DRAFT Environmental Assessment for Deployment of Z® Backscatter Screening Systems, San Ysidro Port of Entry San Diego County, California

March 2008

U.S. Customs and Border Protection

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

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Executive Summary

Introduction

This draft environmental assessment (EA) evaluates the environmental consequences expected to result from the deployment of two Z® Backscatter Screening Systems at the San Ysidro Port of entry (POE) in San Diego County, California. This EA 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, 40 C.F.R. Parts 1500-1508, and U.S. Department of Homeland Security (DHS) Management Directive 5100.1 "Environmental Planning Program," (April 19, 2006), which establishes policy and procedures to ensure the integration of environmental considerations into DHS's mission planning and project decision making. [See also, 71 Fed.Reg.16,790 (April 4, 2006).]

Purpose and Need

The purpose of the Proposed Action is the fielding and operation of two Z® Backscatter Screening Systems at the San Ysidro port of entry (POE) to non-intrusively screen vehicles for the presence of low z (low density) objects, such as explosives and drugs, after such vehicles have been directed to secondary inspection areas. Z® Backscatter Screening Systems will directly support the mission of U.S. Customs and Border Protection (CBP) by assisting CBP Officers in preventing contraband, including illegal drugs and terrorist weapons, from entering the United States, while also facilitating the flow of legitimate trade and travel.

More than 17 million cars passed through the San Ysidro POE during fiscal year 2006, making it the busiest land port in the nation (CBP 2007a). Z® Backscatter technology is needed because it fills a unique niche in the types of inspection tools, including gamma-ray and standard X-ray non-intrusive inspection (NII) technology, that are presently being used by CBP at the nation's POEs. Z® Backscatter Screening Systems do not use any radioactive source or byproduct material. Instead, Z® Backscatter Screening Systems use low dose electrically generated X-rays along with a unique capability of "backscatter." Backscatter detects low z (low density) objects which are not normally seen when using a transmission X-ray. In comparison to the technology currently used by CBP, the backscatter capability provides a much clearer image of low density objects that may be hidden in car fenders, tires, trunks, gas tanks, or under the hood. Due to space constraints, other NII technology currently in use at other ports of entry cannot be accommodated at the San Ysidro POE. In comparison, the small footprint required for the installation and operation of Z® Backscatter Screening Systems make them and ideal choice for the San Ysidro POE. Thus the Proposed Action adds a critical dimension to the inspection capabilities of CBP.

Proposed Action and Alternatives Considered

Under NEPA, the proponent for an action is responsible for considering a reasonable range of alternatives that could accomplish the agency's objectives. If alternatives were eliminated from detailed study, reasons for their elimination must be briefly discussed. After consideration, two alternatives were rejected and eliminated from further analysis. The following two alternatives are the subject of a detailed discussion in section 2 of this EA. In summary, this EA evaluated two alternatives:

- Alternative 1: Fielding and operation of two Z® Backscatter Screening Systems at the San Ysidro POE. This was identified as the preferred alternative.
- Alternative 2: No action alternative (status quo). Inspections will continue at the POE using existing technologies as well as manual inspections by CBP Officers.

Proposed Action

The Proposed Action is for CBP to field and operate one Z® Backscatter Van™ (ZBV™; a mobile Z® Backscatter Screening System) and one Z® Portal™ (a stationary Z® Backscatter Screening System) at the San Ysidro POE. All vehicles directed from primary inspection lanes to secondary inspection areas will be screened by the Z® Backscatter Screening Systems. The images created by this X-ray technology will be scrutinized by CBP Officers for the presence of contraband as well as for persons attempting to illegally enter the country by hiding within a vehicle.

No Action Alternative

The No Action Alternative is the status quo, to continue inspecting vehicles directed to secondary inspection areas with current methods and technologies. At San Ysidro POE, this includes small scale alternative NII technology, visual and manual inspections, as well as the use of canines to detect contraband. CBP Officers will continue to face risks associated with physically dismantling vehicles suspected of carrying contraband and crawling into confined spaces to detect and retrieve hidden merchandize or persons.

