scanned. The driver and passenger(s) will exit the parked vehicle and be escorted to outside of the controlled area before the vehicle is scanned by the mobile system. The other system will be a portal (stationary) configuration that will be installed along an existing traffic lane. Vehicles will be scanned as they are driven through the

[1] Examples of a CBP operational area include, but are not limited to, ports of entry, CBP checkpoints, and at events designated as national special security events.

portal. Occupants of the passenger vehicle will have the option to remain in the vehicle while the driver drives it through the portal or exit the vehicle and have the CBP personnel drive it through the portal. However, when using the portal LEXRIS to scan a bus, all bus passengers will be required to exit the bus due to CBP processing requirements and the bus driver will have the option of driving the bus through the portal or have CBP personnel drive it through the portal.

No Action Alternative: The No Action Alternative is to continue to search vehicles at CBP operational areas with existing technology, equipment and methods. This process involves visual and manual searches with a limited number of tools. This approach is not as efficient and effective at detecting the range of materials that could be detected with low energy X-ray technology in addition to current search techniques. Furthermore, it would not reduce the need for CBP personnel to enter potentially dangerous situations to carry out these searches. The No Action Alternative does not meet the purpose and need; however, it serves as a basis of comparison to the Proposed Action as required by Council on Environmental Quality (CEQ) regulations.

Other Alternatives Considered: Seven additional alternatives were evaluated on their ability to provide CBP with the capability to inspect vehicles for the presence of contraband:

3. X-Ray Imaging Systems
4. Gamma Imaging Systems
5. Trace-Chemical Detection Systems
6. Millimeter Wave Systems
7. Low-power Microwave Systems
8. Ultrasonic Imaging Systems
9. Quadrupole Resonance Imaging Systems

Each of the alternatives was evaluated on its ability to provide the required functional capability to support CBP's mission. All of the additional alternatives were determined to not be functionally viable in meeting the mission requirement for the following reasons and therefore were not carried forward for detailed analyses:

- Alternative (3), X-ray imaging systems, and Alternative (4), gamma imaging systems do not provide the full imaging capabilities achieved by the preferred alternative, including providing a clear high quality image of organic objects; they require control areas that could not be accommodated within the limited space available at CBP operational areas.
- Alternative (5), trace-chemical detection systems, requires either physical contact to collect samples of trace materials or uses gentle streams of air to dislodge and collect particles from the exterior surfaces of objects. Trace-chemical detection systems would not be able to determine the presence of contraband that may be concealed inside a vehicle where physical contact or use of a gentle stream of air was not possible. The possibility of contamination would need to be resolved.
- Alternative (6), millimeter wave systems, and Alternative (7), low-power microwave systems, do not have the power to penetrate metal objects, such as vehicles. They are further limited in their ability to scan vehicles in motion. While some are under review by DHS, none are likely to be available for fielding for years to come, if ever, and at this time do not appear to work for the needed operation at CBP operational areas.
- Alternative (8), ultrasonic imaging systems require contact with the target. This is not practical for vehicle searches.

- Alternative (9), quadrupole resonance imaging is susceptible to radio frequency interference from far field sources, such as AM radio transmitters, and near field sources, such as automobile ignitions and computers. This interference can be within the frequency regime of interest for substances such as TNT, whose detection frequencies are below 1 MHz, right in the AM band. Quadrupole resonance imaging requires that the radio frequency field must penetrate to the contraband, and so no quadrupole signal is obtained from a metal cased object or vehicle. Therefore, quadrupole resonance imaging does not appear to meet the requirements of the agency at CBP operational areas.

Environmental Consequences of the Proposed Action: As described below, the PEA documents that the Proposed Action will result in no significant environmental impacts, direct, indirect, cumulative or otherwise, to the majority of resource categories evaluated. Two resource categories - air quality and radiological health and safety - warranted further evaluation in the PEA.

Climate – The diesel engines and onboard diesel generators on the mobile LEXRIS, will emit small amounts of greenhouse gases (GHG). Vehicles being driven by CBP personnel through the portal (stationary) LEXRIS, will emit small amounts of GHG above the amounts presently emitted because of the slight increase in time spent at the CBP operational areas as a result of the Proposed Action. Only the incremental increase in vehicle GHG emissions is added to the emissions from the LEXRIS to determine GHG emissions attributable to the Proposed Action. The GHG emissions attributable to the Proposed Action are well below the 25,000 metric tons/year level CEQ suggests would be significant enough to warrant discussion of climate impacts.

Geology and Soils – No construction or excavation is required for the fielding or operation of the mobile LEXRIS. The portal (stationary) LEXRIS will be installed on previously disturbed, developed surfaces (pavement and asphalt) at CBP operational areas. Minor excavations and trenching will be required to install the system. This will affect approximately 140 square feet to a maximum depth of 4 feet per system. Undisturbed geologic resources do not exist within the project areas since the deployment sites are on developed surfaces and therefore would not be impacted by the projects. Soils at CBP operational areas have been subject to grading and possibly filling to establish traffic lanes and other surfaces, such as inspection areas. Excavated soil will be used to backfill the project site. Soil slope analysis, if required, and specific erosion control techniques will be adhered to. These actions will retain exposed soils and prevent soil erosion and migration. If any additional geotechnical requirements are identified for engineering or permitting requirements, they will be executed according to applicable permits and the final design plan for the Proposed Action. Therefore, no direct impacts to geology and soils would occur from the implementation of the Proposed Action.

Hydrology and Water Quality – The Proposed Action will not affect hydrology or water quality because it does not require use of water resources, and produces no effluents that could affect water quality.

Floodplains – It is likely that some CBP operational areas will be located in the proximity of floodplains; however, since the LEXRIS are expected to be deployed on existing developed surfaces, no impacts to floodplains are anticipated.

Wetlands – It is likely that some CBP operational areas will be located in the proximity of wetlands. However, LEXRIS are expected to be deployed on existing developed surfaces and when construction is required, CBP operational area specific erosion control techniques will be adhered to as prescribed within stormwater construction permits in order to prevent soil erosion and migration. For these reasons, no impacts to wetlands would be expected.

Coastal Zone – Consistency determinations will be made in all cases where LEXRIS are deployed to CBP operational areas, if necessary, that are located in coastal zones.

Vegetation and Wildlife – The systems will be deployed and operated on previously paved surfaces and sensitive vegetative and wildlife resources do not exist in these areas. CBP will conduct consultation with the United States Fish and Wildlife Service (USFWS), if necessary, to determine any impact to vegetation and wildlife. It is anticipated that the Proposed Action will not impact vegetation or wildlife resources.

Threatened and Endangered Species – The Proposed Action will take place in developed industrial areas where suitable wildlife habitat and species do not exist. CBP will conduct consultation with the USFWS, if necessary, to determine any impact to threatened or endangered species. It is anticipated that the Proposed Action will have no effect on threatened and endangered species.

Air Quality – LEXRIS operations could result in increased air emissions from several sources, including the mobile LEXRIS diesel engine and onboard diesel generator. In addition, there could be small increases in idling and low speed emissions from vehicles waiting to be scanned and being moved into scan areas or moving through the portal LEXRIS. All estimated emission levels from the activities associated with the Proposed Action are below the tons/year *de minimis* threshold values applicable to nonattainment and maintenance areas for all pollutants as specified in 40 CFR 93.153(b)(1)(2). Therefore the Proposed Action is not anticipated to cause an exceedance of any National Ambient Air Quality Standard (NAAQS) for criteria pollutants, nor is it anticipated to conflict with conformity requirements of section 176 of the Clean Air Act (CAA) for federal actions or any approved State Implementation Plan (SIP). That said, actual air quality emissions for each CBP operational area where the systems may be deployed will be determined using the analysis established in the PEA and will be compared to conformance criteria applicable to nonattainment and maintenance areas for all pollutants as specified in 40 CFR 93.153(b)(1)(2).

Noise – The Proposed Action is consistent with other activities that occur at CBP operational areas and will not measurably change the existing noise environment at any operational area. As a result, the Proposed Action will not have a significant noise impact.

Land Use and Zoning – The Proposed Action is consistent with current land use and zoning practices at CBP operational areas. Operation of LEXRIS is not expected to impact land use and zoning.

Aesthetics and Visual Resources – The Proposed Action would not obscure or result in abrupt changes to the complexity of the landscape and skyline when viewed from points readily accessible to the public. No change to the character of the area would occur as a result of the Proposed Action.

Infrastructure and Utilities – CBP operational areas may or may not have pre-existing water and electrical services. Analysis will be conducted on a site by site basis, before LEXRIS is deployed. It

is anticipated that the Proposed Action will not impact the infrastructure and utility services of CBP operational areas.

Traffic and Transportation – During the planning process for each system and prior to deployment, site surveys will be conducted to ensure that the placement and operation of the LEXRIS systems are integrated with CBP operational area traffic patterns and facilities to minimize delays to the movement of vehicles. Deployment of LEXRIS will not impact or impede traffic at CBP operational areas.

Hazardous Materials – LEXRIS systems might contain materials that could be hazardous if the materials are handled improperly. As a CBP asset, all materials within the systems will be in use for their intended purpose, under the supervision of appropriately trained personnel. In the event of an accident, hazardous materials would not be expected to cause any significant harm to the human environment, because the amount of materials is small and most materials will be in solid form, which would be readily contained and recovered. In contrast to other NII systems such as gamma imaging systems, there is no radioactive source or byproduct material used in the systems; therefore, there is no risk of a release of radioactive materials. Accident response procedures are in place at CBP operational areas to contain and remove fluids such as lubricants and fuel.

If LEXRIS components are replaced or decommissioned, the handling, storage, use, transfer, and disposal of all materials will comply with applicable regulations. This will prevent human exposure and releases to the environment of any hazardous material that could potentially be within the system.

Historic and Archeological (Cultural) Resources – There is no construction associated with installation of the mobile LEXRIS, therefore, no historical or cultural resources will be impacted from the operation of mobile LEXRIS. Where installation of a portal LEXRIS requires any excavation, this will occur within the boundaries of a CBP operational area that has already been constructed and the subsurface has already been disturbed. Minor excavation and trenching will be required to install the systems which will not exceed a depth of 4 feet. Impact to historic and archeological resources will be determined, in accordance with the National Historic Preservation Act (NHPA), on a case-by-case basis before LEXRIS systems are deployed to specific CBP operational areas.

Socioeconomics – The Proposed Action will not affect employment, housing or demographics. Implementation of the Proposed Action may produce indirect socioeconomic effects by deterring the movement of illicit drugs, explosives, firearms, or other contraband into the United States. Similar indirect effects could result if the Proposed Action led to the apprehension of criminals or terrorists attempting to enter the United States. Such effects, however, are only theoretical and were not further evaluated in the PEA.

Environmental Justice – Implementation of the Proposed Action will not have any negative or disproportionate effects on minority and low income populations or children.

Irreversible and Irretrievable Commitment of Resources – No sensitive environmental resources will be lost or permanently altered due to the Proposed Action.

Radiological Health and Safety – While the use of any NII screening system must be evaluated to ensure that there are no adverse impacts to the health and safety of the general public, CBP personnel, and contractors, portal LEXRIS are designed and operated to avoid these impacts. As promulgated

by the Nuclear Regulatory Commission (NRC) in 10 CFR Part 20, the maximum permissible level of radiation dose to the general public is 0.1 rem in any one year. CBP has established this protective limit for the general public, contractors and CBP personnel. Testing and analysis conducted by CBP's Radiation Safety Officer (RSO) concluded that exposures from the LEXRIS are expected to be well below the maximum levels of radiation exposure for humans and food adopted by the Nuclear Regulatory Commission (NRC), the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) to protect workers and the general public. Accordingly, the PEA concludes that radiation from the mobile and portal LEXRIS will not have a significant impact on human health or food that may be located in scanned vehicles.

Best Management Practices: CBP identified a number of Best Management Practices (BMPs) that will be implemented for the Proposed Action. These practices are designed to ensure protection of the health and safety of CBP personnel, contractors, and the general public, and to avoid, remedy, or reduce potential adverse impacts associated with operation of LEXRIS.

Findings and Conclusion: The analysis of effects contained in the PEA considered both the context and intensity of the action in determining its significance as outlined in 40 CFR 1508.27. For each resource evaluated, a discussion is provided to assist the reader in understanding the analysis used in determining the potential impact. Based upon the analysis in the PEA, it is determined that the Proposed Action will not significantly affect the human environment.

Consequently, the Proposed Action does not require the preparation of a Programmatic Environmental Impact Statement.

3-27-12

Mr. Ira S. Reese
Executive Director
Laboratories and Scientific Services
Office of Information and Technology
U.S. Customs and Border Protection

Date

4/10/2012

Mr. Karl H. Calvo
Executive Director
Facilities Management and Engineering
Office of Administration
U.S. Customs and Border Protection

Date

Executive Summary

Introduction

This Final Programmatic Environmental Assessment (PEA) documents the potential environmental consequences of deploying and operating Low Energy X-Ray Inspection Systems (LEXRIS) at U.S. Customs and Border Protection (CBP) operational areas in the United States. Figures 2 and 3 in Chapter 2 of the PEA are representative pictures of the LEXRIS.

Proposed Action

The Proposed Action consists of the deployment and operation of LEXRIS at CBP operational areas (examples of a CBP operational area include, but are not limited to, ports of entry, CBP checkpoints, and at events designated as national special security events) in the United States for the purpose of conducting non-intrusive inspections of vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. Two different models are available for this purpose. One system is mobile, mounted on a truck or van type platform and will be used at CBP operational areas. The system can be driven along parked vehicles and will scan the vehicles as it drives by. The driver and passenger(s) will exit the vehicle and be escorted to outside of the controlled area before the vehicle is scanned by the mobile system. The other system will be a portal (stationary) configuration that will be installed along an existing traffic lane. Vehicles will be scanned as they are driven through the portal. Occupants of the vehicle will have the option to remain in the vehicle while the driver drives it through the portal or exit the vehicle and have CBP personnel drive it through the portal.[1]

The systems will be operated by CBP personnel and will most likely be operated on developed surfaces[2] at operational areas. As a best management practice (BMP), the LEXRIS will be set up with established controlled areas to ensure radiation exposure levels remain within standards set by the Nuclear Regulatory Commission (NRC). The systems are discussed in more detail, with discussion of radiation controlled areas, and representative photographs, in Chapter 2.

Purpose and Need

The purpose of deploying and operating LEXRIS is to non-intrusively scan vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. The LEXRIS is a technology employed by CBP at San Ysidro and Otay Mesa land ports of entry which has proven to be an effective and productive enforcement tool in detecting contraband hidden within vehicles. Selection and deployment of additional

[1] In the case of buses at land ports of entry, all passengers will exit the vehicle due to CBP processing requirements and the bus driver will have the option of driving the bus through the portal or have CBP personnel drive it through the portal.

[2] Developed surfaces are areas that have been subject to grading and/or filling and may be covered with gravel, asphalt or concrete.

LEXRIS at CBP operational areas is based on the following criteria: environmental considerations, size and/or intake volume at the operational area, existing equipment, budget, schedule, mission requirements, and cost. Additional environmental analysis will be conducted before LEXRIS are deployed to specific sites.

LEXRIS systems are needed because they fill a unique capability to detect objects, as well as provide clear, high quality images of organic objects, that are not effectively visualized by other NII technologies currently utilized by CBP or that may be more difficult to find by other search techniques used by CBP. The LEXRIS increases the safety of CBP personnel by decreasing the number of vehicles CBP personnel must manually search for contraband and when a manual search is necessary, it also provides CBP personnel with information about what may be encountered during a manual search. LEXRIS gives a clear image of objects that may be hidden in car fenders, tires, trunks, gas tanks, and under hoods.

Alternatives Considered

Nine alternatives were initially evaluated to determine whether they could meet the purpose and need:

- Alternative 1: Fielding and operation of LEXRIS at CBP operational areas in the United States. This was identified as the preferred alternative;
- Alternative 2: No Action Alternative (status quo). Searches will continue at CBP operational areas using existing technologies, as well as visual and manual searches by CBP personnel;
- Alternative 3: X-Ray Imaging Systems;
- Alternative 4: Gamma Imaging Systems;
- Alternative 5: Trace-Chemical Detection Systems;
- Alternative 6: Millimeter Wave Systems;
- Alternative 7: Low-power Microwave Systems;
- Alternative 8: Ultrasonic Imaging Systems; and
- Alternative 9: Quadrupole Resonance Imaging Systems.

Of the nine alternatives, only Alternative 1 (preferred alternative) was identified as being capable of generating efficient, quality images of objects. Alternative 2, the No Action Alternative, has been carried forward for analysis as required by the Council on Environmental Quality (CEQ) regulations. Under the No Action Alternative, searches would continue at CBP operational areas using existing technologies, as well as by conducting visual and manual inspections using existing equipment and methods. This Final PEA evaluates both the Proposed Action and No Action Alternative. See section 2.4 for detailed information on other alternatives that were considered.

Environmental Consequences of the Proposed Action

This Final PEA documents that the Proposed Action will result in no significant environmental impacts, direct, indirect, cumulative, or otherwise at CBP operational areas in the United States. Impacts to the majority of resource categories are not

anticipated as a result of the Proposed Action and were therefore eliminated from further discussion. The only resource categories evaluated in detail in this Final PEA are air quality, and human health and safety in the context of radiological impacts.

Air Quality

Air quality impacts resulting from the Proposed Action would be associated with emissions generated by the mobile LEXRIS's diesel engine and the system's onboard auxiliary power unit. There is also potential for an increase in idling emissions from vehicles waiting to be scanned (both mobile and portal). Anticipated emissions from operation of LEXRIS were determined to be below levels that would cause measurable air quality degradation or require a conformity analysis under the Clean Air Act (see section 3.3).

Radiological Health and Safety

Human Irradiation

While the use of any NII system must be evaluated to ensure that there are no adverse impacts to the health and safety of the public, CBP personnel and contractors, LEXRIS systems are designed and operated to avoid these impacts. As promulgated by the NRC, in title 10 of the Code of Federal Regulations (CFR) Part 20, the maximum permissible level of radiation dose to the general public is 0.1 rem in a year. The 0.1 rem limit does not include exposure to background radiation[3]. CBP will apply this limit of 0.1 rem in any one year to the public, CBP personnel, and contractors. Although LEXRIS are x-ray systems that are not regulated by the NRC, CBP voluntarily uses NRC limits to ensure programmatic consistency. The results of various tests conducted by CBP's Radiation Safety Officer (RSO)[4] concluded that the annual maximum radiation exposures from the systems are expected to range from 118,483 to 0.25 times below CBP's annual radiation exposure limit of 0.1 rem.

Food Irradiation

The Food and Drug Administration (FDA) requires a label be affixed to sealed units producing sources of radiation for the purposes of inspection of foods, for inspection of packaged food, and for controlling food processing stating that no food shall be exposed to low energy X-ray radiation sources so as to receive an absorbed dose in excess of 50 rem (21 CFR 179.21).

The RSO conducted tests to determine the worst-case scenario of radiation doses to food from LEXRIS operations. The total absorbed dose to food from one scan from the

[3] Background radiation is naturally occurring radiation coming from outer space as cosmic radiation, or from naturally occurring radioactive elements such as uranium and radium in the materials of the earth.

[4] The CBP Radiation Safety Officer (RSO) is a health physicist assigned to the CBP, Office of Human Resources Management (HRM) Occupational Safety and Health (OSH) Division who has the overall responsibility for the management and oversight of the CBP radiation safety program. The RSO helps to ensure CBP's compliance with the oversight of the U.S. Nuclear Regulatory Commission.

mobile LEXRIS is 0.0000043 rem.[5] The total absorbed dose deposited in food from one scan from the portal LEXRIS is 0.000003 rem, which is the same total absorbed dose received by occupants of vehicles being scanned by the portal. The absorbed dose from LEXRIS is approximately 11,627,906 (mobile) and 16,666,666 (portal) times less than the 50 rem limit.

In summary, analysis and testing presented in this Final PEA shows that exposures from the LEXRIS are expected to be well below the maximum levels of radiation exposure for humans and food adopted by the NRC, the Occupational Safety and Health Administration (OSHA), and the FDA to protect workers and the general public. Therefore, no significant health effects from radiation exposure are expected as a result of the implementation of the Proposed Action.

Best Management Practices

In association with the Proposed Action, CBP identified a number of BMPs that would be implemented for the Proposed Action. These measures are designed to avoid, remedy, or reduce potential adverse impacts. Further detail is provided in Chapter 5.

Findings and Conclusions

Based upon the results of this Final PEA, it has been concluded that the Proposed Action, conducted in a manner consistent with applicable regulatory requirements, would not result in a significant impact on the quality of the environment, as defined in 40 C.F.R. 1508.27 of the CEQ's regulations for implementing the National Environmental Policy Act of 1969, as long as identified BMPs are followed. Therefore, the issuance of a Finding of No Significant Impact is warranted and the preparation of a Programmatic Environmental Impact Statement (PEIS) is not required.

[5] The 0.0000043 rem per scan total absorbed dose deposited in food subjected to search by the mobile LEXRIS is different from the total absorbed dose received by a person concealed within a vehicle scanned by mobile LEXRIS due to shielding around the hidden person.

Table of Contents

Executive Summary i
Introduction i
Proposed Action i
Purpose and Need i
Alternatives Considered ii
Environmental Consequences of the Proposed Action ii
Best Management Practices iv
Findings and Conclusions iv
1 Introduction 1
1.1 Background 1
1.2 Purpose and Need 1
1.3 Public Involvement 2
1.4 Agency Coordination 2
1.5 Framework for Analysis 2
2 The Proposed Action and Alternatives 3
2.1 Alternative 1 – Proposed Action 3
2.2 Description of the Low Energy X-Ray Technology 3
2.2.1 The LEXRIS Systems 5
2.2.2 Radiation Controlled Area 6
2.2.3 Radiation Safety Engineering Controls 9
2.3 Alternative 2 – No Action Alternative 10
2.4 Other Alternatives Considered 10
3 The Affected Environment and Consequences 12
3.1 Introduction 12
3.1.1 Impact Characterization 12
3.1.2 Significance 12
3.1.3 Best Management Practices 15
3.2 Preliminary Impact Scoping 15
3.3 Air Quality 21
3.3.1 The Affected Environment 21
3.3.2 Potential Consequences 21
3.4 Radiological Health and Safety 26
3.4.1 The Affected Environment 26
3.4.2 Potential Consequences 27
4 Cumulative Impacts 31
4.1 Introduction 31
4.2 Past and Present Actions Relevant to the Proposed Action and Alternative 31
4.3 Reasonably Foreseeable Actions that Could Interact with the Proposed Action and Alternative 32
4.4 Summary of Cumulative Effects 32
5 Best Management Practices 34
6 Findings and Conclusions 35
7 References 36
8 Acronyms and Abbreviations 38

9 Preparer 40
10 Distribution List 41
Appendix A: Background Information on Ionizing Radiation 43
Appendix B: Background Information Concerning Risks from Occupational Radiation Exposure 50

List of Figures

Figure 1: Concept of X-Ray Technology 4
Figure 2: Typical Mobile LEXRIS 5
Figure 3: Typical Portal (Stationary) LEXRIS 6
Figure 4: Mobile Radiation Controlled Area 8
Figure 5: Portal (Stationary) Radiation Controlled Area 9
Figure 6: Some Proposed Models for How the Effect of Radiation Vary with Doses at Low Levels 55

List of Tables

Table 1: Preliminary Impact Scoping 16
Table 2: Conformity Criteria for Nonattainment Areas 24
Table 3: Conformity Criteria for Maintenance Areas 25
Table 4: Summary of Regulatory Dose Limits 46
Table 5: Estimated Loss of Life Expectancy from Health Risks 56
Table 6: Estimated Loss of Life Expectancy from Industrial Accidents 57
Table 7: Average Annual Effective Dose Equivalent to Individuals in the United States 59

1 Introduction

This Final Programmatic Environmental Assessment (PEA) reviews the environmental consequences expected to result from the deployment of Low Energy X-Ray Inspection Systems (LEXRIS) at U.S. Customs and Border Protection (CBP) operational areas in the United States. This Final PEA is written to fulfill the requirements of the National Environmental Policy Act of 1969 (NEPA), 42 U.S.C. §§ 4321 *et seq*. (as amended); the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA, title 40 of the Code of Federal Regulations (CFR) Parts 1500-1508; and U.S. Department of Homeland Security (DHS) Directive (Dir.) 023-01 (formerly 5100.1) "Environmental Planning Program," (April 19, 2006) which establishes policy and procedures to ensure the integration of environmental considerations into the Department of Homeland Security's mission planning and project decision-making (DHS 2006). [See also 71 Fed. Reg. 16,790 (April 4, 2006).]

1.1 Background

CBP is charged with the dual mission of securing the Nation's borders while facilitating legitimate trade and travel. This mission is accomplished through CBP's six operational offices: the Office of Border Patrol, the Office of Field Operations, the Office of Air and Marine, the Office of International Affairs, the Office of Internal Affairs, and the Office of International Trade. CBP's Strategic Plan, *Secure Borders, Safe Travel, Legal Trade, U.S. Customs and Border Protection Fiscal Year 2009-2014 Strategic Plan* identifies the agency's progress in protecting the nation from the threats of global terrorism, illegal migration, and trafficking of narcotics and other contraband; protecting the United States economy by enforcing trade laws, intellectual property rights, and collection of revenue on goods imported into the United States; protecting our food supply and agricultural industry from pests and disease; and increasing the security of our air space.

Use of the LEXRIS at, for example U.S. ports of entry, directly supports CBP's mission of securing the borders and the homeland from terrorists and other threats. In addition, the operation of LEXRIS will further the mission of CBP by assisting CBP personnel in preventing contraband, including illegal drugs and terrorist weapons from entering the United States, while also facilitating the flow of legitimate trade and travel.

1.2 Purpose and Need

The purpose of the Proposed Action is to non-intrusively scan vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. The LEXRIS is a technology employed by CBP at San Ysidro and Otay Mesa land ports of entry which has proven to be an effective and productive enforcement tool in detecting contraband hidden within conveyances located at CBP operational areas. Additional LEXRIS are needed because they fill a unique capability to detect objects that are not effectively visualized by other non-intrusive inspection (NII) technologies currently utilized by CBP. The LEXRIS increases the safety of CBP personnel by decreasing the number of vehicles CBP personnel must manually search for contraband and when a manual search is necessary, it also provides CBP personnel with information about what

may be encountered during a manual search. LEXRIS gives a clear image of objects that may be hidden in car fenders, tires, trunks, gas tanks, and under hoods. Additional environmental analysis will be conducted before LEXRIS are deployed to specific sites.

1.3 Public Involvement

In keeping with established policy regarding an open decision-making process, this Final PEA will be made available to agencies and the general public for a 30 day review period. A Notice of Availability (NOA) will be published in the Federal Register. Copies of the Final PEA will be made available to the general public at the following public review website: http://ecso.swf.usace.army.mil/Pages/Publicreview.cfm.

For further information on the Proposed Action or to request a copy of the PEA, please contact Mr. David Duncan, Project Manager, Office of Information and Technology, Laboratories and Scientific Services, Interdiction Technology Branch, 1300 Pennsylvania Avenue, NW, Suite 1575, Washington, DC 20229.

1.4 Agency Coordination

CBP will consult with State Historic Preservation Offices, Regional U.S. Fish and Wildlife Service (USFWS) Offices and various Native American tribes regarding the Proposed Action for all CBP operational areas where LEXRIS will be deployed. Since the portal LEXRIS will be installed within the boundaries of an existing CBP operational area that has already been constructed, and any radiation will be confined to the controlled area where the inspections occur, it is anticipated that there will be no historic, cultural, plant, fish or wildlife resources that could be affected by the Proposed Action. CBP will document state, Federal and Native American tribal consultations for all CBP operational areas where LEXRIS will be deployed and operated.

1.5 Framework for Analysis

This Final PEA was prepared in compliance with NEPA, 42 U.S.C. §§ 4321-4347 (as amended), the CEQ regulations for implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508) and DHS Dir. 023-01 (formerly 5100.1), "Environmental Planning Program," (April 19, 2006). [See also 71 Fed. Reg. 16,790 (April 4, 2006).] NEPA directs Federal agencies to fully understand and take into consideration during decision-making, the environmental consequences of proposed Federal actions. This PEA is intended to be a concise public document that provides sufficient evidence and analysis for determining whether to prepare a PEIS or a FONSI.

In addition to the evaluation for potential direct and indirect impacts, the Proposed Action was also evaluated for cumulative impacts on the environment as described later in Chapter 4, "Cumulative Impacts," of this Final PEA.

2 The Proposed Action and Alternatives

Under NEPA, the proponent for an action is responsible for considering a reasonable range of alternatives for achieving a goal or implementing a project or program. This section provides a description of the Proposed Action and alternatives considered in order to identify potentially affected environments and potential impacts to these environments. Nine alternatives were given an initial evaluation, but seven were rejected from further detailed consideration in this Final PEA, as discussed in section 2.4 below. Two alternative action scenarios were evaluated in detail for this Final PEA:

- Alternative 1: Fielding and operation of LEXRIS at CBP operational areas in the United States; and
- Alternative 2: No Action Alternative. Searches will continue at CBP operational areas using existing technologies, as well as visual and manual searches by CBP personnel.

Deployment and operation of the LEXRIS was chosen as the preferred alternative and is presented as the Proposed Action.

2.1 Alternative 1 – Proposed Action

The Proposed Action consists of the deployment and operation of LEXRIS at CBP operational areas in the United States for the purpose of conducting searches of vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. Two different models of the LEXRIS are available. One system is mobile, mounted on a truck or van type platform and will be used at CBP operational areas by driving the system along parked vehicles to be scanned. The driver and passenger(s) will exit the parked vehicle and be escorted to outside of the controlled area before the vehicle is scanned by the mobile system. The other system will be a portal (stationary) configuration that will be installed along an existing traffic lane. Vehicles will be scanned as they are driven through the portal. Occupants of the vehicle will have the option to remain in the vehicle while the driver drives it through the portal or exit the vehicle and have CBP personnel drive it through the portal.[6]

The systems will be operated by CBP personnel and will most likely be operated on developed surfaces at CBP operational areas. As a best management practice (BMP), the systems will be set up with established controlled areas to ensure radiation exposure levels remain within standards set by the Nuclear Regulatory Commission (NRC).

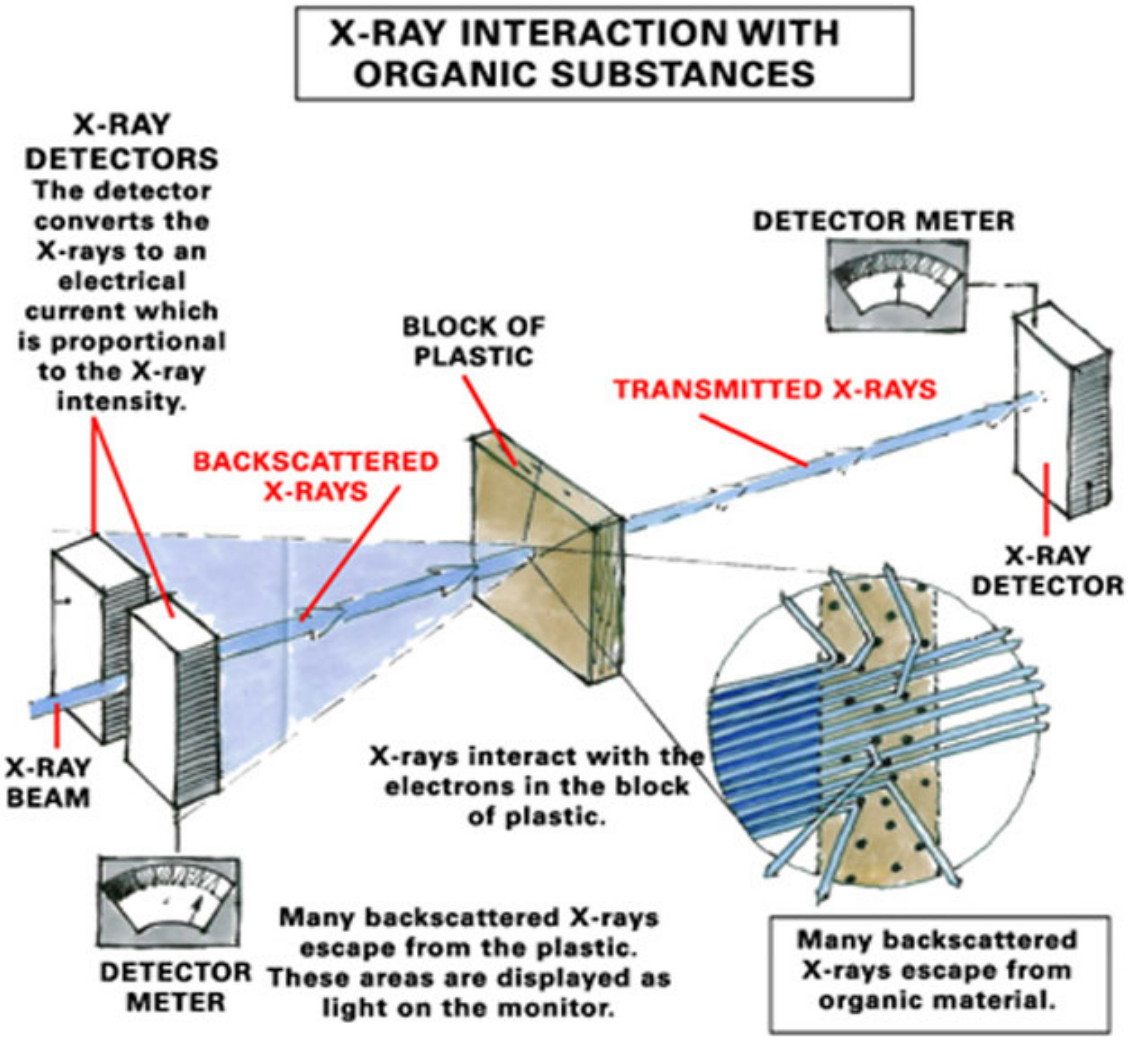
2.2 Description of the Low Energy X-Ray Technology

As radiation-producing devices, LEXRIS are subject to review by Federal radiation protection authorities. These include the Occupational Safety and Health Administration

[6] In the case of buses at land ports of entry, all passengers will exit the vehicle due to CBP processing requirements and the bus driver will have the option of driving the bus through the portal or have CBP personnel drive it through the portal.

(OSHA) and the Food and Drug Administration (FDA). It should be noted, however, that radiation equipment being operated by a Federal agency is not subject to state regulation. Although LEXRIS use X-rays in the imaging process, they do not use X-rays in the same way that traditional systems do. The following paragraphs briefly describe technical and scientific features of the low energy X-ray technology. A visual representation of the effects of the LEXRIS is presented in Figure 1 below.

Figure 1: Concept of X-Ray Technology



When X-rays are directed at an object, there are generally three possible results:

- The X-rays pass through the object
- The X-rays are absorbed by the object
- The X-rays are scattered by the object

As a general rule, dense objects (i.e. steel) absorb more X-rays than less dense objects (i.e. wood). This attribute of X-rays is the basis for the creation of medical X-rays, or

shadowgrams. In contrast less dense materials scatter the X-rays, a phenomenon that is known as "Compton Scattering." Denser materials or elements are more likely to absorb X-rays rather than scatter them.

The LEXRIS analyze the backscatter photons to create their unique images. In doing so, the LEXRIS utilize a patented "Flying Spot," which allows the position of the X-ray beam to be defined at every instant of time. This capability allows any backscatter signal that is received to be easily correlated with the particular region of the vehicle undergoing a search. This enables the LEXRIS to generate clear high quality images of organic materials even when such substances are hidden in a complex environment. This capability distinguishes the LEXRIS from traditional X-ray inspection systems, since traditional X-ray systems are suited to creating images of much denser substances.

Organic materials are effectively imaged by LEXRIS because they contain elements such as carbon, oxygen, hydrogen, and nitrogen. This ability to create clear high quality images of organic materials makes the LEXRIS valuable tools for intercepting such materials at CBP operational areas.

2.2.1 The LEXRIS Systems

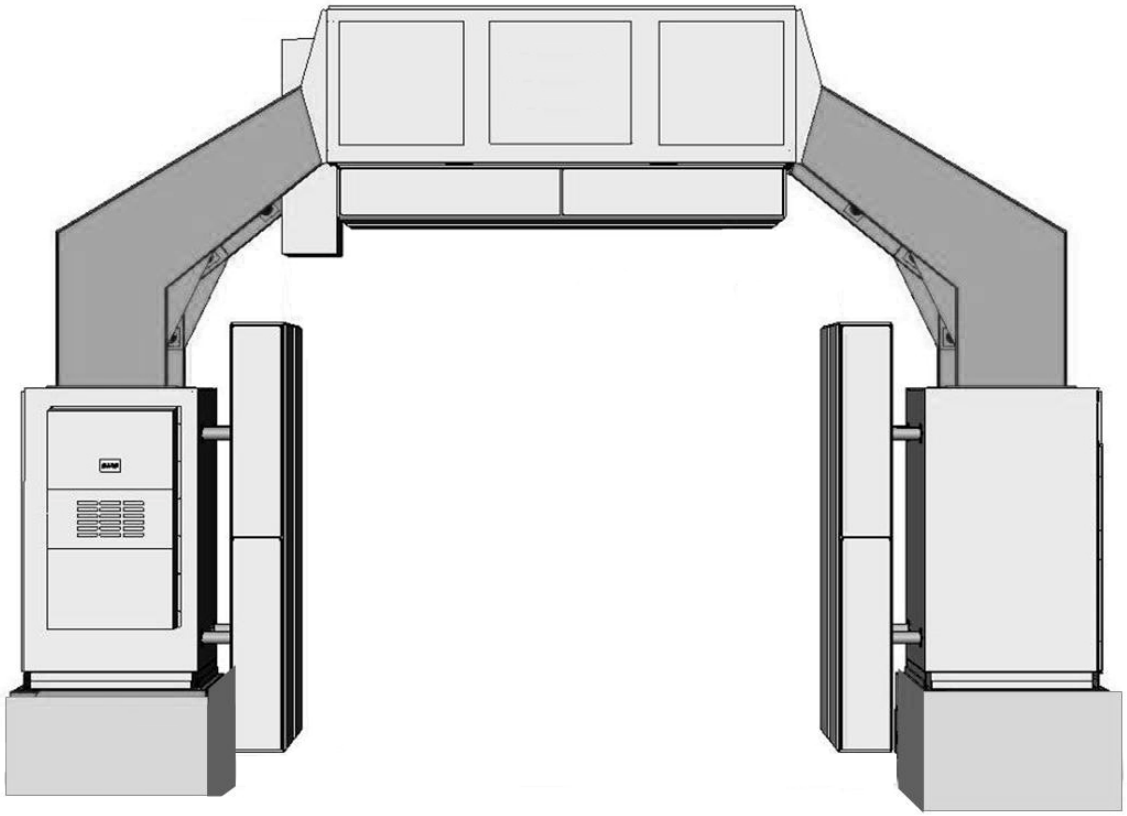
Figure 2 shows a photograph of a representative mobile LEXRIS. The van is a Dodge/Freightliner/Mercedes Sprinter van equipped with a diesel engine and an automatic transmission, although the vehicle make and model are not critical to the functionality of the low energy X-ray technology that is on board.