Although the No Action Alternative does not meet the purpose and need, it serves as a basis of comparison to the Proposed Action and other alternatives.

Other Alternatives Considered

Seven additional alternatives were evaluated on their ability to provide CBP with the capability to inspect vehicles for low z (low density) merchandise:

- 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 the CBP 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 are less effective at identifying low z (low density) material than the Z Backscatter Screening Systems; Alternatives (3) and (4) require control areas that could not be accommodated within the limited space available at the POE.
- Alternative (5), trace-chemical detection systems, require either physical contact to collect samples of trace materials or use 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. This would take time, perhaps 90 seconds to 3 minutes for each test and therefore does not meet the requirements of this port at this time.
- 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 this location.
- Alternative (8), ultrasonic imaging systems, require contact with the target. Studies show that even at a distance of 2 meters, ultrasonic imaging systems have difficulty in imaging metal objects and would therefore be inadequate at detecting low-z materials
- Alternative (9), quadrupole resonance imaging, is unable to scan vehicles on the move. The detector (or object) must remain stationary while making a measurement. Quadrupole resonance imaging is also 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.

Given these limitations, Z Backscatter is the only available technology that meets the CBP need.

Environmental Consequences of the Proposed Action and Alternatives

This EA documents that the Proposed Action will result in no significant environmental impacts, direct, indirect, cumulative or otherwise.

Climate – The Proposed Action will not have an adverse effect on the climate.

Geology and Soils – No construction is required for the fielding or operation of the mobile Z® Backscatter Screening System (ZBV™). Minimum construction is required for installation of the stationary system (Z® Portal™). Construction associated with the Z® Portal™ will include removing existing pavement to place the footers of the system. The dimensions of the Z® Portal™ are 23.9 feet wide (across the traffic lane), 14.8 feet high and 8 feet deep. Excavation will occur to approximate depths of 1-2 feet into the subsurface for the Z® Portal™ footings (2 footings each measuring approximately 7 feet long by 10 feet wide). Soils associated with the San Ysidro POE are classified as Tujunga sand with 0-5 percent slopes, excessively drained soils (USDA 2007). Due to the previously disturbed location and minimally intrusive construction methods associated with installation of the Z® Portal™, no impact to soils is anticipated from the Proposed Action.

Hydrology and Water Quality – The Proposed Action will not affect hydrology, water resources or water quality.

Floodplains – The POE is not located in a floodplain. Floodplains will not be impacted as a result of the Proposed Action.

Wetlands – The Proposed Action will occur on previously paved surfaces and will not impact any wetlands.

Coastal Zone – The Proposed Action is not located within the California coastal zone and will not impact the coastal zone or the Tijuana River Estuary, which is protected under the National Estuarine Research Reserve Program that was established through the Coastal Zone Management program. California's coastal zone generally extends 1,000 yards inland from the mean high tide line. The San Ysidro POE is 5.5 miles from the Pacific Ocean. In addition, the San Ysidro POE is located 3.75 miles to the east of the Tijuana River Estuary.

Vegetation and Wildlife – The two Z® Backscatter Screening Systems will be deployed and operated on existing asphalt and concrete surfaces. The Proposed Action will not have an adverse impact on vegetation or wildlife resources.

Threatened and Endangered Species – The POE does not support habitat conditions for any threatened or endangered species that may occur in the area, nor is it considered a critical habitat for any species. No threatened or endangered species will be affected by the Proposed Action

Air Quality – Air quality impacts associated with the Proposed Action would be limited to localized effects associated with emissions generated by the Z® Backscatter Screening Systems and any idling vehicles during operations. Estimated emissions resulting from the Proposed Action were found to be substantially lower than the state and federal requirements for this area. Conformity analysis conducted in accordance with 40 C.F.R.