Figure 2: Typical Mobile LEXRIS

Image Source: CBP

Figure 3 illustrates the portal (stationary) LEXRIS. Vehicles will be scanned by this system when they are driven through the portal. Vehicles will travel through the portal at approximately 3 miles per hour. The dimensions of the system are 28.5 feet wide, 21.3 feet tall, and 9.3 feet deep.

Figure 3: Typical Portal (Stationary) LEXRIS



2.2.2 Radiation Controlled Area

To meet the threshold radiation dose limit for CBP personnel, contractors and the general public, CBP establishes controlled areas. "Controlled Area" is defined by 10 CFR 20.1003 as "an area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee for any reason." CBP has elected to use the term "controlled area" rather than "restricted area" as the systems are not in continuous scanning mode.

The controlled area limits the potential radiation dose to humans to below the CBP protective limit of 0.00005 rem in any one hour. Personnel (except those who may drive the vehicle through the portal) and persons who have chosen to get out of their vehicles, during scanning operations are required to remain behind a marker delineating a controlled area. By controlling the hourly dose, CBP can effectively limit the annual cumulative dose (based on an annual maximum of 2,000 work hours of exposure time) to below the NRC's public annual radiation dose standard of 0.1 rem (sections 3.4.1.1 and 3.4.2.1). See Appendix A and Appendix B for detailed information about radiation regulations and occupational risks.

The dimensions for the mobile LEXRIS controlled area are 30 feet in length and 36 feet in width. The radiation controlled area travels with the mobile system, is 24 feet from the side with the X-ray beam (the passenger side), and is 5 feet from the other three sides of the vehicle as shown in Figure 4. The vertical dimension of the system radiation controlled area is 24 feet.

The dimensions for the portal (stationary) system controlled area will extend 10 feet on each side (forward and back) of the installation, as shown in Figure 5. The vertical dimension of the controlled area is from ground level to a height of 22 feet.

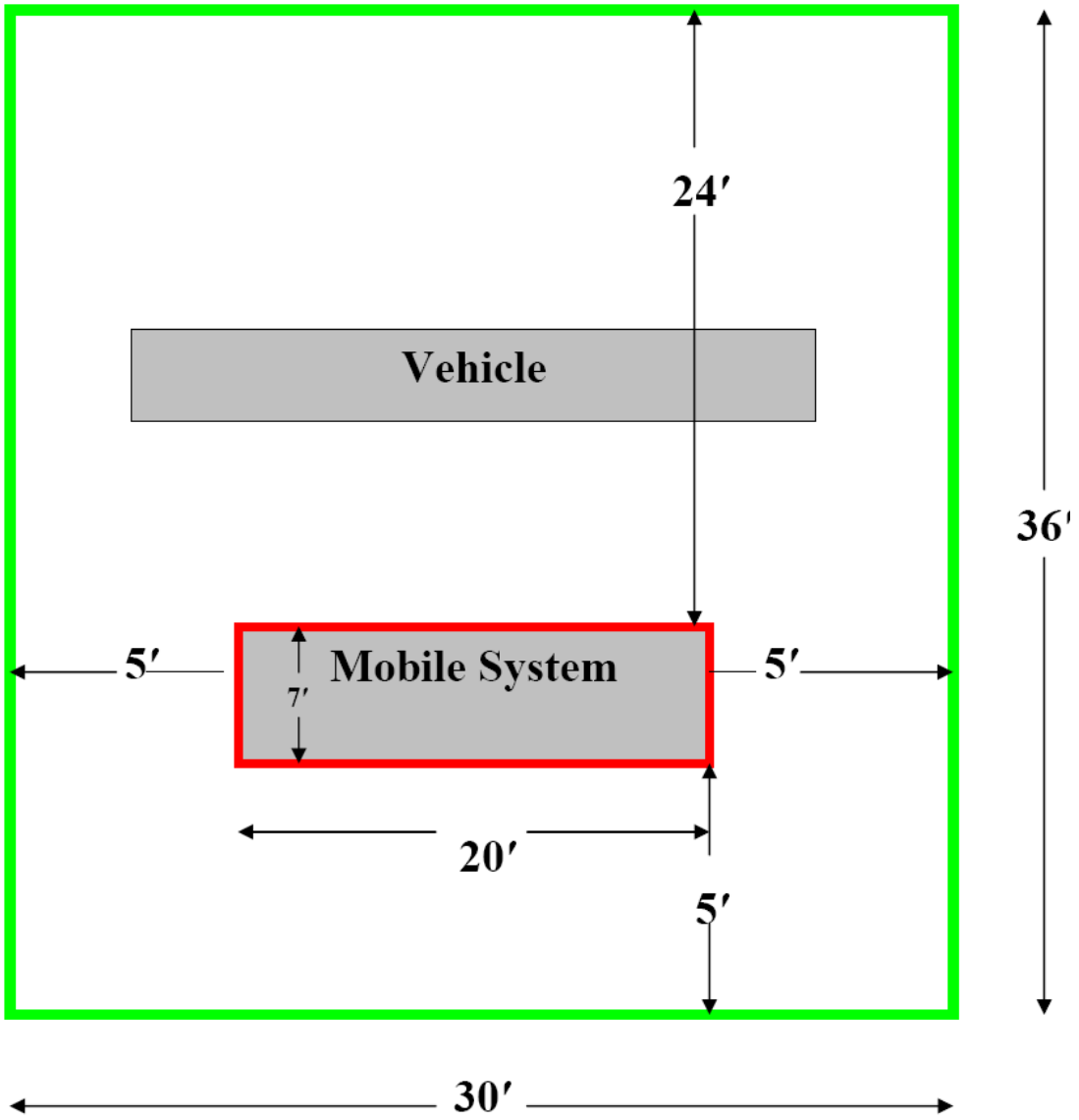
In the mobile and portal LEXRIS configurations, the radiation dose will not exceed the CBP protective limit of 0.00005 rem in any one hour at the edges of the controlled areas.

In the extreme, a system operator (or a member of the general public) could be situated at the edge of the controlled area 8 hours a day, every workday of the year (that is to say, 2,000 hours per year) and not exceed the annual radiation dose limits prescribed by the NRC. The controlled area ensures that the system conforms to the radiation protection guidelines of reducing the radiation levels to "As Low as is Reasonably Achievable" (ALARA).

ALARA is defined in 10 C.F.R. 20.1003 as:

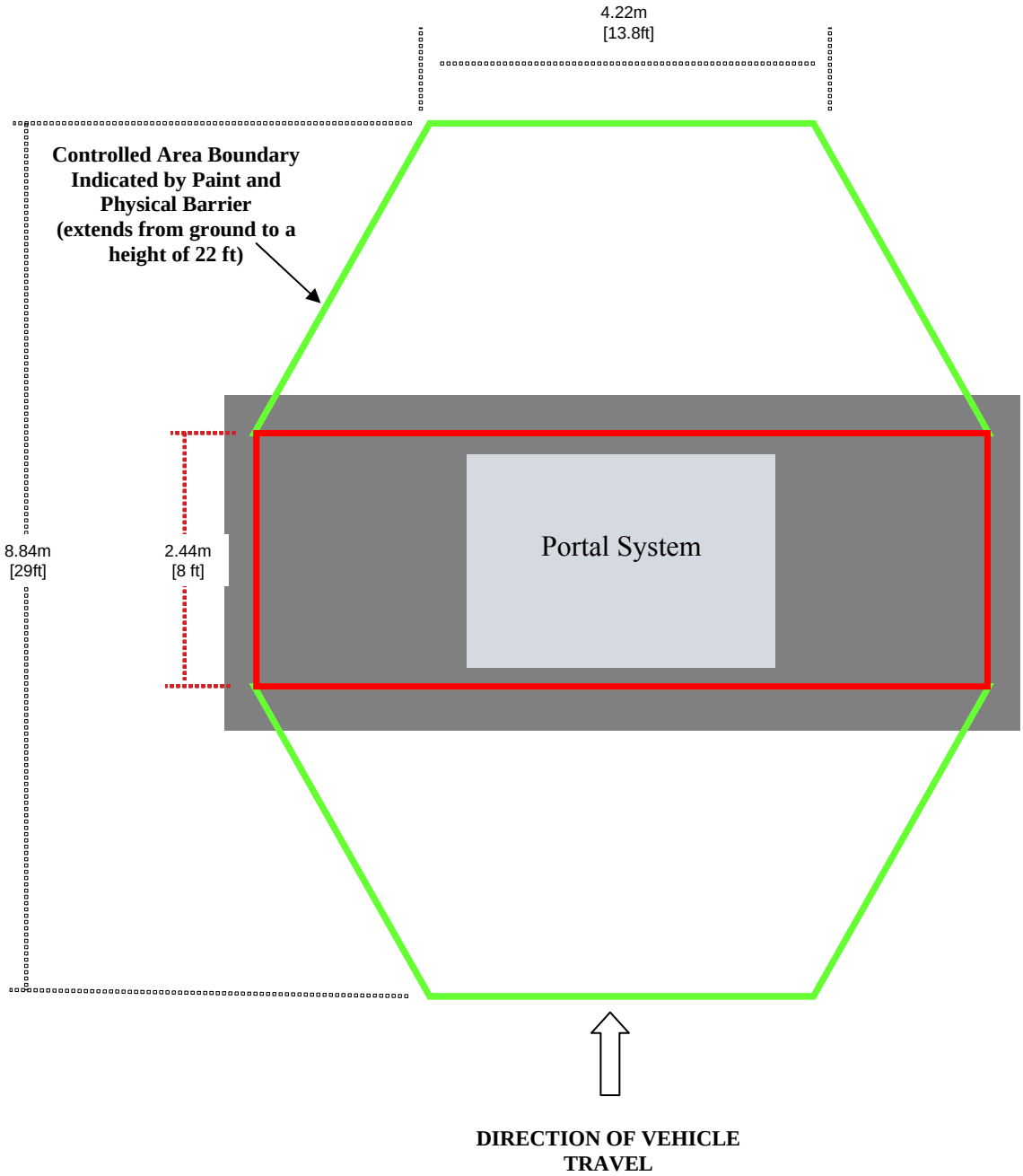
> *"making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to the state 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."*

Figure 4: Mobile Radiation Controlled Area



Controlled Area Boundary extends from ground to a height of 24 ft

Figure 5: Portal (Stationary) Radiation Controlled Area



2.2.3 Radiation Safety Engineering Controls

The systems incorporate redundant safety controls, such as emergency shutoff pushbuttons, at several locations on the LEXRIS. The personnel assigned to operate the LEXRIS will be specifically trained for safe X-ray system operations according to standards established by CBP's Office of Training and Development. Training for LEXRIS operators will consist of lectures, courses, and a written examination in basic radiation physics, radiation safety, biological effects of radiation, instrumentation,

radiation control, hands on training, and operating procedures during normal and emergency conditions.

2.3 Alternative 2 – No Action Alternative

The No Action Alternative is to continue to search vehicles at CBP operational areas with existing technology, equipment and methods. This process involves visual and manual searches with a limited number of tools. This approach is not as efficient and effective at detecting the range of materials that could be detected with low energy X-ray technology in addition to current search techniques. Furthermore, it would not reduce the need for CBP personnel to enter potentially dangerous situations to carry out these searches. The No Action Alternative does not meet the purpose and need; however, it serves as a basis of comparison to the Proposed Action as required by CEQ regulations.

2.4 Other Alternatives Considered

Seven additional alternatives were evaluated on their ability to provide CBP with the capability to inspect vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs:

- Alternative 3: X-Ray Imaging Systems
- Alternative 4: Gamma Imaging Systems ($^{137}Cs/^{60}Co$)
- Alternative 5: Trace-Chemical Detection Systems
- Alternative 6: Millimeter Wave Systems
- Alternative 7: Low-power Microwave Systems
- Alternative 8: Ultrasonic Imaging Systems
- Alternative 9: Quadrupole Resonance Imaging Systems

Each of the alternatives was evaluated on its ability to provide the required functional capability to support CBP's mission. All of the additional alternatives were determined to not be functionally viable in meeting the mission requirement for the following reasons and therefore were not carried forward for detailed analyses:

- Alternative (3), X-ray imaging systems, and Alternative (4), gamma imaging systems do not provide the full imaging capabilities achieved by the preferred alternative, including providing a clear high quality image of organic objects; they require control areas that could not be accommodated within the limited space available at CBP operational areas.
- Alternative (5), trace-chemical detection systems, requires either physical contact to collect samples of trace materials or uses gentle streams of air to dislodge and collect particles from the exterior surfaces of objects. Trace-chemical detection systems would not be able to determine the presence of contraband that may be concealed inside a vehicle where physical contact or use of a gentle stream of air was not possible. The possibility of contamination would need to be resolved.
- Alternative (6), millimeter wave systems, and Alternative (7), low-power microwave systems, do not have the power to penetrate metal objects, such as vehicles. They are further limited in their ability to scan vehicles in motion. While some are under review by DHS, none are likely to be available for fielding for

years to come, if ever, and at this time do not appear to work for the needed operation at CBP operational areas.

- Alternative (8), ultrasonic imaging systems require contact with the target. This is not practical for vehicle searches.
- Alternative (9), quadrupole resonance imaging is susceptible to radio frequency interference from far field sources, such as AM radio transmitters, and near field sources, such as automobile ignitions and computers. This interference can be within the frequency regime of interest for substances such as TNT, whose detection frequencies are below 1 MHz, right in the AM band. Quadrupole resonance imaging requires that the radio frequency field must penetrate to the contraband, and so no quadrupole signal is obtained from a metal cased object or vehicle. Therefore, quadrupole resonance imaging does not appear to meet the requirements of the agency at CBP operational areas.

Given these limitations, low energy X-ray technology is the only available technology that meets the CBP need to non-intrusively scan vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs.

3 The Affected Environment and Consequences

3.1 Introduction

This section examines the environmental resources that exist at CBP operational areas and the possible impacts to these resources from the Proposed Action and alternative. The descriptions presented represent baseline conditions for the comparison of changes caused by implementation of the Proposed Action and alternative. Potential changes or impacts to the resources listed are described in each section as potential consequences. Cumulative impacts, or impacts attributable to the Proposed Action when combined with other past, present or reasonably foreseeable future impacts regardless of the source are presented in Chapter 4.

3.1.1 Impact Characterization

Impacts include ecological (such as the effects on natural resources and on the components, structures and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health. Impacts may also include those resulting from actions which may have both beneficial and detrimental effects.

Direct impact – A direct impact is one that would be caused by implementing the Proposed Action or alternative and would occur at the same time and place.

Indirect impact – An indirect impact from the Proposed Action or alternative is one that would occur later in time or which is further removed in distance but which is still reasonably foreseeable. For example, indirect impacts are those that induce changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

3.1.2 Significance

Significance as used in NEPA requires considerations of both context and intensity. Context means that the significance of an action must be analyzed in several conditions, such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the Proposed Action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short-and long-term effects are relevant. Intensity refers to the severity of impact. The following should be considered in evaluating intensity:

1. Impacts that may be both beneficial and adverse.
2. The degree to which the Proposed Action affects public health or safety.
3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers or ecologically critical areas.
4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.
7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.
8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.
9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.
10. Whether the action threatens a violation of Federal, state, or local law or requirements imposed for the protection of the environment.

(40 CFR § 1508.27)

CEQ regulations and DHS Dir. 023-01 identify three distinct levels of analysis that can be used to satisfy NEPA. The determining factor for choosing a particular level of analysis is whether the Proposed Action has the potential to cause one or more "significant impacts." These levels of analysis include: an environmental impact statement (EIS), which is the most detailed level of analysis and is used when significant impacts are expected; an environmental assessment (EA), used when the significance of the potential impacts are not known but are assumed to be less than significant; and a categorical exclusion (CATEX), used when an action fits into a category of actions that based on experience do not individually or cumulatively have a significant impact on the human environment and, therefore, do not require an EA or EIS. Actions that an agency determines are suitable for a CATEX are categorized and defined by the agency and approved by CEQ.

In order to verify that a particular CATEX is applicable to an agency action, agency officials must determine that the action meets the following three conditions:

A. *Clearly Fits the Category.* The entire action clearly fits within one or more of the categories of excludable actions listed in DHS Dir. 023-01, Appendix A.

B. *Is Not a Piece of a Larger Action.* It is not appropriate to segment an action or connected actions by division into smaller parts in order to avoid a more extensive evaluation. Accordingly, actions must be considered in the same review if the actions are connected, for example: where one action triggers or forces another; where one action depends on another, or where one action will not proceed unless another action is taken.

C. *No Extraordinary Circumstances Exist.* It is not appropriate to categorically exclude an action when there are extraordinary circumstances present that would create the potential for a normally excluded action to have a significant environmental effect. A determination of whether additional analysis of extraordinary circumstances is required for an action that is normally excluded must focus on the action's potential

effects and consider the environmental significance of those effects in terms of both context (whether local, state, regional, tribal, national, or international) and intensity. In Dir. 023-01, DHS marked certain CATEXs with an asterisk to indicate that these categories of actions have a higher possibility of involving extraordinary circumstances. For these categories of actions, a Record of Environmental Consideration (REC) must be prepared to document consideration of extraordinary circumstances and the determination that the Proposed Action has been appropriately categorically excluded or otherwise requires further analysis through an EA or EIS process. Dir. 023-01 identifies eleven separate extraordinary circumstances to consider in determining whether it is appropriate to use a CATEX rather than a more extensive EA or EIS. The determination is made by considering whether the specific action is likely to involve one or more of the following circumstances:

1. A potentially significant effect on public health or safety.

2. A potentially significant effect on species or habitats protected by the Endangered Species Act, Marine Mammal Protection Act, the Migratory Bird Treaty Act, or Magnuson-Stevens Fishery Conservation and Management Act.