Part 93, shows emissions for these criteria to be *de minimis*. No long-term air quality impacts would occur. See section 3.2 for further discussion of air quality.

Noise – Noise impacts currently resulting from the entry of vehicles into the United States at the San Ysidro port of entry would remain unchanged under the Proposed Action. Noise impacts would be limited to short-term effects from equipment used during construction. Noise associated with construction is considered a point source, with attenuation at a rate of 6 decibels per doubling rate. The distance to the 65 Ldn (day-night noise level) contour (commonly used for planning purposes to identify impacts to sensitive receptors such as residences, schools, and hospitals) is approximately 450 feet. Because of the absence of any noise-sensitive receptors within 450 feet of the Z® Backscatter Screening Systems, noise generated during construction activities is anticipated to be temporary and less than significant.

Land Use and Zoning – The Proposed Action is consistent with current land uses and zoning at the POE.

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 long-term change to the character of the area would occur as a result of the Proposed Action because the deployment site; the POE, already exists.

Infrastructure and Utilities – Adequate utilities exist at the POE to support the Proposed Action.

Traffic and Transportation – The Proposed Action will benefit the flow of traffic at the POE by reducing wait times in secondary inspection. There will be no construction of additional traffic lanes associated with the Proposed Action.

Waste Management – Wastes associated with the Proposed Action are used oil and lubricants for the operation and maintenance of the Z® Backscatter Screening Systems. These will be accumulated and stored in compliance with applicable regulations at or near the point of generation and recycled by a licensed used oil recycler. 40 C.F.R. Part 279 exempts used oil and lubricants from regulation as a hazardous waste if they are recycled and not mixed with any other hazardous wastes. It is not anticipated that the operation and maintenance of the Z® Backscatter Screening Systems will generate amounts of hazardous wastes that would have any affect on the POE's current generator status. There is no radioactive source or byproduct material used in the Z® Backscatter Screening Systems therefore, there is no risk of a release of radioactive materials.

Historic and Archeological (Cultural) Resources – The Proposed Action will occur in an industrial facility where there is no potential to impact resources that are listed on, or potentially eligible for listing on, the National Register of Historic Places. There are no known archeological resources within the POE associated with the Proposed Action. There is minimal construction and excavation related to the Proposed Action.

Implementing the Proposed Action will not have a significant impact on cultural or historic resources.

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 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 not quantifiable and will not be further evaluated in this document.

Environmental Justice – Implementation of the Proposed Action will not have any negative effect on minority and low-income populations or children. The exposure levels resulting from a scan by the Z® Backscatter Screening Systems are so low that no one (including children) who crosses the border frequently will have adverse exposure risk.

Irreversible and Irretrievable Commitment of Resources – Irreversible and irretrievable commitment of resources associated with the Proposed Action will be materials, utilities, labor and time expended on the installation and operation of the Z® Backscatter Screening Systems.

Radiological Health and Safety – While the use of any X-ray screening system must be evaluated to ensure that there are no adverse impacts to the health and safety of the traveling public, CBP Officers, and POE employees, the Z® Backscatter Screening Systems are designed and operated to avoid these impacts. As promulgated by the Nuclear Regulatory Commission (NRC) in 10 C.F.R Part 20, the maximum permissible level of radiation dose to the general public is 0.1 rem (100 mrem, 100,000 µrem) in a year. This same standard has been adopted by the State of California. As explained more fully below, CBP will use this protective limit for both travelers and CBP employees and other POE workers.

Vehicle Occupants – An independent radiation survey to measure the dose to vehicle occupants that could occur from a screen by the Z® Portal™ was conducted by a Certified Health Physicist. Vehicle screens were conducted on a 4-door sedan automobile. Screens last for approximately one second. The highest reading obtained from a single screen was 0.000003 rem (0.003 mrem, 3 µrem). This dose is 120,000 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 33,333 times less than the levels set by the NRC to protect the general public (0.1 rem (100 mrem, 100,000 µrem) in a year). This means that a person would have to be screened by the Z® Portal™ more than 33,333 times in a year to exceed the exposure limits set by the NRC and the State of California for members of the general public. It is not reasonable to expect that a person would make 33,333 trips a year across the border.