3. A potentially significant effect on a district, site, highway, structure, or object that is listed in or eligible for listing in the National Register of Historic Places, affects a historic or cultural resource or traditional and sacred sites, or the loss or destruction of a significant scientific, cultural, or historical resource.

4. A potentially significant effect on an environmentally sensitive area.

5. A potential or threatened violation of a federal, state, or local law or administrative determination imposed for the protection of the environment. Some examples of administrative determinations to consider are a local noise control ordinance; the requirement to conform to an applicable State Implementation Plan (SIP); and Federal, state, or local requirements for the control of hazardous or toxic substances.

6. An effect on the quality of the human environment that is likely to be highly controversial in terms of scientific validity, likely to be highly uncertain, or likely to involve unique or unknown environmental risks.

7. Employment of new technology or unproven technology that is likely to involve unique or unknown environmental risks, where the effect on the human environment is likely to be highly uncertain, or where the effect on the human environment is likely to be highly controversial in terms of scientific validity.

8. Extent to which a precedent is established for future actions with significant effects.

9. Significantly greater scope or size than normally experienced for a particular category of action.

10. Potential for significant degradation of already existing poor environmental conditions. Also, initiation of a potentially significant

environmental degrading influence, activity, or effect in areas not already significantly modified from their natural condition.

11. Whether the action is related to other actions with individually insignificant, but cumulatively significant impacts.

It is possible that, pursuant to an examination of the foregoing circumstances, LEXRIS deployments could fit into at least one of the categorical exclusions listed in the DHS Dir. 023-01. The analysis to reach such a determination, or whether an EA or EIS is warranted, will, in part, tier off the information included in this PEA, along with site specific information and a consideration of the extraordinary circumstances set forth above.

3.1.3 Best Management Practices

CBP identified a number of BMPs that will be implemented for the Proposed Action. These practices are designed to ensure protection of the health and safety of CBP personnel, contractors, and the general public, and to avoid, remedy, or reduce potential adverse impacts associated with operation of the LEXRIS. BMPs are discussed in Chapter 5.

3.2 Preliminary Impact Scoping

This section of the Final PEA describes the natural and human environment that exists within the project area and the potential impacts of the Proposed Action and No Action Alternative outlined in Chapter 2 of this document. In keeping with the CEQ guidelines (40 CFR 1500.4) on reducing paperwork and focusing the analysis on issues of concern to the public and policymakers, only those environmental resources that could potentially be affected by the Proposed Action and No Action Alternatives are provided. Some topics are limited in scope due to the lack of effect from the Proposed Action on the resource or because the relevance of a particular topic must be determined when NEPA analysis is undertaken for individual LEXRIS projects that are tiered from this PEA. Table 1 presents the results from the preliminary impact scoping and delineates the rationale for exclusion of various resource categories from further discussion in this Final PEA.

Table 1: Preliminary Impact Scoping

Resource	Description	Potential Impact (Yes/No)
Climate	The diesel engines and onboard diesel generators on the mobile LEXRIS, will emit small amounts of greenhouse gases (GHG). Vehicles being driven by CBP personnel through the portal (stationary) LEXRIS, will emit small amounts of GHG above the amounts presently emitted because of the slight increase in time spent at the CBP operational areas as a result of the Proposed Action. Only the incremental increase in vehicle GHG emissions is added to the emissions from the LEXRIS to determine GHG emissions attributable to the Proposed Action. The GHG emissions attributable to the Proposed Action are well below the 25,000 metric tons/year level CEQ suggests would be significant enough to warrant discussion of climate impacts.	No
Geology and Soils	No construction is required for the fielding or operation of mobile LEXRIS. The portal (stationary) LEXRIS will be installed on previously disturbed, developed surfaces (pavement and asphalt) at CBP operational areas. Minor excavations and trenching will be required to install the system. This will affect approximately 140 square feet to a maximum depth of 4 feet, per system. Undisturbed geologic resources do not exist within the project areas since the deployment sites are on developed surfaces and therefore would not be impacted by the projects. Soils at CBP operational areas have been subject to grading and possibly filling to establish traffic lanes and other surfaces, such as inspection areas. Excavated soil will be used to backfill the project site. Soil slope analysis, if required, and specific erosion control techniques will be adhered to as prescribed within the stormwater construction permit. These actions will retain exposed soils and prevent soil erosion and migration. If any additional geotechnical requirements are identified for engineering or permitting requirements, they will be executed according to applicable permits and the final	No

Resource	Description	Potential Impact (Yes/No)
	design plan for the Proposed Action.	
Hydrology and Water Quality	The Proposed Action will not affect hydrology or water quality because it does not require use of water resources, and produces no effluents that could affect water quality.	No
Floodplains	It is likely that some CBP operational areas will be located in the proximity of floodplains; however, since the LEXRIS are expected to be deployed on existing developed surfaces, no impacts to floodplains are anticipated.	No
Wetlands	It is likely that some CBP operational areas will be located in the proximity of wetlands. However, LEXRIS are expected to be deployed on existing developed surfaces and when construction is required, CBP operational area specific erosion control techniques will be adhered to as prescribed within stormwater construction permits in order to prevent soil erosion and migration. For these reasons, no impacts to wetlands would be expected.	No
Coastal Zone	Consistency determinations will be made in all cases where LEXRIS are deployed to CBP operational areas, if necessary, that are located in coastal zones.	No
Vegetation and Wildlife	The Proposed Action is expected to occur on asphalt or previously developed surfaces and sensitive vegetative and wildlife resources do not exist in these areas. CBP will conduct consultation with the USFWS, to determine any impact to vegetation and wildlife for each system deployment. Site specific consultation will determine the impact to vegetation or wildlife; however, it is anticipated that the Proposed Action will not impact vegetation or wildlife resources.	No
Threatened and Endangered Species	The Proposed Action will take place in developed industrial areas where suitable wildlife habitat and species do not exist. CBP will conduct consultation with the United States Fish and Wildlife Service (USFWS) to determine any impact to threatened or endangered species for each system deployment. Site specific consultation	No

Resource	Description	Potential Impact (Yes/No)
	will determine the impact to threatened and endangered species; however, it is anticipated that the Proposed Action will have no effect on threatened and endangered species.	
Air Quality	LEXRIS operations could result in increased air emissions from several sources, including the mobile LEXRIS diesel engine and onboard diesel generator. In addition, there could be small increases in idling and low speed emissions from vehicles waiting to be scanned and being moved into scan areas or moving through the portal LEXRIS. It is possible that the LEXRIS will be deployed to CBP operational areas located in air quality "nonattainment" areas as defined by the CAA. Initial review, using worst case assumptions determined that emission increases from the Proposed Action would be far below levels that would require a conformity determination. However, there is potential for direct and cumulative air quality impacts resulting from the deployment of LEXRIS at CBP operational areas and further discussion is provided in Section 3.3.	Yes
Noise	The Proposed Action is consistent with other activities that occur at CBP operational areas and will not measurably change the existing noise environment at any operational area. As a result, the Proposed Action will not have a significant noise impact.	No
Land Use and Zoning	The Proposed Action is consistent with current land use and zoning practices at CBP operational areas. Operation of LEXRIS is not expected to impact land use and zoning.	No
Aesthetics and Visual Resources	The Proposed Action would not obscure or result in abrupt changes to the complexity of the landscape and skyline when viewed from points readily accessible to the public at any CBP operational area. No change to the character of the CBP operational area would occur as a result of the Proposed Action. There are no viewshed implications or negative aesthetic or visual impacts	No

Resource	Description	Potential Impact (Yes/No)
	associated with the deployment of LEXRIS at CBP operational areas.	
Infrastructure/Utilities	CBP operational areas may or may not have pre-existing water and electrical services. Analysis will be conducted on a site by site basis, as LEXRIS is deployed. It is anticipated that the Proposed Action will not impact the infrastructure and utility services of CBP operational areas.	No
Traffic / Transportation	During the planning process for each system and prior to deployment, site surveys will be conducted to ensure that the placement and operation of the LEXRIS systems are integrated with CBP operational area traffic patterns and facilities to minimize delays to the movement of vehicles. Deployment of LEXRIS will not impact or impede traffic at CBP operational areas.	No
Hazardous Materials	LEXRIS systems might contain materials that could be hazardous if the materials are handled improperly. An example of such a material would be lead metal which is used for radiation shielding. As a system component, the lead will be innocuous and will provide protection from ionizing radiation. As a CBP asset, all materials within LEXRIS will be in use for their intended purpose, under the supervision of appropriately trained personnel. Under this scenario, there is no hazard to the human environment because the materials will be contained within the systems as functional components of the systems. In the event of an accident, hazardous materials would not be expected to cause any significant harm to the human environment, because the amount of materials is small and most materials will be in solid form, which would be readily contained and recovered. In contrast to other NII systems such as gamma imaging systems, there is no radioactive source or byproduct material used in the systems; therefore, there is no risk of a release of radioactive materials. Accident response procedures are in place at CBP operational areas to contain and remove fluids such as lubricants and fuel.	No

Resource	Description	Potential Impact (Yes/No)
	The most important action to ensure that hazardous materials have no significant effect on the human environment will be upon the replacement or decommissioning of a component or systems. Appropriate disposition will depend upon type and quantity of materials involved and the applicable regulations. If a component is replaced or decommissioned, the handling, storage, use, transfer, and disposal of all materials will comply with all applicable Federal, state, or local environmental laws and regulations. These BMPs will prevent human exposure and releases to the environment of any hazardous material.	
Historic and Archeological (Cultural) Resources	Where installation of a portal LEXRIS requires any excavation, this will occur within the boundaries of a CBP operational area that has already been constructed and the subsurface has already been disturbed. Impact to historic and archeological resources will be determined, in accordance with the National Historic Preservation Act (NHPA), on a case-by-case basis as LEXRIS systems are deployed to specific CBP operational areas.	No
Socioeconomics	The Proposed Action will not affect employment, housing, or demographics in the local area or region. Implementation of the Proposed Action may produce indirect socioeconomic effects by deterring the movement of illicit drugs, explosives, firearms, or other contraband into the United States. Similar indirect effects could result if the Proposed Action led to the apprehension of criminals or terrorists. Such effects, however, are only theoretical and will not be further evaluated in this document.	No
Environmental Justice	Implementation of the Proposed Action will not have any negative effect on minority and low-income populations or children.	No
Irreversible and Irretrievable Commitment of Resources	The irreversible and irretrievable commitment of resources associated with the Proposed Action will be the procurement of the LEXRIS, materials, utilities, labor and time expended in the operation of the LEXRIS. No	No

Resource	Description	Potential Impact (Yes/No)
	sensitive environmental resources will be lost or permanently altered due to the Proposed Action.	
Radiological Health and Safety	Although exposures from LEXRIS are expected to be well below limits prescribed by the Environmental Protection Agency (EPA) and OSHA, further evaluation is warranted. See section 3.4 for further discussion.	Yes

3.3 Air Quality

3.3.1 The Affected Environment

LEXRIS will be deployed to CBP operational areas located in "attainment," "non attainment," and maintenance areas for criteria air pollutants found in the United States as defined by the CAA. Air quality conditions will be assessed for each location where LEXRIS is deployed.

3.3.2 Potential Consequences

Significance of potential impacts to air quality is based on whether the Proposed Action could result in emissions[7] that could worsen existing air quality conditions at CBP operational areas and in doing so would change the attainment status of such areas or violate emission limits applicable in the region where the LEXRIS is deployed. Air quality impacts could be considered significant if:

1. The Proposed Action results, directly or indirectly, in an exceedance of one or more of the NAAQS for criteria pollutants within the region of concern.
2. The Proposed Action is not in conformity with section 176 of the CAA which requires Federal action to conform to a state implementation plan (SIP) if such a plan is in effect in the area where the LEXRIS is deployed.

3.3.2.1 Proposed Action

Direct Impacts

- Emissions from LEXRIS mobile diesel engines and onboard diesel generator could directly impact air quality.

Indirect Impacts

[7] Emissions resulting from the Proposed Action are an incremental source of air pollution which is added to existing air quality conditions at CBP operational areas.

- Mobile LEXRIS and operation of the portal LEXRIS, could contribute to increased idling times for vehicles waiting to be scanned. This scenario would indirectly impact air quality due to increased idling emissions from other vehicles.

ANALYSIS

Operation of LEXRIS will generate emissions from the mobile system's vehicle diesel engine, as well as an on-board diesel generator, and idling emissions from vehicles waiting to be scanned (both mobile and portal). The amount of emissions will be influenced by a number of factors, including the habits of the driver, the particular engine in the vehicle, engine maintenance, the hours of operation, and other variables. In view of these unknowns, the emission analysis utilized is based on maximizing assumptions in order to present the greatest foreseeable level of emissions. If these maximizing assumptions do not produce projected emissions levels that approach thresholds levels that trigger a conformity analysis, it will support a conclusion that the Proposed Action will not create significant air quality effects.

The mobile LEXRIS's vehicle, a Dodge/Freightliner/Mercedes Sprinter van, meets the Best Available Control Technology, as defined by EPA, and can be equipped with one of four different CDI (common-rail direct injection) diesel engines. The units available to CBP have the largest engine available, which is 156 horsepower (hp). The emissions analysis assumes that the system will be equipped with this particular engine and operated 24 hours a day, either idling or moving at slow speed.

The second source of emissions is the onboard generator that powers the scanning equipment. This generator is 15 kilowatt (kW) single phase and uses diesel fuel from the system's main fuel tank. The generator's engine is a Kubota V2203 diesel engine that produces 32.5 standby hp.

When the portal system is in use, vehicles are scanned as they are driven through the system. This scenario could cause vehicles waiting to be scanned to increase idling time and emissions. Emission estimates for vehicles that will be scanned assume that the mobile system operates continually in stationary mode, and both systems process an average of 60 vehicles per hour (i.e. processing time equals 1 minute per vehicle). Idling emissions estimates are maximized here because:

- The mobile system will not be operated continually in stationary mode.
- Local idling controls are not taken into account.
- The systems will not be operated 24 hours per day.
- The systems are able to process vehicles quickly and therefore it is not likely that vehicles will be idling in a queue waiting to be scanned.

Emission estimates will be calculated for NOx, VOC, CO, PM-10, and PM-2.5 emissions estimates for the mobile LEXRIS's vehicle engine and onboard generator for operation at each site deployed. Since actual emissions data from the system are not readily available, it is necessary to estimate emissions for these two engines using test data from other

sources.[8] For reasons stated above, the data and operational assumptions should overstate the actual emissions, which will help support a conclusion of "no significant effect" in cases where specific data are not available. The following is a list of assumptions and data sources that will be used to generate emissions estimates:

- Emissions estimates for the system's engine were derived from actual idling emissions samples from heavy heavy duty diesel vehicles (HHDDVs – greater than 8,500 pounds) calculated by the Center for Alternative Fuels, Engines and Emissions (CAFEE) in 2005.
- Emissions estimates for the system's generator were derived from "emissions factors" used by the EPA for small diesel engines (AP-42).
- The systems will be operated for 24 hours per day.

With one exception, these data sources and assumptions will have the effect of overestimating the mobile system's emissions. For instance, CAFEE test data from HHDDVs is based on tests on a variety of large diesel trucks with engines that are both older and larger than the CDI diesel engine. In addition, the CDI engine is continually being redesigned with emissions-reducing technologies that don't exist on older, large diesel engines. In contrast, one factor in the analysis will probably understate the mobile system's emissions. Although the emissions estimates are based on idling emissions, the mobile system will also "creep" as it moves past a vehicle during a scan. Creep is defined as moving between zero and ten miles per hour. Specific data on creep emissions are not available, although an analysis of data from the California Air Resources Board indicates that NOx emissions in HHDDVs during low-speed transient operations are approximately double NOx idling emissions across the same time frame (Huai 2006). Since the system will creep for only brief periods as it scans vehicles, a failure to account for increased emissions during such low speed operations could potentially understate emissions by a small amount. However, since all other data and assumptions used in the analysis tend to overstate potential emissions to a considerable degree, failure to account for increased emissions under low speed transient operations should be more than offset by the other factors that are overestimating emissions.

[8] According to EPA420-F-98-014 (April 1998), the EPA has determined that, for an analysis not requiring detailed specific emission estimates tailored to local conditions, the summary of idle emission factors contained in that document can be used to obtain first-order approximations of emissions under idling conditions.

Table 2: Conformity Criteria for Nonattainment Areas

	Tons/year
Ozone (VOC or NOX):	
Serious NAA….....	50
Severe NAA….....	25
Extreme NAA….....	10
Other ozone NAA outside an ozone transport region.....	100
Other ozone NAA inside an ozone transport region:	
VOC.....	50
NOX.....	100
Carbon monoxide: All NAA.....	100
SO2 or NO2: All NAA….....	100
PM10:	
Moderate NAA….....	100
Serious NAA….....	70
PM2.5:	
Direct emissions.....	100
SO2.....	100
NOX (unless determined not to be a significant precursor).....	100
VOC or ammonia (if determined to be significant precursors).....	100
Pb: all NAA….....	25

40 C.F.R. 93.153

Table 3: Conformity Criteria for Maintenance Areas

	Tons/year
Ozone (NOX, SO2 or NO2):	
All maintenance areas.....	100
Ozone (VOC):	
Maintenance areas inside an ozone transport Region.....	50
Maintenance areas outside an ozone transport Region.....	100
Carbon monoxide: all maintenance areas.....	100
PM10: all maintenance areas….....	100
PM2.5:	
Direct emissions.....	100
SO2.....	100
NOX (unless determined not to be a significant precursor).....	100
VOC or ammonia (if determined to be significant precursors).....	100
Pb: all maintenance areas.....	25

40 C.F.R. 93.153

Actual air quality emissions for each CBP operational area where the systems may be deployed will be determined using the analysis above and will be compared to conformance criteria applicable to nonattainment (Table 2) and maintenance areas (Table 3) for all pollutants as specified in 40 CFR 93.153(b)(1)-(2). The emission levels from operation of LEXRIS are not expected to result in air quality exceedances or SIP violations. Therefore, the Proposed Action is not anticipated to exceed any standards for criteria pollutants.

3.3.2.2 No Action Alternative

Under the No Action Alternative, the search process at the CBP operational area will be conducted with current technology, techniques and equipment, including visual and manual searches. There would be no direct or indirect impacts to air quality as a result of implementing the No Action Alternative.

3.4 Radiological Health and Safety

3.4.1 The Affected Environment

The affected environment, at respective CBP operational areas, include locations where vehicles would be scanned, as well as areas immediately surrounding the LEXRIS. People associated with the deployment and operation of the LEXRIS are classified into three categories:

1. General public, including vehicle occupants
2. CBP personnel or contractors
3. Maintenance personnel

The cumulative effects of operating multiple NII technology within a specified location are addressed in Chapter 4.