Based on this testing and analysis, radiation exposure levels from the Z® Portal™ will be so low that it is concluded that radiation from the Z® Portal™ will not have a significant adverse impact on vehicle occupants who are screened by it. By comparison, a person receives a dose of approximately 0.006 rem (6 mrem, 6,000 µrem) per test from a chest

X-ray and a dose of approximately 0.001 rem (1 mrem, 1,000 µrem) per test from a dental X-ray (American Nuclear Society 2008).

Radiation exposure from the mobile van (ZBV™) is even less than the Z® Portal™ because drivers and passengers exit their vehicles before the screening and remain outside of the controlled area during the screening. Therefore, drivers and passengers would not be exposed to radiation from a ZBV™ screen. To determine whether a person hidden in a vehicle was at risk, the CBP Radiation Safety Officer conducted testing to determine the exposure that such a person would receive from a ZBV™ screen. Testing revealed that the total absorbed dose to any person hiding in a vehicle would be approximately 0.000000844 rem (0.000844 mrem, 0.844 µrem) per ZBV™ screen. This dose is 426,540 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 118,483 times below levels permissible to the general public (0.1 rem (100 mrem, 100,000 µrem) in a year.

Assuming 0.000000844 rem (0.000844 mrem, 0.844 µrem) per ZBV™ screen, to reach the maximum allowable "in a year" radiation dose, a person would have to be screened 118,483 times in a year. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the ZBV™ will not have a significant impact on persons hiding in screened vehicles.

CBP Officers and POE Employees **–** Due to the nature of their work, CBP Officers and POE employees who work around the Z® Backscatter Screening Systems have the potential to be "occupationally exposed"[1] to radiation. The Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) allow a higher permissible exposure level ("occupational dose") for radiation workers in restricted areas (5 rem (5,000 mrem, 5,000,000 µrem) in a year) but CBP has elected to use the general public protection standard of 0.1 rem (100 mrem, 100,000 µrem) in a year as the maximum permissible level of radiation dose for CBP officers and POE employees (50 times more stringent than occupational dose limits). The radiation dose from the Z® Backscatter Screening Systems will be no more than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour since personnel will stand behind a marker delineating a "controlled area." An analysis of potential exposure was based on 2,000 work hours per year as the maximum exposure time. This assumes that an individual spends all of a forty-hour work week, every week of the year, standing at the boundary of the Z® Backscatter Screening Systems controlled area. Even under those circumstances, neither CBP Officers nor POE employees will experience a cumulative dose greater than the NRC limit for protecting the general public.

The CBP Radiation Safety Officer also conducted field testing to determine the dose that CBP Officers that operate the ZBV™ could receive. The measured absorbed dose for ZBV™ operators is 0.000000493 rem (0.000493 mrem, 0.493 µrem) per screen, or an average of 0.000012 rem (0.12 mrem,12 µrem) per hour. If the maximizing assumption is made that a CBP Officer could spend 2,000 hours operating the ZBV™ in a year, the greatest potential exposure in a year would be 0.024 rem (24 mrem, 24,000 µrem)

[1] As defined by the International Commission on Radiological Protection (ICRP) (ICRP, 2007)

[0.000012 rem (0.12 mrem,12 µrem) per hour x 2,000 hours = 0.024 rem (24 mrem, 24,000 µrem]. This is less than one fourth the level established by the NRC to protect the general public, 0.1 rem (100 mrem, 100,000 µrem) in a year, and one fourth of the maximum exposure rate of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour that CBP will enforce through the utilization of controlled areas.

Controlled Areas – The side panels and top of the Z® Portal™; through built-in shielding, limit the radiation to background levels therefore, the only possible exposure is at the entrance and exit of the installation. A controlled area will be clearly marked at the entrance and exit to establish the proximity within which CBP officers and POE employees may stand. The dimensions for the Z® Portal™ controlled area will extend 10 feet at the entrance and exit of the Z® Portal™. The vertical dimension of the Z® Portal™ controlled area is from ground level to a height of 15 feet. In the extreme, a system operator could be situated at the edge of the controlled area closest to the Z® Portal™ eight hours a day, every workday of the year (that is to say, 2,000 hours per year) and not receive more than the limits prescribed by the NRC and the State of California. The controlled areas ensure that the systems conform to the radiation protection guidelines of reducing the radiation levels As Low as is Reasonably Achievable (ALARA). ALARA is defined in 10 C.F.R. 20.1003 as: "(acronym for "as low as is reasonably achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest." In addition, 10 C.F.R. 20.1101(b) requires that: "[t]he licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)."

The controlled area for the ZBV™ travels with the van itself. The dimensions of the ZBV™ controlled area are 30 feet in length and 36 feet in width. The controlled area is 24 feet from the side where the X-ray beam is located (the van's passenger side), and 5 feet from the other three sides. The vertical dimension of the ZBV™ controlled area is from ground level to a height of 24 feet. At the edges of this controlled area, the radiation dose will not exceed 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. The radiation dose of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour is inclusive of background radiation, which accounts for approximately half (0.0002-0.0003 rem (0.02-0.03 mrem, 20-30 µrem) in any one hour) of the radiation dose.

Analysis and testing for this Environmental Assessment shows that exposures are expected to be well below the maximum levels of exposure set by the NRC, OSHA and State of California to protect workers and the general public; therefore, the health and safety impacts from radiological exposure for the Proposed Action were found to not be significant. See section 3.3 for further discussion of radiological health and safety.

Summary of Mitigation Actions Planned

Mitigation Measures for Wastes – Petroleum, oils, and lubricants will be stored, handled, and disposed of in compliance with applicable laws and regulations. Procedures for the safe refueling of the ZBV™ and for the containment and clean-up of potential spills will be in accordance with existing POE procedures for preventing and controlling releases. CBP personnel will be trained in spill prevention and countermeasures as required by the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. §6901, *et seq.*) and the Oil Pollution Act of 1990 (OPA) (33 U.S.C §2701 *et seq.*)

Mitigation Measures for Radiological Health and Safety – Mitigation measures 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 screening operations supervisors in the hazards associated with radiation producing equipment.
- Incorporation of radiation safety engineering controls (E-Stops) on the equipment.
- Training operators and screening operations supervisors in the location and use of radiation safety engineering controls (E-Stops).
- The establishment of radiation controlled areas during screening operations. "Controlled area" is defined by 10 C.F.R. 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." In order to limit the cumulative radiation dose to no more than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour, CBP will establish controlled areas for the Z® Backscatter Screening Systems. CBP has elected to use the term "controlled area" rather than "restricted area" because the screening systems are not in continuous screening mode. Further, "restricted area" traditionally has other uses at the POE and does not accurately describe the level of caution that the NRC and CBP desires to communicate to the public. CBP has informed the NRC of the use of this terminology.

Cumulative Impacts

"Cumulative impact" is defined by the Council on Environmental Quality in 40 C.F.R 1508.7 as the impact on the environment that 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. The following relevant issues were analyzed for potential cumulative effects.

Air Quality

A few additional vehicles in operation at the POE due to the Proposed Action or possible future additions of NII equipment will not create measurable effects in an environment which is dominated by tens of thousands of vehicles and where air pollution control technologies such as those required to meet Tier 2 emissions standards for cars and light trucks are continually reducing pollution per vehicle.

Radiological Health and Safety

NII equipment has little potential to create cumulative health impacts under normal operating conditions when it is used for its intended purpose by qualified personnel under the supervision of a radiation safety officer in accordance with applicable health and safety regulations. Even where an individual has received medical and dental X-rays or radiation therapy for a chronic illness, this additional radiation is too little to cause any adverse cumulative effect.