3.4.1.1 Radiation Dose Standards

CBP Personnel, Contractors and the General Public: For its own personnel, contractors, and the general public, CBP has adopted the same radiation dose limit of 0.1 rem per year that the NRC prescribes for members of the general public. CBP has adopted the NRC standard because OSHA only addresses "occupational dose" exposure limits. Although LEXRIS are x-ray systems that are not regulated by the NRC, CBP voluntarily uses NRC limits for programmatic consistency. As defined by the International Commission on Radiological Protection (ICRP 2007), CBP personnel could be considered "occupationally exposed," and therefore subjected to higher levels of radiation, because their assigned duties involve exposure to radiation or to radioactive material. Notwithstanding this standard, CBP has taken a more protective approach and has elected to limit the "occupational dose" of CBP personnel to no more than that allowable for the general public, which is 50 times more stringent than occupational dose limits established under OSHA. CBP has established procedures to ensure CBP personnel, contractors and the general public do not exceed radiation exposure of more than 0.1 rem in any one year.

This limit applies to all CBP personnel or contractors who operate LEXRIS and to the CBP personnel who may drive the vehicles through the portal (stationary) LEXRIS. This means that the same exposure limit that is being applied to LEXRIS operators is also being applied to those CBP personnel who may drive the vehicle through the LEXRIS, as well as the general public. For a more detailed discussion of dose standards, see Appendix A. Occupational exposure to the effective radiation dose standard that CBP has adopted is not expected to cause a significant increase in the risk of cancer. For a more detailed discussion of information concerning health risks from occupational radiation exposure, see Appendix B.

Food: The FDA at 21 CFR 179.21 requires a label be affixed to each machine stating that no food shall be exposed to X-ray radiation sources to receive an absorbed dose in excess of 50 rem. The absorbed dose to food from a single scan from mobile LEXRIS is 0.0000043 rem and the absorbed dose to food from a single scan from portal LEXRIS is 0.000003 rem, which is the same dose received by occupants of vehicles being scanned

by the portal. These doses are approximately 11,627,906 (mobile) to 16,666,666 (portal) times less than this limit.

3.4.2 Potential Consequences

The radiation exposure pathway for the general public, and CBP personnel and contractors is created from exposure to scattered radiation from the X-ray source during scanning operations. The dose numbers presented are representative of typical exposures from LEXRIS. Significance of impacts to health and safety from radiation exposure is based on both the potential for an accident, and the consequences of any project-related effect associated with normal operation. For purposes of NEPA analysis, an impact is significant if it would increase or decrease health and safety risks to CBP personnel and contractors, the general public, or food. BMPs described in Chapter 5 will be implemented in a number of ways to ensure the safety of CBP personnel, contractors, and the general public, by limiting and controlling radiation exposure levels.

3.4.2.1 Proposed Action

Direct Impacts

- Potential direct adverse radiological impacts from the Proposed Action include increased radiation exposure to CBP personnel, contractors and the general public or increased radiation exposure to system maintenance personnel who are employees of the equipment manufacturer, if procedures to minimize exposure are not applied.

Indirect Impacts

- Potential indirect adverse radiological impacts from the Proposed Action include an increased risk for CBP personnel, contractors, and the general public to develop negative health effects from radiation exposure over a period of time if operational guidelines and BMPs are not applied.

<u>ANALYSIS</u>

Mobile LEXRIS

During mobile LEXRIS operations, all vehicle occupants will be escorted to waiting areas outside the controlled area boundary where X-radiation from the system has diminished to negligible levels. CBP personnel and contractors operating[9] mobile LEXRIS will also remain outside of the system's controlled area during operations.

CBP's RSO conducted testing to determine the absorbed dose that CBP personnel could receive while operating the mobile LEXRIS. This testing determined that the measured dose for operators of the mobile LEXRIS is 0.000000493 rem per scan, or an average of 0.000001 rem per hour. If the maximizing assumption is made that CBP personnel could

[9] "Operating" the mobile system involves turning the system on and driving it past the vehicles to be scanned.

spend 2,000 hours operating the system in a year, the greatest potential exposure in a year would be 0.002 rem (0.000001 rem per hour x 2,000 hours = 0.002 rem).

The CBP RSO also conducted testing to determine the absorbed dose that a person hidden in a vehicle[10] would receive from mobile LEXRIS. The total radiation absorbed by any person concealed within the vehicle scanned by mobile LEXRIS would be approximately 0.000000844 rem per scan. This dose is 426,540 times less than the average annual background dose in the United States of 0.360 rem and 118,483 times below the radiation dose limit to the general public of 0.1 rem per year established by the NRC and adopted by CBP.

Portal LEXRIS

During portal LEXRIS operations, CBP personnel (except those who may drive the vehicle through the portal) and persons who have chosen to get out of their vehicles, during scanning operations are required to remain behind a marker delineating a controlled area. CBP personnel operating the portal LEXRIS will receive a dose of 0.0000001 rem per scan, or an average of 0.000002 per hour, during portal LEXRIS operations.[11] If the maximizing assumption is made that CBP personnel could spend 2,000 hours operating the portal system in a year, the greatest potential exposure in a year would be 0.004 rem (0.000002 rem per hour x 2,000 hours = 0.004 rem).

An independent radiation survey to measure exposure levels to vehicle occupants who are scanned by the portal LEXRIS was conducted by a certified health physicist. Scans were conducted on a 4-door sedan. A total of eight passes through the portal LEXRIS were completed for the purpose of measuring integrated exposure per scan. The vehicle was traveling at an average speed of 2.5 mph. The location of the ion chamber (measuring device) in the vehicle was changed for each scan to evaluate whether the exposure in the vehicle was uniform or variable. The highest reading obtained from a single scan from the portal LEXRIS was 0.000003 rem. This dose is 120,000 times less than the average annual background dose in the United States of 0.360 and 33,333 times less than the annual public dose limit of 0.1 rem. A person would have to be scanned by the portal LEXRIS more than 33,333 times in a year to exceed the exposure limits set by the NRC for members of the general public. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the portal LEXRIS will not have a significant impact to persons who are scanned by the system. In addition, CBP has established procedures to ensure CBP personnel, contractors, the general public or any person driving through the portal are not exposed to more than 0.1 rem in any one year.

---

[10] CBP will not knowingly scan people in vehicles using the mobile LEXRIS, since operational procedures for this system require vehicle occupants to exit vehicles and wait in a designated area during scanning operations. However, a person hidden in a vehicle that is scanned by the mobile LEXRIS will be exposed to a minute dose of radiation (0.000000844 rem per scan) as a direct consequence of the search.

[11] "Operating" the portal system involves turning the system on and remaining outside of the system's controlled area during operations. Such "operation" does not include driving vehicles through the portal system.

Human Health **-** The doses from mobile and portal LEXRIS scans range from 0.000000844 to 0.000003 rem. These doses are 120,000 to 426,540 times less than the average annual background dose in the United States of 0.360 rem and 33,333 to 118,483 times below the annual public dose limit of 0.1 rem. Assuming 0.000003 rem per scan (worst case), a person would have to be scanned over 33,333 times in a year to reach the maximum annual dose limit of 0.1 rem. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the mobile and portal LEXRIS will not have a significant impact on human health.

Maintenance Personnel **-** All maintenance personnel who maintain the X-ray source components are employees of the equipment manufacturer. Due to the nature of their jobs, they have the potential to be exposed to a higher level of radiation than CBP personnel and contractors and other members of the general public. Their potential exposure levels are expected to be monitored by their employers. For a more detailed discussion of dose standards, see Appendix A.

CBP personnel will not perform any maintenance of the X-ray source components. CBP personnel will periodically perform maintenance of the detectors and test the systems using procedures described in the operator's manual. All maintenance of X-ray source components will be performed by the manufacturer.

Food **-** The CBP RSO conducted tests to determine the highest possible radiation doses to food from mobile and portal LEXRIS operations. The total absorbed dose deposited in food scanned by the mobile LEXRIS is 0.0000043 rem per scan. This dose to food is 83,720 times less than the average annual background dose in the United States of 0.360 rem. The total absorbed dose to food scanned by the portal LEXRIS is 0.000003 rem per scan, which is 120,000 times less than the 0.360 rem average annual background dose.

The Food and Drug Administration (FDA) requires a label be affixed to sealed units producing sources of radiation for the purposes of inspection of foods, for inspection of packaged food, and for controlling food processing stating that no food shall be exposed to X-ray radiation sources to receive an absorbed dose in excess of 50 rem (21 CFR 179.21). The LEXRIS absorbed dose is approximately 11,627,906 (mobile) and 16,666,666 (portal) times less than this limit.

Based on these measurements and in compliance with the provisions of 21 CFR 179.21 it is concluded that radiation from the Proposed Action will have no significant impact on food that may be located in scanned vehicles.

3.4.2.2 No Action Alternative

Under the No Action Alternative, the search process at CBP operational areas will be conducted with current technology, techniques and equipment, including visual and manual searches. If LEXRIS systems are not installed, and search technology currently in use at a CBP operational area does not utilize radiation, it would generally be the case

that CBP personnel, contractors and the general public at those operational areas would not be exposed to radiation levels above those that are naturally occurring.

4 Cumulative Impacts

4.1 Introduction

Pursuant to the CEQ regulations, the cumulative effects analysis in an environmental assessment (EA) should consider the potential environmental impacts resulting from "the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions" (40 CFR 1508.7). CEQ guidance (CEQ 1997) regarding cumulative effects affirms this requirement, stating that the first steps in assessing cumulative effects involve defining the scope of the other actions and their interrelationship with the Proposed Action. The scope must consider other projects that coincide with the location and timetable of the Proposed Action and other actions. Cumulative effects analysis must also evaluate the nature of interactions among these actions.

In this PEA, an effort has been made to identify actions that are being considered and are in the planning phase at this time that could result in direct or indirect impacts to environmental resources in the vicinity of the LEXRIS at CBP operational areas. To the extent that details regarding such actions exist and the actions have a potential to interact with the Proposed Action in this PEA, these actions are included in this cumulative analysis. This approach enables decision-makers to have the most complete information available so that they can evaluate the environmental consequences of a Proposed Action in relation to other projects that may affect the same region of influence.

Cumulative Impacts – A 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.

Past and Present Actions – Past and present actions refer to actions that have taken place in the past or in the present, can have direct or indirect impacts and can combine with the impacts of the Proposed Action to produce cumulative impacts.

Reasonably Foreseeable Actions – Reasonably foreseeable actions refer to actions that will take place in the future, can have direct or indirect impacts and can combine with the impacts of the Proposed Action to produce cumulative impacts.

4.2 Past and Present Actions Relevant to the Proposed Action and Alternative

CBP operates, or plans to operate in the near future, other NII technologies suited to the various inspection needs at different CBP operational areas throughout the United States. Implementation of the Proposed Action may lead to an increased potential for exposure of CBP personnel, contractors, and the general public to additional sources of radiation. However, as more NII technologies are deployed, the systems will have controlled areas

which are designed to reduce the risk of radiation exposure by, among other things, setting aside more space at CBP operational areas for each NII technology.

4.3 Reasonably Foreseeable Actions that Could Interact with the Proposed Action and Alternative

Over the course of time, there is the potential to deploy additional NII technologies at CBP operational areas. Depending on which systems are deployed, this may lead to an increased potential for exposure of CBP personnel, contractors, and the general public to additional sources of radiation. However, as more NII technologies are deployed, the systems will have controlled areas which are designed to reduce the risk of radiation exposure.

4.4 Summary of Cumulative Effects

The potential for cumulative impacts resulting from the actions described above when combined with the Proposed Action in this PEA are summarized here. The scope of the cumulative effects analysis is limited to air quality, radiological health and safety, and spatial consideration of multiple NII systems. Other resources described in section 3.2 will not be impacted by the Proposed Action and therefore will not contribute to cumulative impacts.

Any other NII equipment operated at CBP operational areas will be sufficiently distanced from the Proposed Action so that equipment operations will have no significant cumulative effects on the general public, CBP personnel or contractors. NII equipment has little potential to create cumulative health impacts under normal operating conditions when the equipment is used for its intended purpose by qualified personnel under the supervision of a RSO in accordance with applicable health and safety regulations.

Past, present and reasonably foreseeable actions related to air quality in states and regions where the LEXRIS would be deployed at CBP operational areas will likely result in the control and/or reduction of emissions and improvement of air quality at those CBP operational areas as well as throughout the United States. Planned expansions of CBP operational areas and potential additions of NII systems could result in additional emissions at CBP operational areas in the future. However, this will take place in the context of ongoing emissions reduction efforts and other state and Federal regulatory actions. Therefore, future growth at CBP operational areas and NII deployments are not expected to result in significant, cumulative air quality effects.

Controlled areas are established for each NII system and are designed to provide adequate separation from other NII operating areas, adjacent structures, work areas and traffic flows to protect CBP personnel, contractors, and the general public. Limiting access to the controlled areas ensures that the general public, as well as CBP personnel, and contractors are not exposed to radiation levels exceeding those prescribed by state and Federal regulations (see Appendix A and Appendix B). In the event other NII technologies are planned for operation at the CBP operational areas where the LEXRIS will be deployed, CBP will ensure that controlled areas for each technology are

adequately designated and do not overlap with one another to prevent any cumulative radiological health and safety impacts.

The systems and associated controlled areas will typically occupy a maximum of 1,752 square feet of space at a CBP operational area. In deploying LEXRIS, CBP will ensure the operational areas have in excess of the 1,752 square feet required for safe operation of the LEXRIS and to operate other NII equipment without overlapping operations or designated controlled areas for the systems.

5 Best Management Practices

CBP identified a number of BMPs that will be implemented for the Proposed Action. These measures are designed to avoid, remedy, or reduce potentially adverse impacts associated with operation of the LEXRIS.

BMP for Radiological Health and Safety – BMPs for Radiological Health and Safety include but are not limited to:

- Incorporation of safety warnings and precautions into technical manuals and operator manuals.
- Training of operators and supervisors in the hazards associated with radiation producing equipment.
- Incorporation of emergency stop buttons on the equipment.
- Training operators and supervisors in the location and use of emergency stop buttons.
- The establishment of a radiation "controlled area" during operations.
- CBP has established procedures to ensure CBP personnel, contractors and the general public do not exceed radiation exposure of more than 0.1 rem in any one year.

The combination of these precautions will ensure that the cumulative radiation dose to CBP personnel, contractors, and the general public will not exceed the CBP protective limit of 0.00005 rem in any one hour or 0.1 rem per year.

BMPs for Wastes - Wastes associated with the Proposed Action are used oil and lubricants for the operation and maintenance of the mobile system. These will be accumulated in approved containers at or near the point of generation and recycled for use again by a licensed waste recycling company. Used oil and lubricants are exempt from consideration as a hazardous waste under 40 CFR part 279 if they are managed through a used oil recycler and are not mixed with any other hazardous wastes. The operation and maintenance of the system would not result in generation rates that would exceed the limits for a conditionally exempt generator (100 kilograms (220 pounds) of waste in any calendar month).

BMPs for Air – CBP utilizes an idling baseline developed as a result of experience at CBP operational areas, thus ensuring that vehicles waiting to be scanned by LEXRIS will comply with all applicable Federal, state, and local environmental laws and regulations regarding the control of idling times and emissions.

6 Findings and Conclusions

Based upon the analysis in this Final PEA, it is concluded that the Proposed Action, conducted in a manner consistent with applicable regulatory requirements and BMPs would not result in a significant impact on the quality of the environment, as defined in 40 CFR 1508.27 of the CEQ's regulations for implementing NEPA. Therefore, issuance of a FONSI is warranted, and preparation of a PEIS is not required.

7 References

Advisory Council on Historic Preservation. 2000. 36 CFR part 800 (Protection of Historical Properties); 65 Fed. Reg. 77725 (Dec. 12, 2000).

Burke, Robert. 2000. Counter Terrorism for Emergency Responders.

CAFEE. 2007. Center for Alternative Fuels, Engines and Emissions. Website: http://cafee.wvu.edu/ (last accessed in January 2011).

CBP. 2009. Customs and Border Protection. CBP Performance and Accountability Report - Fiscal Year 2008. Website: http://www.cbp.gov/linkhandler/cgov/newsroom/publications/admin/par_fy08_pub.ctt/par_fy08.pdf (last accessed in January 2011).

CEQ. 1978. Council on Environmental Quality. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act. 40 CFR parts 1500-1508; 43 Fed. Reg. 55,994 (November 29, 1978).

DHS. 2006. DHS MD 023.1, Environmental Planning Program. 71 Fed. Reg. 16790, 16790-16820 (April 4, 2006).

DOE. 2006. Department of Energy. What Every Public Safety Officer Should Know About Radiation and Radioactive Materials. Website: http://www.wipp.energy.gov/fctshts/radiation_brochure.pdf (last accessed in January 2011).

Endangered Species Act of 1973, Pub. L. No. 93-205 (1973) (codified at 16 U.S.C. §§ 1531-1544 (as amended)).

EPA. 1990. National Ambient Air Quality Standards. Website: http://www.epa.gov/air/criteria.html (last accessed in January 2011).

EPA. 1993. Determining Conformity of General Federal Actions to State or Federal Implementation Plans. 58 Fed. Reg. 63214 (November 30, 1993).

EPA. 2007. Technology Transfer Network, Clearinghouse for Inventories & Emissions Factors. AP 42, Fifth Edition, Chapter 3: Stationary Internal Combustion Sources, 1996.

EPA. 2010. "The Greenbook of Nonattainment Areas". Website: http://www.epa.gov/air/oaqps/greenbk/ (last accessed in January 2011).

Executive Office of the President. 2003. Homeland Security Presidential Directive/Hspd-7. Website: http://www.dhs.gov/xabout/laws/gc_1214597989952.shtm (last accessed in January 2011).

GAO. 2002. Customs Service: Acquisition and Deployment of Radiation Detection Equipment. Statement of Gary L. Jones, Director Natural Resources and Environment and Laurie E. Ekstrand, Director Tax Administration and Justice. GAO-03-235.

GAO. 2005. Combating Nuclear Smuggling: Efforts to Deploy Radiation Detection Equipment in the United States and Other Countries. Statement of Gene Aloise, Director Natural Resources and Environment. GAO-05-840T.

Huai, et al. 2006. "Analysis of Heavy-duty Diesel Truck Activity and Emissions Data". 40 Atmospheric Environment 2333-2344 (2006).

Homeland Security Act of 2002. Pub. L. No. 107-296 (2002).

IAEA. 2006. International Atomic Energy Agency. Illicit Trafficking and Other Unauthorized Activities involving Nuclear and Radioactive Materials Fact Sheet.

National Environmental Policy Act of 1969, Pub. L. No. 91-190 (1969) (codified at 42 U.S.C. §§ 4321-4347 (as amended)).

National Historic Preservation Act of 1966, Pub. L. No. 89-665 (1966) (codified at 16 U.S.C. § 470 (as amended)).

NRCS. 2007. Natural Resources Conservation Service. Environmental Quality Incentives Program. Website: http://www.nrcs.usda.gov/PROGRAMS/EQIP/ (last accessed in January 2011).

Skoog/Leary. 1992. Principles of Instrumental Analysis, Fourth Edition.