Controlled areas are calculated and verified 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 workers, the general public and contents of adjacent buildings. Limiting access to the controlled areas ensures that the public (which includes system operators and POE personnel) are not exposed to radiation levels exceeding those prescribed by state and federal regulations (see Appendix B and Appendix C).

Findings and Conclusions

The evaluation of the Proposed Action, fielding and operation of two Z® Backscatter Screening Systems at the San Ysidro POE, demonstrates that there will be no significant, adverse effects on the human or natural environment as long as identified mitigation measures are followed. Therefore, no further environmental impact analysis is warranted.

Table of Contents

Executive Summary i
Introduction i
Purpose and Need i
Proposed Action and Alternatives Considered ii
Proposed Action ii
No Action Alternative ii
Other Alternatives Considered ii
Environmental Consequences of the Proposed Action and Alternatives iii
Summary of Mitigation Actions Planned ix
Cumulative Impacts ix
Findings and Conclusions x
1 Introduction 1
1.1 Background 1
1.2 Purpose and Need 2
1.3 Public Involvement 4
1.4 Framework for Analysis 5
1.5 Description of the AS&E™ Z® Backscatter Technology 5
1.5.1 Z® Backscatter Van™ (ZBV™) 6
1.5.2 Z® Portal™ Screening System 7
1.5.3 Controlled Area 8
2 The Proposed Action and Alternatives 11
2.1 Alternative 1 – Proposed Action 11
2.2 Alternative 2 – No Action/Status Quo 11
2.3 Other Alternatives Considered 11
3 The Affected Environment and Consequences 13
3.1 Preliminary Impact Scoping 13
3.2 Air Quality 17
3.2.1 Criteria for Significance 17
3.2.2 Baseline Environment 18
3.2.3 Potential Consequences 20
3.3 Radiological Health and Safety 23
3.3.1 Criteria for Significance 23
3.3.2 Baseline Environment 23
3.3.3 Potential Consequences 24
4 Cumulative Impacts 30
4.1 Past and Present Actions Relevant to the Proposed Action and Alternative 30
4.2 Reasonably Foreseeable Actions that Could Interact with the Proposed Action and Alternative 30
4.3 Analysis of Cumulative Effects 31
4.3.1 Air Quality 31
4.3.2 Radiological Health and Safety 31
5 Findings and Conclusions 32
5.1 Findings 32
5.2 Mitigation 37

5.3 Conclusions ... 37
6 References ... 38
7 Persons and Organizations Contacted ... 40
8 Acronyms and Abbreviations ... 41
9 List of Preparers ... 43
10 Distribution List ... 44
Appendix A: Correspondence ... 47
Appendix B: Background Information on Ionizing Radiation ... 62
Appendix C: Background Information Concerning Risks from Occupational Radiation Exposure ... 69

List of Figures

Figure 1: San Ysidro Port of Entry and Vicinity ... 4
Figure 2: Concept of Backscatter X-Ray Technology ... 6
Figure 3: Z® Backscatter Van™ (ZBV™) ... 7
Figure 4: Z® Portal™ ... 8
Figure 5: Z® Portal™ Controlled Area ... 9
Figure 6: ZBV™ Controlled Area ... 10

List of Tables

Table 1: Preliminary Impact Scoping ... 13
Table 2: Threshold Conformity Criteria for Non-Attainment Areas ... 19
Table 3: Threshold Conformity Criteria for Maintenance Areas ... 19
Table 4: ZBV™ Emissions Estimate: Engine, Generator, and Combined ... 22
Table 5: Summary of Regulatory Dose Limits ... 66

1 Introduction

The U.S. Customs and Border Protection (CBP), a component of the Department of Homeland Security (DHS), proposes to deploy one mobile and one stationary Z® Backscatter Screening System at the San Ysidro port of entry (POE). All vehicles directed to secondary inspection areas will be screened for the presence of contraband or persons attempting to illegally enter the country by hiding within a vehicle. The "backscatter" X-ray process generates remarkably clear images of softer materials that are difficult or impossible to image with other X-ray and gamma imaging technologies. A comprehensive description of the "backscatter" X-ray technology and systems is found in section 2 of this environmental assessment (EA).