Strom. 2007. Screening Individuals with Backscatter X-ray Systems. Health Physics Society.

Young, Jack et al. 1995. Radiation and Public Perception.

8 Acronyms and Abbreviations

^{137}Cs	Cesium 137
^{60}Co	Cobalt 60
ALARA	As Low As is Reasonably Achievable
AM	Amplitude Modulation
BEIR	Biological Effects of Ionizing Radiation
BMP	Best Management Practice
CAA	Clean Air Act
CAFEE	Center for Alternative Fuels, Engines and Emissions
CBP	U.S. Customs and Border Protection
CDI	Common-rail Direct Injection
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
DHS	Department of Homeland Security
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
erg	an erg is a small but measurable amount of energy
FDA	Food and Drug Administration
FONSI	Finding of No Significant Impact
Gy	Gray
HDDV	Heavy Duty Diesel Vehicle
HHDDV	Heavy Heavy Duty Diesel Vehicle
hp	horsepower
H_T	Dose equivalent
ICRP	International Commission on Radiological Protection
IITB	Interdiction Technology Branch
LSS	Laboratories and Scientific Services
MD	Management Directive
MHz	Megahertz
mrad	millirad
mrem	millirem
NAA	Nonattainment Area
NAAQS	National Ambient Air Quality Standards
NCRP	National Council on Radiation Protection
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NII	Non-Intrusive Inspection
NOA	Notice of Availability
NRC	Nuclear Regulatory Commission
OFO	Office of Field Operations
OIT	Office of Information and Technology
ONDCP	Office of National Drug Control Policy
OSHA	Occupational Safety and Health Administration
PEA	Programmatic Environmental Assessment

rad	radiation absorbed dose
rem	roentgen equivalent man
RSO	Radiation Safety Officer
SIP	State Implementation Plan
Sv	sievert
TEDE	Total Effective Dose Equivalent
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation

9 Preparer

Anneke E. Frederick, Environmental Scientist, 16 years in environmental science, conducted research, impact analysis, technical review and editing of this environmental assessment.

10 Distribution List

Jennifer Hass
Environmental Program Office
U.S. Customs and Border Protection
1300 Pennsylvania Avenue, NW
Suite 1220
Washington, DC 20229

Steve Tilden
Radiation Safety Officer
US Customs and Border Protection
7799 Leesburg Pike, Room 6213
Falls Church, VA 20598

Carolyn Whorton
NII Program Manager
U.S. Customs and Border Protection
Interdiction Technology Branch
1300 Pennsylvania Avenue NW,
Suite 1575
Washington, DC 20229

Lance R. LeFleur, Director
Alabama Department of Environmental Management
P.O. Box 301463
Montgomery, AL 36130-1463

Henry R. Darwin, Director
Arizona Department of Environmental Quality
ADEQ Central Office
1110 West Washington Street
Phoenix, AZ 85007

Matthew Rodriguez, Secretary
California Environmental Protection Agency
1001 I Street
P.O. Box 2815
Sacramento, CA 95812-2815

Collin O'Mara, Secretary
Department of Natural Resources and Environmental Control
89 Kings Highway
Dover, DE 19901

Herschel T. Vinyard, Jr., Secretary
Florida Department of Environmental Protection
3900 Commonwealth Boulevard, Mail Slot 49
Tallahassee, FL 32399

F. Allen Barnes, Director
Georgia Environmental Protection Division
Georgia Department of Natural Resources
2 Martin Luther King Jr. Drive, Suite 1152
East Tower
Atlanta, GA 30334

Peggy M. Hatch, Secretary
Louisiana Department of Environmental Quality
P.O. Box 4301
Baton Rouge, LA 70821-4301

Robert Summers, Secretary
Maryland Department of the Environment
1800 Washington Boulevard
Baltimore, MD 21230

Kenneth L. Kimmell, Commissioner
Massachusetts Department of Environmental Protection
One Winter Street, 2nd FloorF
Boston, MA 02108

Trudy Fisher, Executive Director
Mississippi Department of Environmental Quality
P.O. Box 2249
Jackson, MS 39225

Dick Pedersen, Director
Oregon DEQ
811 SW 6th Avenue
Portland, OR 97204-1390

Michael Krancer, Secretary
Pennsylvania Department of Environmental Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

Director
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Mark R. Vickery, P.G. Executive Director
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Deborah Markowitz, Secretary
Vermont Agency of Natural Resources
103 South Main Street, Center Building
Waterbury, VT 05671-0301

Director
Department of Natural and Environmental Resources
P.O. Box 366147
San Juan, PR 00936

Appendix A: Background Information on Ionizing Radiation

The background material contained in this appendix is excerpted from information found in National Council on Radiation Protection and Measures (NCRP) *Uncertainties in Fatal Cancer Risk Estimates Used in Radiation Protection, NCRP Report Number 126*, and is intended to provide the user with the best available background and regulatory information on ionizing radiation.

- **Measurement of Radiation Dose**

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."

Absorbed dose means the energy imparted by ionizing radiation per unit mass of irradiated material. The units of absorbed dose are the rad and the gray (Gy).

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 (an erg is a small but measurable amount of energy) per gram of absorbing material. To indicate the dose an individual receives in the unit rad, the word "rad" follows immediately after the magnitude, for example "50 rad." One thousandth of a rad (millirad) is abbreviated "mrad," and one millionth of a rad (microrad) is abbreviated "µrad."

Dose equivalent (H_T) means the product of the absorbed dose in tissue, quality factor, and all other necessary modifying factors at the location of interest. The units of dose equivalent are the rem and sievert (Sv). At the present time, rem is used in the United States while sieverts are used internationally. Eventually, the United States will adopt these international terms.

The term "rem" (Roentgen equivalent man) is a special unit used for expressing dose equivalent. Some types of 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. To indicate the dose an individual receives in the unit rem, the word "rem" follows immediately after the magnitude, for example "50 rem." One thousandth of a rem (millirem) is abbreviated "mrem," and one millionth of a rem (microrem) is abbreviated "µrem." The quality factor allows for the effect of higher energy deposition along particle tracks produced by various radiation types such as neutrons or alpha particles.

Regulations Covering Radiation Dose

Regulations pertaining to radiation exposure are administered by many different Federal and state agencies under a variety of legislative authorities.

- **Nuclear Regulatory Commission (NRC) (10 CFR Part 20)**

NRC promulgates regulations and establishes standards for protection against radiation arising out of activities conducted under licenses that NRC issues. NRC regulations control the receipt, possession, use, transfer, and disposal of licensed material by any licensee. CBP currently holds an NRC Materials License for ^{137}Cs/ ^{60}Co sealed sources. LEXRIS do not require source or byproduct material for their operation; therefore these regulations do not apply. However, as discussed above, CBP uses the levels provided by the NRC as a conservative approach for limiting radiation exposure by LEXRIS.

- **Occupational Safety and Health Administration (OSHA) (29 CFR 1910.1096)**

OSHA regulations establish standards for protection against ionizing radiation that result in an occupational risk, but do not regulate the safety of licensed radioactive materials. As discussed more fully above, CBP has adopted the same radiation dose limit of 0.1 rem that the NRC prescribes for members of the general public. This approach is more stringent than occupational dose limits established under OSHA. The limit CBP has adopted applies to all CBP personnel and contractors who work with the LEXRIS.

- **Food and Drug Administration (FDA) Performance Standards for Ionizing Radiation Emitting Products (21 CFR Part 1020)**

FDA promulgates regulations and establishes standards for the protection against radiation by setting performance standards that manufacturers of ionizing radiation emitting products must meet. CBP has determined that the total absorbed doses to food from LEXRIS is minute in relation to the average annual background dose of 0.360 rem.

- **Environmental Protection Agency (EPA) Radiation Protection Guidance to Federal Agencies for Occupational Exposure (52 Fed. Reg. 2822 (January 27, 1987))**

Federal radiation exposure protection guidance for occupational exposure is defined in *Radiation Protection Guidance to Federal Agencies for Occupational Exposure.* Administered by the EPA, the guidance was developed cooperatively by the NRC, OSHA, the Mine Safety and Health Administration, the Department of Defense, the Department of Energy, the National Aeronautics and Space Administration, the Department of Commerce, the Department of Transportation, the Department of Health and Human Services, and the EPA. The guidance provides general principles, and specifies the numerical primary guides for limiting worker exposure. It applies to all workers who are exposed to radiation in the course of their work, either as employees of institutions and companies subject to Federal regulation or as Federal employees. It is expected that individual Federal agencies, on the basis of their knowledge of specific worker exposure situations, will use the guidance as the basis upon which to revise or develop detailed standards and regulations to the extent that they have regulatory or

administrative jurisdiction. CBP has procedures to ensure their personnel, contractors and the general public do not exceed radiation exposure of more than 0.1 rem in any one year.

- **State Regulations**

Many states have adopted regulations modeled on the *Suggested State Regulations for Control of Radiation.* Conference of Radiation Control Program Directors, www.crcpd.org/ssrcr.aspx.

Regulatory Jurisdiction

As it applies to the operation of LEXRIS, the applicable regulations are issued by FDA (21 CFR Part 1020) and OSHA (29 CFR 1910.1096).

- The NRC Guidance provided in 10 CFR Part 20, *Standards for Protection Against Radiation*, apply to persons licensed by the NRC to receive, possess, use , transfer, or dispose of byproduct, source, or special nuclear material or to operate a production or utilization facility.
- The EPA guidance provided in 52 Fed. Reg. 2822, *Radiation Protection Guidance to Federal Agencies for Occupational Exposure,* is to be used as the basis upon which individual Federal agencies revise or develop detailed standards and regulations to the extent that they have regulatory or administrative jurisdiction.

Dose Limits

Dose limits represent the upper boundary below which risks from radiation exposure are deemed to be acceptable. Various Federal and state regulations establish dose limits for occupational exposures that occur as a result of a person's employment, and limits for the total exposures received by the public in general.

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 the course of employment in which the individual's assigned duties involve exposure to radiation or to radioactive material from licensed and unlicensed sources of radiation, whether in the possession of the licensee or other person. Occupational dose does not include doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released under §35.75, from voluntary participation in medical research programs, or as member of the public"* (20 CFR 20.1003).

The individuals subject to the occupational dose classification must closely monitor their degree of radiation exposure using dosimeters. The annual occupational dose limit for adults shall not exceed whichever is the more limiting of: a total effective dose equivalent of 5 rems or the sum of the deep-dose equivalent and the committed dose equivalent to any individual organ or tissue (other than the lens of the eye) being equal to 50 rem (10 CFR 20.1201).

The second radiation dose classification, "public dose," is

> *"the dose received by a member of the public from exposure to radiation or to radioactive material released by a licensee, or to another source of radiation under the control of a licensee. Public dose does not include occupational dose or doses received from background radiation, from any medical administration the individual has received, from exposure to individuals administered radioactive material and released under §35.75 or from voluntary participation in medical research programs"* (10 CFR 20.1003).

The total effective dose equivalent to individual members of the general public from the licensed operations shall not exceed 0.1 rem in a year (10 CFR 20.1301). A summary of pertinent dose limits is presented below in Table 4.

Table 4: Summary of Regulatory Dose Limits

Dose Limit by Agency and Regulation (rem in a year)			
	NRC 10 CFR part 20	**EPA 52 Fed. Reg. 2822**	**OSHA 29 CFR 1910.1096**
"Occupational Dose" = "Radiation Workers" in "Restricted Areas"			
Whole Body	5	5	5 (1.25 rem/calendar quarter)
Lens of Eye	15	15	5 (1.25 rem/calendar quarter)
Skin, Hands and Feet	50	50	
Skin of Whole Body	50		30 (7.5 rem/calendar quarter)
Hands and forearms; feet and ankles	50		75 (18.75 rem/calendar quarter)
Minors	10% of above limits	10% of above limits	10% of above limits
Pregnant Women [a]	10% of above limits	10% of above limits	Not Addressed
"Non-Occupational Dose" = "Controlled Area"			
Member of the General Public	0.1 rem in a year	Not Addressed	Not Addressed

Dose Limit by Agency and Regulation (rem in a year)			
	NRC 10 CFR part 20	**EPA 52 Fed. Reg. 2822**	**OSHA 29 CFR 1910.1096**
Radiation Levels in Unrestricted (Uncontrolled) Areas			
Member of the General Public	0.002 rem in any one hour		Not Addressed

[a] Applicable period is nine months, or during the entire length of the pregnancy, rather than 1 year.

Radiation Protection Principles

In the United States and most other countries, three basic principles have governed radiation protection of workers and members of the general public:

1. Any activity involving occupational exposure should be useful enough to society to warrant the exposure of the worker. This same principle applies to virtually any human endeavor that involves some risk of injury.
2. For justified activities, exposure of the work force should be as low as reasonably achievable.
3. To provide an upper limit on risk to individual workers, "limitation" of the maximum allowed dose is required. This is required above the protection provided by the first two principles because their primary objective is to minimize the total harm from occupational exposure to the entire work force; they do not limit the way that harm is distributed among individual workers.

As Low as is Reasonably Achievable

"As Low as is Reasonably Achievable" (ALARA) means making every reasonable effort to maintain exposures to ionizing radiation as far below the dose limits as 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 the 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. This common sense approach means that radiation doses for both workers and the general public are typically kept lower than their regulatory limits.

The principle reduction of exposure to levels that are ALARA is typically implemented in four different ways:

1. Shielding of the source holder.
2. Selection of as small of an amount of source material as is needed.
3. Designing facilities to reduce the anticipated exposure.
4. Designing work practices to reduce the anticipated exposure.

Effective implementation of the ALARA principle involves most facets of an effective radiation protection program: education of workers concerning the health risks of exposure to radiation; training in regulatory requirements and procedures to control exposure; monitoring, assessment and reporting of exposure levels and doses; management and supervision of radiation protection activities (including the choice and implementation of radiation control measures).

A comprehensive radiation protection program will also include, as appropriate: properly trained and qualified radiation protection personnel; adequately designed, operated and maintained facilities and equipment; and quality assurance and audit procedures.

U.S. Customs and Border Protection Dose Limits

- In conformance with ALARA principles, CBP has adopted for its workers the same dose limit that the NRC prescribe for the general public – i.e. 0.1 rem in a year. As a result, CBP establishes a controlled area around each system as described in section 2.2.2 to equally protect CBP personnel, contractors, and the general public from radiation emissions in accordance with the maximum dose permitted under Federal and state regulations. CBP has taken care to model and explore potential exposure to personnel working around these systems, and has, for example, made measurements to determine the effects of scanning an individual by LEXRIS or other NII systems. In addition, CBP has established procedures to ensure CBP personnel, contractors and the general public do not exceed radiation exposure of more than 0.1 rem in any one year.

Health Risks

In their July 2010 revised position statement on radiation risk, the Health Physics Society[12] recommended against the quantitative estimation of health risks below an individual dose of 5 rem in a year or a lifetime dose of 10 rem in addition to natural background. Doses from natural background radiation in the United States average about 0.360 rem per year. Estimation of health risks associated with radiation doses that are of similar magnitude as those received from natural sources should be strictly qualitative and encompass a range of hypothetical health outcomes, including the possibility of no adverse health effects at such low levels.

The Society further states, "While there is substantial and convincing scientific evidence for health risks following high-dose exposures, below 5-10 rem (which includes occupational and

[12] The Health Physics Society is a non-profit scientific professional organization whose mission is excellence in the science and practice of radiation safety. Since its formation in 1956, the Society has grown to approximately 6000 scientists, physicians, engineers, lawyers, and other professionals representing academia, industry, government, national laboratories, the Department of Defense and other organizations. Society activities include encouraging research in radiation science, developing standards and disseminating radiation safety information. Society members are involved in understanding, evaluating and controlling the potential risks form radiation relative to the benefits. Official position statements are prepared and adopted in accordance with standard policies and procedures of the Society.

environmental exposures), risks of health effects are either too small to be observed or nonexistent."

The Society has concluded that estimates of risk should be limited to individuals receiving a dose of 5 rem in any one year or a lifetime dose of 10 rem in addition to natural background. In making risk estimates, specific organ doses and age-adjusted and gender adjusted organ risk factors should be used. Below these doses, risk estimates should not be used. Expressions of risk should only be qualitative, that is, a range based on the uncertainties in estimating risk (NCRP 1997) emphasizing the inability to detect any increased health detriment (that is zero health effects is a probable outcome).

References

National Council on Radiation Protection and Measures (NCRP). (1997) Uncertainties in fatal cancer risk estimates used in radiation protection. Bethesda, MD: NCRP; NCRP Report No. 126.

Health Physics Society (July 2010) Radiation Risk In Perspective. McLean, VA; Report PS010-2

Appendix B: Background Information Concerning Risks from Occupational Radiation Exposure

The background material contained in this appendix is an excerpt of information found in U.S. Nuclear Regulatory Commission Regulatory Guide 8.29, *Instruction Concerning Risks from Occupational Radiation Exposure* (February 1996), and is intended to provide the user with the best available information about the health risks from occupational exposure to ionizing radiation. Ionizing radiation consists of energy or small particles, such as gamma rays and beta and alpha particles, emitted from radioactive materials, which can cause chemical or physical damage when they deposit energy in living tissue. A question and answer format is used. Many of the questions or subjects were developed by the NRC staff in consultation with workers, union representatives and licensee representatives experienced in radiation protection training.

How Is Radiation Measured?

In the United States, radiation dose or exposure is measured in units called rad, rem, or roentgen (R). For practical purposes with gamma and X-rays, these are considered equal: 1 R = 1 rad = 1 rem.

Milli (m) means 1/1000. For example, 1,000 mrad = 1 rad. Micro (μ) means 1/1,000,000. So, 1,000,000 μrad = 1 rad, or 10 μR = 0.000010 R.

The International System of Units (SI system) for radiation measurement use "gray" and "sievert."
1 Gy = 100 rad
1 mGy = 100 mrad
1 Sv = 100 rem
1 mSv = 100 mrem

Is It Safe To Be Around Sources Of Radiation?

High-level radiation exposure (i.e., greater than 10 rem acute) may have potential health risks. From follow-up of the atomic bomb survivors, we know acutely delivered very high radiation doses can increase the occurrence of certain kinds of disease (e.g., cancer) and negative genetic effects. To protect the public, radiation workers and environment from the potential effects of low-level exposure (i.e., less than a lifetime dose of 10 rem), the current radiation safety practice is to prudently assume similar adverse effects are possible with low-level protracted exposure to radiation. Thus, the risks associated with low-level medical, occupational and environmental radiation exposure are conservatively calculated to be proportional to those observed with high-level exposure. These calculated risks are compared to other known occupational and environmental hazards, and appropriate safety standards have been established by international and national radiation protection organizations (e.g., ICRP and NCRP) to control and limit potential harmful radiation effects:

Total Body Radiation Exposure Limits

Limit	Amount of Exposure in a Year
Occupational dose limit	5 rem
Public dose limit	0.1 rem

Both public and occupational dose limits are set to limit cancer risk. It is important to remember when dealing with radiation sources in other materials or waste that there may be chemical or biological hazards separate and distinct from the radiation hazard. These chemical or biological hazards are often more dangerous to humans than the radiation hazard.

What Is Meant By Health Risk?

A health risk is generally thought of as something that may endanger health. Scientists consider health risk to be the statistical probability or mathematical chance that personal injury, illness, or death may result from some action. Most people do not think about health risks in terms of mathematics. Instead, most of us consider the health risk of a particular action in terms of whether we believe that particular action will, or will not, cause us some harm. The intent of this appendix is to provide estimates of, and explain the basis for, the risk of injury, illness, or death from occupational radiation exposure. Risk can be quantified in terms of the probability of a health effect per unit of dose received.

When X-rays, gamma rays, and ionizing particles interact with living materials such as our bodies, they may deposit enough energy to cause biological damage.

Radiation can cause several different types of events such as the very small physical displacement of molecules, changing a molecule to a different form, or ionization, which is the removal of electrons from atoms and molecules. When the quantity of radiation energy deposited in living tissue is high enough, biological damage can occur as a result of chemical bonds being broken and cells being damaged or killed. These effects can result in observable clinical symptoms.

The basic unit for measuring absorbed radiation is the rad. One rad (0.01 gray in the International System of units) equals the absorption of 100 ergs (a small but measurable amount of energy) in a gram of material such as tissue exposed to radiation. To reflect biological risk, rads must be converted to rems. The new international unit is the sievert (100 rem = 1 Sv). This conversion accounts for the differences in the effectiveness of different types of radiation in causing damage. The rem is used to estimate biological risk. For beta and gamma radiation, a rem is considered equal to a rad.

What Are The Possible Health Effects Of Exposure To Radiation?

Health effects from exposure to radiation range from no effect at all to death, including diseases such as leukemia or bone, breast and lung cancer. Very high (100s of rads), short-term doses of radiation have been known to cause prompt (or early) effects, such as vomiting and diarrhea,

skin burns, cataracts and even death. It is suspected that radiation exposure may be linked to the potential for genetic effects in the children of exposed parents. Also, children who were exposed to high doses (20 or more rads) of radiation prior to birth (as an embryo/fetus) have shown an increased risk of mental retardation and other congenital malformations. These effects (with the exception of genetic effects) have been observed in various studies of medical radiologists, uranium miners, radium workers, radiotherapy patients and the people exposed to radiation from atomic bombs dropped on Japan. In addition, radiation effects studies with laboratory animals, in which the animals were given relatively high doses, have provided extensive data on radiation-induced health effects, including genetic effects.

It is important to note that these kinds of health effects result from high doses, compared to occupational levels, delivered over a relatively short period of time.

Although studies have not shown a consistent cause-and-effect relationship between current levels of occupational radiation exposure and biological effects, it is prudent from a worker protection perspective to assume that some effects may occur.

Who Developed Radiation Risk Estimates?

Radiation risk estimates were developed by several national and international scientific organizations over the last 40 years. These organizations include the National Academy of Sciences (which has issued several reports from the Committee on the Biological Effects of Ionizing Radiations, BEIR), the National Council on Radiation Protection and Measurements (NCRP), the International Commission on Radiological Protection (ICRP), and the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR). Each of these organizations continues to review new research findings on radiation health risks.

Several reports from these organizations present new findings on radiation risks based upon revised estimates of radiation dose to survivors of the atomic bombing at Hiroshima and Nagasaki. For example, UNSCEAR published risk estimates in 1988 and 1993 (UNSCEAR 1988, UNSCEAR 1993). The NCRP also published a report in 1988, “New Dosimetry at Hiroshima and Nagasaki and Its Implications for Risk Estimates” (NCRP 1988). In January 1990, the National Academy of Sciences released the fifth report of the BEIR Committee, “Health Effects of Exposure to Low Levels of Ionizing Radiation,” National Research Council, 1990). Each of these publications also provides extensive bibliographies on other published studies concerning radiation health effects for those who may wish to read further on this subject.

What Are The Estimates Of The Risk Of Fatal Cancer From Radiation Exposure?

We don’t know exactly what the chances are of getting cancer from a low-level radiation dose, primarily because the few effects that may occur cannot be distinguished from normally occurring cancers. However, we can make estimates based on extrapolation from extensive

knowledge from scientific research on high dose effects. The estimates of radiation effects at high doses are better known than are those of most chemical carcinogens (NCRP 1989).

From currently available data, the NRC has adopted a risk value for an occupational dose of 1 rem (0.01 Sv) Total Effective Dose Equivalent (TEDE) of 4 in 10,000 of developing a fatal cancer, or approximately 1 chance in 2,500 of fatal cancer per rem of TEDE received. The uncertainty associated with this risk estimate does not rule out the possibility of higher risk, or the possibility that the risk may even be zero at low occupational doses and dose rates.

The radiation risk incurred by a worker depends on the amount of dose received. A worker who receives 5 rems (0.05 Sv) in a year incurs 10 times as much risk as another worker who receives only 0.5 rem (0.005 Sv). Only a very few workers receive doses near 5 rems (0.05 Sv) per year (Raddatz et al 1995).

According to the BEIR V report (National Research Council 1990), approximately one in five adults normally will die from cancer from all possible causes such as smoking, food, alcohol, drugs, air pollutants, natural background radiation and inherited traits. Thus, in any group of 10,000 workers, we can estimate that about 2,000 (20%) will die from cancer without any occupational radiation exposure.

To explain the significance of these estimates, we will use as an example a group of 10,000 people, each exposed to 1 rem (0.01 Sv) of ionizing radiation. Using the risk factor of 4 effects per 10,000 rem of dose, we estimate that 4 of the 10,000 people might die from delayed cancer because of that 1 rem dose (although the actual number could be more or less than 4) in addition to the 2,000 normal cancer fatalities expected to occur in that group from all other causes. This means that a 1 rem (0.01 Sv) dose may increase an individual worker's chances of dying from cancer from 20 percent to 20.04 percent. If one's lifetime occupational dose is 10 rem, we could raise the estimate to 20.4 percent. A lifetime dose of 100 rem may increase chances of dying from cancer from 20 to 24 percent[13]. The average measurable dose for radiation workers reported to the NRC was 0.31 rem (0.0031 Sv) for 1993 (Raddatz et al 1995). Today, very few workers ever accumulate 100 rems (0.015 Sv), which represents an estimated increase from 20 to about 20.06 percent in the risk of dying from cancer.

It is important to understand the probability factors here. A similar question would be, "If you select one card from a full deck of cards, will you get the ace of spades?" This question cannot be answered with a simple yes or no. The best answer is that your chance is 1 in 52. However, if 1000 people each select one card from full decks; we can predict that about 20 of them will get an ace of spades. Each person will have 1 chance in 52 of drawing the ace of spades, but there is no way we can predict which persons will get that card. The issue is further complicated by

[13] Given CBP's standard of 0.1 rem (0.001 Sv) exposure in any one year, the risk would equate to 4 effects per 100,000. This means that a 0.1 rem (0.001 Sv) dose may increase an individual worker's chance of dying from cancer from 20 percent to 20.005 percent. Today, there are virtually no circumstances under which CBP personnel would ever accumulate 100 rem (1 Sv) on the job in a working lifetime.

the fact that in a drawing by 1000 people, we might get only 15 successes, and in another, perhaps 25 correct cards in 1000 draws. We can say that if you receive a radiation dose, you will have increased your chances of eventually developing cancer. It is assumed that the more radiation exposure you get, the more you increase your chances of cancer.

The normal chance of dying from cancer is about one in five for persons who have not received any occupational radiation dose. The additional chance of developing fatal cancer from an occupational exposure of 1 rem (0.01 Sv) is about the same as the chance of drawing any ace from a full deck of cards three times in a row. The additional chance of dying from cancer from an occupational exposure of 10 rem (0.1 Sv) is about equal to your chance of drawing two aces successively on the first two draws from a full deck of cards.

It is important to realize that these risk numbers are only estimates based on data for people and research animals exposed to high levels of radiation in short periods of time. There is still uncertainty with regard to estimates of radiation risk from low levels of exposure. Many difficulties are involved in designing research studies that can accurately measure the projected small increases in cancer cases that might be caused by low exposures to radiation as compared to the normal rate of cancer.

These estimates are considered by the NRC staff to be the best available for the worker to use to make an informed decision concerning acceptance of the risks associated with exposure to radiation. A worker who decides to accept this risk should try to keep exposure to radiation as low as is reasonably achievable (ALARA) to avoid unnecessary risk.

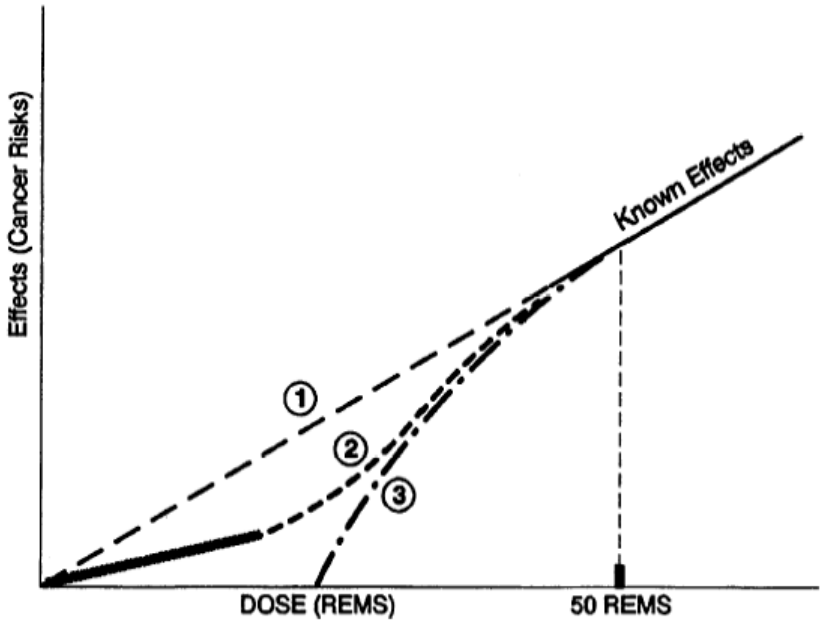
If I Receive A Radiation Dose That Is Within Occupational Limits, Will It Cause Me To Get Cancer?

Probably not. Based on the risk estimates previously discussed, the risk of cancer from doses below the occupational limits is believed to be small. Assessment of the cancer risks that may be associated with low doses of radiation are projected from data available at doses larger than 10 rems (0.1 Sv) (ICRP 1991). For radiation protection purposes, these estimates are made using the straight line portion of the linear quadratic model (See Figure 6 below). We have data on cancer probabilities only for high doses, as shown by the solid line. Only in studies involving radiation doses above occupational limits are there dependable determinations of the risk of cancer, primarily because below the limits the effect is small compared to differences in the normal cancer incidence from year to year and place to place. The ICRP, NCRP and other standards-setting organizations assume for radiation protection purposes that there is some risk, no matter how small the dose (Curves 1 and 2). Some scientists believe that the risk drops off to zero at some low dose (Curve 3), the threshold effect, The ICRP and NCRP endorse the linear quadratic model as a conservative means of assuring safety (Curve 2).

For regulatory purposes, the NRC uses the straight line portion of Curve 2, which shows the number of effects decreasing linearly as the dose decreases. Because the scientific evidence does not conclusively demonstrate whether there is or is not an effect at low doses, the NRC

assumes for radiation protection purposes, that even small doses have some chance of causing cancer. Thus, a principle of radiation protection is to do more than merely meet the allowed regulatory limits; doses should be kept as low as is reasonably achievable (ALARA). This is as true for natural carcinogens such as sunlight and natural radiation as it is for those that are manmade, such as cigarette smoke, smog and X-rays.

Figure 6: Some Proposed Models for How the Effects of Radiation Vary with Doses at Low Levels



How Can We Compare The Risk Of Cancer From Radiation To Other Kinds Of Health Risks?

One way to make these comparisons is to compare the average number of days of life expectancy lost because of the effects associated with each particular health risk. Estimates are calculated by looking at a large number of persons, recording the age when death occurs from specific causes, and estimating the average number of days of life lost as a result of these early deaths. The total number of days of life lost is then averaged over the total observed group.

Several studies have compared the average days of life lost from exposure to radiation with the number of days lost as a result of being exposed to other health risks. The word “average” is important because an individual who gets cancer loses about 15 years of life expectancy, while his or her coworkers do not suffer any loss. Some representative numbers are presented in Table 5. For categories of NRC-regulated industries with larger doses, the average measurable

occupational dose in 1993 was 0.31 rem (0.0031 Sv). A simple calculation based on the article by Cohen and Lee (Cohen et al 1991) shows that 0.3 rem (0.003 Sv) per year from age 18 to 65 results in an average loss of 15 days. These estimates indicate that the health risks from occupational radiation exposure are smaller than the risks associated with many other events or activities we encounter and accept in normal day-to-day activities.

It is also useful to compare the estimated average number of days of life lost from occupational exposure to radiation with the number of days lost as a result of working in several types of industries. Table 6 shows average days of life expectancy lost as a result of fatal work-related accidents. Table 6 does not include non-accidental types of occupational risks such as occupational disease and stress because the data are not available.

These comparisons are not ideal because we are comparing the possible effects of chronic exposure to radiation to different kinds of risks such as accidental death, in which death is inevitable if the event occurs. This is the best we can do because good data are not available on chronic exposure to other workplace carcinogens. Also, the estimates of loss of life expectancy for workers from radiation-induced cancer do not take into consideration the competing effect on the life expectancy of the workers from industrial accidents.

Table 5: Estimated Loss of Life Expectancy from Health Risks

Health Risks	Estimate of Life Expectancy Lost (Average)
Smoking 20 cigarettes a day	6 years
Overweight (by 15%)	2 years
Alcohol consumption (U.S. average)	1 year
All accidents combined	1 year
Motor vehicle accidents	207 days
Home accidents	74 days
Drowning	24 days
All natural hazards (earthquake, lightning, flood, etc.)	7 days
Medical radiation	6 days
Occupational Exposure	
0.3 rem/y from age 18 to 65	15 days
1 rem/y from age 18 to 65	51 days

(Cohen et al 1991)

Table 6: Estimated Loss of Life Expectancy from Industrial Accidents

Industry Type	Estimated Days of Life Expectancy Lost (Average)
All Industries	60
Agriculture	320
Construction	227
Mining and Quarrying	167
Transportation and Public Utilities	160
Government	60
Manufacturing	40
Trade	27
Services	27

(Cohen et al 1991)

What Are The Health Risks From Radiation Exposure To The Embryo/Fetus?

During certain stages of development, the embryo/fetus is believed to be more sensitive to radiation damage than adults. Studies of atomic bomb survivors exposed to acute radiation doses exceeding 20 rads (0.2 Gy) during pregnancy show that children born after receiving these doses have a higher risk of mental retardation. Other studies suggest that an association exists between exposure to diagnostic X-rays before birth and carcinogenic effects in childhood and in adult life. Scientists are uncertain about the magnitude of the risk. Some studies show the embryo/fetus to be more sensitive to radiation-induced cancer than adults, but other studies do not. In recognition of the possibility of increased radiation sensitivity, and because dose to the embryo/fetus is involuntary on the part of the embryo/fetus, a more restrictive dose limit has been established for the embryo/fetus of a declared pregnant radiation worker. See Regulatory Guide 8.13, "Instruction Concerning Prenatal Radiation Exposure."

If an occupationally exposed woman declares her pregnancy in writing, she is subject to the more restrictive dose limits for the embryo/fetus during the remainder of the pregnancy. The dose limit of 500 mrems (5 mSv) for the total gestation period applies to the embryo/fetus and is controlled by restricting the exposure to the declared pregnant woman. Restricting the woman's occupational exposure, if she declares her pregnancy, raises questions about individual privacy rights, equal employment opportunities and the possible loss of income. Because of these concerns, the declaration of pregnancy by a female radiation worker is voluntary. Also, the declaration of pregnancy can be withdrawn for any reason, for example, if the woman believes that her benefits from receiving the occupational exposure would outweigh the risk to her embryo/fetus from the radiation exposure.

Can A Worker Become Sterile Or Impotent From Normal Occupational Radiation Exposure?

No. Temporary or permanent sterility cannot be caused by radiation at the levels allowed under NRC's occupational limits. There is a threshold below which these effects do not occur. Acute doses on the order of 10 rems (0.1 Sv) to the testes can result in a measurable but temporary reduction in sperm count. Temporary sterility (suppression of ovulation) has been observed in women who have received acute doses of 150 rads (1.5 Gy). The estimated threshold (acute) radiation dose for induction of permanent sterility is about 200 rads (2 Gy) for men and about 350 rads (3.5 Gy) for women (National Research Council 1990, Scott et al 1993). These doses are far greater than the NRC's occupational dose limits for workers.

Although acute doses can affect fertility by reducing sperm count or suppressing ovulation, they do not have any direct effect on one's ability to function sexually. No evidence exists to suggest that exposures within the NRC's occupational limits have any effect on the ability to function sexually.

What Are Background Radiation Exposures?

The average person is constantly exposed to ionizing radiation from several sources. Our environment and even the human body contain naturally occurring radioactive materials (e.g., potassium-40) that contribute to the radiation dose that we receive. The largest source of natural background radiation exposure is terrestrial radon, a colorless, odorless, chemically inert gas, which causes about 55 percent of our average, non-occupational exposure. Cosmic radiation originating in space contributes additional exposure. The use of X-rays and radioactive materials in medicine and dentistry adds to our population exposure. As shown below in Table 7, the average person receives an annual radiation dose of about 0.36 rem (3.6 mSv). By age 20, the average person will accumulate over 7 rems (70 mSv) of dose. By age 50, the total dose is up to 18 rems (180 mSv). After 70 years of exposure this dose is up to 25 rems (250 mSv).

Table 7: Average Annual Effective Dose Equivalent to Individuals in the United States

Source		Effective Dose Equivalent (mrems)	
Natural			
	Radon	200	
	Other than Radon	100	
	Total Natural		300
Nuclear Fuel Cycle			0.05
Consumer Products[b]			9
Medical			
	Diagnostic X-Rays	39	
	Nuclear Medicine	14	
	Total Medical		53
Total			About 310 mrems/year

(NCRP 1987).

References

B.L. Cohen and I.S. Lee, "Catalog of Risks Extended and Updated," Health Physics, Vol. 61, September 1991.

B.R. Scott et al., "Health Effects Model for Nuclear Power Plant Accident Consequence Analysis," Part I: Introduction, Integration, and Summary, U.S. Nuclear Regulatory Commission, NUREG/CR-4214, Revision 2, Part I, October 1993.

C.T. Raddatz and D. Hagemeyer, "Occupational Radiation Exposure at Commercial Nuclear Power Reactors and Other Facilities, 1993," U.S. Nuclear Regulatory Commission, NUREG-0713, Volume 15, January 1995.

International Commission on Radiological Protection (ICRP), Annals of the ICRP, Risks Associated with Ionizing Radiation, Volume 22, No.1, Pergamon Press, Oxford, UK, 1991.

National Council on Radiation Protection and Measurements (NCRP), New Dosimetry at Hiroshima and Nagasaki and Its Implications for Risk Estimates, Proceedings of the Twenty-third Annual Meeting of the National Council on Radiation Protection and Measurements Held on April 8-9, 1987 (1988).

National Council on Radiation Protection and Measurements (NCRP), Comparative Carcinogenicity of Ionizing Radiation and Chemicals, NCRP Report No. 96, March 1989.

National Council on Radiation Protection and Measurements (NCRP), Ionizing Radiation Exposure of the Population of the United States, NCRP Report No. 93, September 1987.

National Research Council, Health Effects of Exposure to Low Levels of Ionizing Radiation, Report of the Committee on the Biological Effects of Ionizing Radiation (BEIR V), National Academy Press, Washington, DC, 1990.

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR); Sources, Effects and Risks of Ionizing Radiation, Report E.88.IX.7, United Nations, New York, 1988.

United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), Sources, Effects and Risks of Ionizing Radiation, United Nations, New York, 1993.

Appendix C: Notice of Availability

2562 Federal Register / Vol. 77, No. 11 / Wednesday, January 18, 2012 / Notices

submitted will be summarized and included in the request for Office of Management and Budget (OMB) approval. All comments will become a matter of public record. In this document the CBP is soliciting comments concerning the following information collection:

Title: Passenger List/Crew List.

OMB Number: 1651–0103.

Form Number: CBP Form I–418.

Abstract: CBP Form I–418 is prescribed by the Department of Homeland Security, Customs and Border Protection (CBP), for use by masters, owners, or agents of vessels in complying with Sections 231 and 251 of the Immigration and Nationality Act (INA). This form is filled out upon arrival of any person by water at any port within the United States from any place outside the United States. The master or commanding officer of the vessel is responsible for providing CBP officers at the port of arrival with lists or manifests of the persons on board such conveyances. CBP is working to allow for electronic submission of the information on CBP Form I–418. This form is provided for in 8 CFR 251.1, 251.3, and 251.4. A copy of CBP Form I–418 can be found at *http://forms.cbp.gov/pdf/CBP_Form_I418.pdf.*

Current Actions: This submission is being made to extend the expiration date with no change to information collected or to CBP Form I–418.

Type of Review: Extension (without change).

Affected Public: Businesses.

Estimated Number of Respondents: 95,000.

Estimated Time per Respondent: 1 hour.

Estimated Total Annual Hours: 95,000.

Dated: January 12, 2012.

Tracey Denning,

Agency Clearance Officer, U.S. Customs and Border Protection.

[FR Doc. 2012–865 Filed 1–17–12; 8:45 am]

BILLING CODE 9111–14–P

DEPARTMENT OF HOMELAND SECURITY

U.S. Customs and Border Protection

Notice of Availability of the Draft Programmatic Environmental Assessment for the Deployment and Operation of Low Energy X-Ray Inspection Systems at U.S. Customs and Border Protection Operational Areas

AGENCY: U.S. Customs and Border Protection, Department of Homeland Security.

ACTION: Notice of Availability and Request for Comments.

SUMMARY: U.S. Customs and Border Protection (CBP) is advising the public that a draft Programmatic Environmental Assessment (PEA) for Low Energy X-Ray Inspection Systems (LEXRIS) at CBP operational areas has been prepared and is available for public review. The draft PEA analyzes the potential environmental impacts due to the deployment and use of LEXRIS. CBP seeks public comment on the draft PEA. CBP will consider comments before issuing a final PEA.

DATES: The draft PEA will be available for public review and comment for a period of 30 days beginning on the date this document is published in the **Federal Register**. To ensure consideration, comments must be received by February 17, 2012. Comments regarding the draft PEA may be submitted as set forth in the **ADDRESSES** section of this document.

ADDRESSES: Copies of the draft PEA may be obtained by accessing the following Internet addresses: *http://ecso.swf.usace.army.mil/Pages/Publicreview.cfm* or *www.dhs.gov/nepa,* or by sending a request to David Duncan of CBP by telephone (202) 344–1527 by fax (202) 344–1418, by email to *david.c.duncan@dhs.gov* or by writing to: CBP, Attn: David Duncan, 1300 Pennsylvania Avenue NW., Suite 1575, Washington, DC 20229.

You may submit comments on the draft PEA by mail or email. Comments are to be addressed to CBP, Attention: David Duncan, 1300 Pennsylvania Avenue NW., Suite 1575, Washington, DC 20229, or sent to *david.c.duncan@dhs.gov.*

Substantive comments received during the comment period will be addressed in, and included as an appendix to, the final PEA. The final PEA will be made available to the public through a Notice of Availability in the **Federal Register**.

Respondents may request to withhold names or street addresses, except for city or town, from public view or from disclosure under the Freedom of Information Act. Such request must be stated prominently at the beginning of the comment and will be honored to the extent allowed by law. A request to withhold personal information does not apply to submissions from organizations or businesses, or from individuals identifying themselves as representatives or officials of organizations or businesses.

FOR FURTHER INFORMATION CONTACT: Antoinette DiVittorio, Environmental and Energy Division, U.S. Customs and Border Protection, telephone (202) 344–3131.

SUPPLEMENTARY INFORMATION:

Background

A draft Programmatic Environmental Assessment (PEA) for the deployment and operation of Low Energy X-Ray Inspection Systems (LEXRIS) at CBP operational areas has been completed by the U.S. Customs and Border Protection (CBP), Office of Information and Technology, Laboratories and Scientific Services, Interdiction Technology Branch. The draft PEA is available for public comment.

The purpose of deploying and operating LEXRIS is to non-intrusively scan vehicles for the presence of contraband, including weapons of mass destruction, explosives, and illicit drugs. Use of LEXRIS at U.S. ports of entry, for example, directly supports CBP's mission of securing the U.S. borders and homeland from terrorists and other threats while simultaneously facilitating legitimate trade and travel by assisting CBP personnel in preventing contraband, including illegal drugs and terrorist weapons, from entering the United States.

Two different LEXRIS models are available. One system is mobile, mounted on a truck or van type platform and will be used at CBP operational areas. The system can be driven along side a parked vehicle and will scan the vehicle as it drives by. The driver and passenger(s) will exit the vehicle to be scanned and be escorted outside the controlled area before the vehicle is scanned. The other system is a stationary, portal configuration that will be installed along an existing traffic lane. Vehicles will be scanned as they are driven through the portal. Occupants of the vehicle will have the option of remaining in the vehicle while the driver drives it through the portal or exiting the vehicle and having CBP personnel drive it through the portal. Examples of CBP operational areas include, but are not limited to, ports of entry, CBP checkpoints, and locations of events designated as national special security events.

LEXRIS is needed to fill a unique capability to detect objects that are not effectively visualized by other non-intrusive inspection technologies currently used by CBP. LEXRIS gives a clear image of objects in the vehicle, including objects that may be hidden in fenders, tires, trunks, gas tanks, and under hoods. LEXRIS provides CBP personnel with information about what may be encountered during a manual search and, in some cases, will

eliminate the need for CBP personnel to manually enter vehicles to search for contraband. As a result, LEXRIS will increase the safety of CBP personnel.

The draft PEA addresses the potential impacts from the installation and operation of LEXRIS at various CBP operational areas throughout the United States for the purpose of conducting non-intrusive inspections. Evaluations were conducted on various resources present at operational areas, including: climate, soils, water quality, air quality, vegetation, wildlife, noise, infrastructure, aesthetics, and radiological health and safety.

Next Steps

This process is being conducted pursuant to the National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321 *et seq.*), the Council on Environmental Quality Regulations for Implementing the NEPA (40 CFR parts 1500–1508), and Department of Homeland Security Directive 023–01, *Environmental Planning Program*, (April 19, 2006).

Substantive comments concerning environmental impacts received from the public and agencies during the comment period will be evaluated to determine whether further environmental impact review is needed in order to complete the Final PEA. The Final PEA will be made available to the public through a Notice of Availability in the **Federal Register**.

Should CBP determine, after review of the comments, that the implementation of the proposed action would not have a significant impact on the environment, it will prepare a Finding of No Significant Impact (FONSI), and a Notice of Availability of the FONSI for publication in the **Federal Register**.

Should CBP determine that significant environmental impacts exist due to the action, CBP will prepare a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) for publication in the **Federal Register**.

Dated: January 12, 2012.

Karl H. Calvo,

Executive Director, Facilities Management and Engineering, Office of Administration.

[FR Doc. 2012–809 Filed 1–17–12; 8:45 am]

BILLING CODE 9111–14–P

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[LLAZ91000.L14300000.ET0000. LXSIURAM0000, AZA 35138]

Public Land Order No. 7787; Withdrawal of Public and National Forest System Lands in the Grand Canyon Watershed; Arizona

AGENCY: Bureau of Land Management, Interior.

ACTION: Public Land Order.

SUMMARY: This order withdraws approximately 1,006,545 acres of public and National Forest System lands from location and entry under the Mining Law of 1872, 30 U.S.C. 22–54, subject to valid existing rights, for a period of 20 years in order to protect the Grand Canyon Watershed from adverse effects of locatable mineral exploration and development.

DATES: This Order is effective on January 21, 2012.

FOR FURTHER INFORMATION CONTACT: Chris Horyza, Bureau of Land Management, Arizona State Office, One North Central Avenue, Suite 800, Phoenix, Arizona 85004, (602) 417–9446 or Liz M. Schuppert, U.S. Forest Service, Kaibab National Forest, 800 South 6th Street, Williams, Arizona 86046, (928) 635–8367. Persons who use a telecommunications device for the deaf (TDD) may call the Federal Information Relay Service (FIRS) at 1–(800) 877–8339 to reach the Bureau of Land Management or U.S. Forest Service contact during normal business hours. The FIRS is available 24 hours a day, 7 days a week, to leave a message or question with either of the above individuals. You will receive a reply during normal business hours.

SUPPLEMENTARY INFORMATION: The public and National Forest System lands described in this order are within Coconino and Mohave Counties, Arizona. The lands will remain open to the mineral leasing laws, geothermal leasing laws, mineral material sales laws, and other public land laws. Non-Federal interests within the area described are not affected by this order. If the non-Federal interests within the boundaries of the area described in this order are subsequently acquired by the United States, the non-Federal interests will become subject to the withdrawal.

Order

By virtue of the authority vested in the Secretary of the Interior by section 204 of the Federal Land Policy and Management Act of 1976, 43 U.S.C. 1714, it is ordered as follows:

1. Subject to valid existing rights, the following described public and National Forest System lands are hereby withdrawn from location and entry under the Mining Law of 1872 (30 U.S.C. 22–54), but not from the mineral leasing, geothermal leasing, mineral materials or other public land laws, in order to protect the Grand Canyon Watershed from adverse effects of locatable mineral exploration and development:

Gila and Salt River Meridian

South Parcel

T. 28 N., R. 1 E.,
Sec. 1;
Sec. 2, lots 1 and 2, S½NE¼, and SE¼;
Sec. 11, E½;
Sec. 12.
T. 29 N., R. 1 E.,
Secs. 1, 2, and, secs. 11 to 14, inclusive;
Sec. 23, E½;
Secs. 24 and 25;
Sec. 26, E½;
Sec. 35, NW¼NE¼NE¼, N½NW¼NE¼, SW¼NW¼NE¼, NW¼SE¼NW¼NE¼, NW¼NW¼SW¼NE¼, SE¼SE¼SW¼NE¼, E½SE¼NE¼, E½NW¼SE¼NE¼, SW¼SE¼NE¼, and SE¼;
Sec. 36.
T. 30 N., R. 1 E.,
Secs. 1 and 2:
Secs. 11 to 14, inclusive;
Secs. 23 to 26, inclusive;
Secs. 35 and 36.
T. 31 N., R. 1 E.,
Sec. 17, lots 2, 3, S½NE¼, W½, and SE¼;
Secs. 18, 19, and 20;
Sec. 21, lot 2, W½NE¼, SE¼NE¼, W½, and SE¼;
Secs. 27 to 35, inclusive.
T. 28 N., R. 2 E.,
Secs. 1 to 6, inclusive;
Sec. 7, excluding MS 1419;
Secs. 8 to 13, inclusive.
T. 29 N., Rs. 2, 3, and 4 E.
T. 30 N., R. 2 E.,
Secs. 2 to 11, inclusive;
Secs. 13 to 36, inclusive.
T. 27 N., R. 3 E.,
Sec. 1.
T. 28 N., R. 3 E.,
Secs. 1 to 18, inclusive;
Secs. 23 to 25, inclusive;
Sec. 36.
T. 30 N., R. 3 E.,
Secs. 15 to 36, inclusive.
T. 27 N., R. 4 E.,
Secs. 1 to 6, inclusive.
T. 28 N., Rs. 4 and 5 E.
T. 30 N., R. 4 E.,
Sec. 13, 24, 25, and 26;
Sec. 27, S½;
Sec. 28, S½;
Sec. 29, S½;
Sec. 30, lots 3 to 7, inclusive, NE¼SW¼ and N½SE¼;
Secs. 31 to 36, inclusive.
T. 27 N., R. 5 E.,
Secs. 1 to 6, inclusive.
T. 29 N., R. 5 E., partly unsurveyed.
T. 30 N., R. 5 E.,

Appendix D: Response to Public Comments

From: Beth Altazan-Dixon [mailto:Beth.Dixon@LA.GOV]
Sent: Monday, February 06, 2012 9:29 AM
To: DUNCAN, DAVID C
Subject: DEQ SOV 120125/0230 US Customs and Border Protection-NOA

February 6, 2012

David Duncan
US Department of Homeland Security
1300 Pennsylvania Ave NW, Suite 1575
Washington, D.C. 2029
david.duncan@dhs.gov

RE: 120125/0230 US Customs and Border Protection-NOA
Draft PEA for Low Energy X-Ray Inspection Systems

Dear Mr. Duncan:

The Department of Environmental Quality (LDEQ), Business and Community Outreach Division has received your request for comments on the above referenced project.

After reviewing your request, the department has no objections based on the information provided in your submittal. However, for your information, the following general comments have been included. Please be advised that if you should encounter a problem during the implementation of this project, you should immediately notify LDEQ's Single-Point-of-contact (SPOC) at (225) 219-3640.

- Please take any necessary steps to obtain and/or update all necessary approvals and environmental permits regarding this proposed project.
- If your project results in a discharge to waters of the state, submittal of a Louisiana Pollutant Discharge Elimination System (LPDES) application may be necessary.
- If the project results in a discharge of wastewater to an existing wastewater treatment system, that wastewater treatment system may need to modify its LPDES permit before accepting the additional wastewater.
- All precautions should be observed to control nonpoint source pollution from construction activities. LDEQ has stormwater general permits for construction areas equal to or greater than one acre. It is recommended that you contact the LDEQ Water Permits Division at (225) 219-3181 to determine if your proposed project requires a permit.
- If your project will include a sanitary wastewater treatment facility, a Sewage Sludge and Biosolids Use or Disposal Permit application or Notice of Intent must be submitted no later than June 1, 2011. Additional information may be obtained on the LDEQ website at http://www.deq.louisiana.gov/portal/tabid/2296/Default.aspx or by contacting the LDEQ Water Permits Division at (225) 219- 3181.
- If any of the proposed work is located in wetlands or other areas subject to the jurisdiction of the U.S. Army Corps of Engineers, you should contact the Corps directly regarding permitting issues. If a Corps permit is required, part of the application process may involve a water quality certification from LDEQ.
- All precautions should be observed to protect the groundwater of the region.
- Please be advised that water softeners generate wastewaters that may require special limitations depending on local water quality considerations. Therefore if your water system

improvements include water softeners, you are advised to contact the LDEQ Water Permits to determine if special water quality-based limitations will be necessary.

- Any renovation or remodeling must comply with LAC 33:III.Chapter 28, Lead-Based Paint Activities; LAC 33:III.Chapter 27, Asbestos-Containing Materials in Schools and State Buildings (includes all training and accreditation); and LAC 33:III.5151, Emission Standard for Asbestos for any renovations or demolitions.
- If any solid or hazardous wastes, or soils and/or groundwater contaminated with hazardous constituents are encountered during the project, notification to LDEQ's Single-Point-of-Contact (SPOC) at (225) 219-3640 is required. Additionally, precautions should be taken to protect workers from these hazardous constituents.

Additionally, based on the information provided, the Assessment Division has no comments regarding this project. However, if the project scope changes in the future, please notify LDEQ before implementation.

Please send all future requests to my attention. If you have any questions, please feel free to contact me at (225) 219-3958 or by email at beth.dixon@la.gov.

Sincerely,

Beth Altazan-Dixon, EPS III
Performance Management
LDEQ/Office of the Secretary
Business and Community Outreach and Incentives Division
P.O. Box 4301 (602 N. 5th Street)
Baton Rouge, LA 70821-4301
Phone: 225-219-3958
Fax: 225-325-8148
Email: ***beth.dixon@la.gov***

Response to the Louisiana Department of Environmental Quality: Their comments have been noted.

Bryan W. Shaw, Ph.D., *Chairman*
Buddy Garcia, *Commissioner*
Carlos Rubinstein, *Commissioner*
Mark R. Vickery, P.G., *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

January 27, 2012

Mr. David Duncan
U.S. Department of Homeland Security
U.S. Customs and Border Protection
Washington, DC 20229

Re: TCEQ Grant and Texas Review and Comment System (TRACS) #2012-040, Notice of Availability of the Draft Programmatic Environmental Assessment for Deployment and Operation of Low Energy X-Ray Inspection Systems at U.S. Custom and Border Protection Operational Areas

Dear Mr. Duncan:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers following comments:

The proposed action may take place in nonattainment areas in Texas, however, information presented in the draft environmental assessment does not give any indication that activity associated with the project will contribute to exceedances of the National Ambient Air Quality Standards.

We do not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities are completed in accordance with applicable local, state and federal statutes and regulations. We agree with a finding of no significant impact and have no objection to the release of funds for this project. We recommend that best management practices to control runoff from construction sites be utilized to prevent impact to surface and groundwater.

Thank you for the opportunity to review this project. If you have any questions, please contact Ms. Janie Roman at (512)239-0604 or Janie.roman@tceq.texas.gov.

Sincerely,

Jim Harrison, Director
Intergovernmental Relations Division

Response to the Texas Commission on Environmental Quality: Air quality conditions will be assessed for each location before LEXRIS is deployed. It is known that LEXRIS operations could result in increased air emissions from the mobile LEXRIS diesel engine and onboard diesel generator. In addition, there could be minute increases in idling and low speed emissions from vehicles waiting to be scanned and being moved into scan areas or moving through the portal LEXRIS. The emission levels from operation of portal and mobile LEXRIS are not expected to result in air quality exceedances or SIP violations. Furthermore, LEXRIS operations have not significantly increased air quality emissions at sites with existing LEXRIS (San Ysidro and Otay Mesa, which are nonattainment areas for ozone and moderate maintenance areas for carbon monoxide). Based on this information, the Proposed Action is not anticipated to exceed any standards for criteria air pollutants.