1.1 Background

DHS was established in the aftermath of the terrorist attacks of September 11, 2001. The following elements are central to the mission of the department:

> AWARENESS – Identify and understand threats, assess vulnerabilities, determine potential impacts, and disseminate timely information to our homeland security partners and the American public.
>
> PREVENTION – Detect, deter, and mitigate threats to our homeland.
>
> PROTECTION – Safeguard our people and their freedoms, critical infrastructure, property, and the economy of our Nation from acts of terrorism, natural disasters, or other emergencies.
>
> RESPONSE – Lead, manage, and coordinate the national response to acts of terrorism, natural disasters, or other emergencies.
>
> RECOVERY – Lead national, state, local, and private sector efforts to restore services and rebuild communities after acts of terrorism, natural disasters, or other emergencies.
>
> SERVICE – Serve the public effectively by facilitating lawful trade, travel, and immigration.
>
> ORGANIZATIONAL EXCELLENCE – Value our most important resource, our people. Create a culture that promotes a common identity, innovation, mutual respect, accountability and teamwork to achieve efficiencies, effectiveness, and operational synergies.

On March 1, 2003, the Immigration and Naturalization Service (INS) ceased to exist, U.S. Customs was renamed CBP and various border functions from INS and the Department of Agriculture were transferred to CBP. As the single, unified border agency, CBP's mission is vitally important to the protection of America and the American people. CBP's priority mission is preventing terrorists and terrorist weapons from entering the United States, while also facilitating the flow of legitimate trade and travel. In performing its mission, CBP intercepts large quantities of contraband at the seaports and ports of entry (POEs). For example, in Fiscal Year 2007 alone, a total of 2,786,137 pounds of marijuana, 281,371 pounds of cocaine, 3,248 pounds of methamphetamine, and 2,167 pounds of heroin were seized nationally by CBP (CBP 2007b).

To improve the inspection process, CBP continuously seeks technological solutions that are safe for both humans and the environment and are cost effective.

One method of conducting inspections used by CBP involves the use of non-intrusive inspection (NII) technology, which use X-ray or gamma radiation sources to "see" into motor vehicles and cargo containers to identify potential contraband as well as persons attempting to illegally enter the country by hiding within a vehicle. These NII technologies can perform effective, rapid inspections without having to physically enter into or unload motor vehicles or containers, thereby reducing the risks for CBP Officers.

At the ports of entry, CBP's Office of Field Operations (OFO) secures the flow of people and cargo into and out of the country, while facilitating legitimate travel and trade. OFO's Strategic Plan, *Securing America's Borders at Ports of Entry, Office of Field Operations Strategic Plan FY 2007–2011*, defines CBP's national strategy for securing America's borders specifically at the ports of entry. OFO's strategic plan includes a mission statement that fully supports the CBP mission statement, but narrows the scope to ports of entry. "Ports of entry are America's gateways. At ports of entry, CBP prevents entry of people and goods that are prohibited or threaten our citizens, infrastructure, resources, and food supply, while efficiently facilitating legitimate trade and travel." Z® Backscatter Screening Systems directly supports the four elements outlined below in the operational vision for secure borders at the ports of entry. The successful combination of these elements creates ports of entry where only lawful border crossers and legitimate goods are allowed to enter the United States:

Deterrence – Potential violators are unwilling to attempt to enter the country through the ports of entry.

Interception – Dangerous and inadmissible people and goods are detected and prevented from entry.

Facilitation – Known low-risk people and goods are separated from those of higher risk and moved quickly and securely through the port.

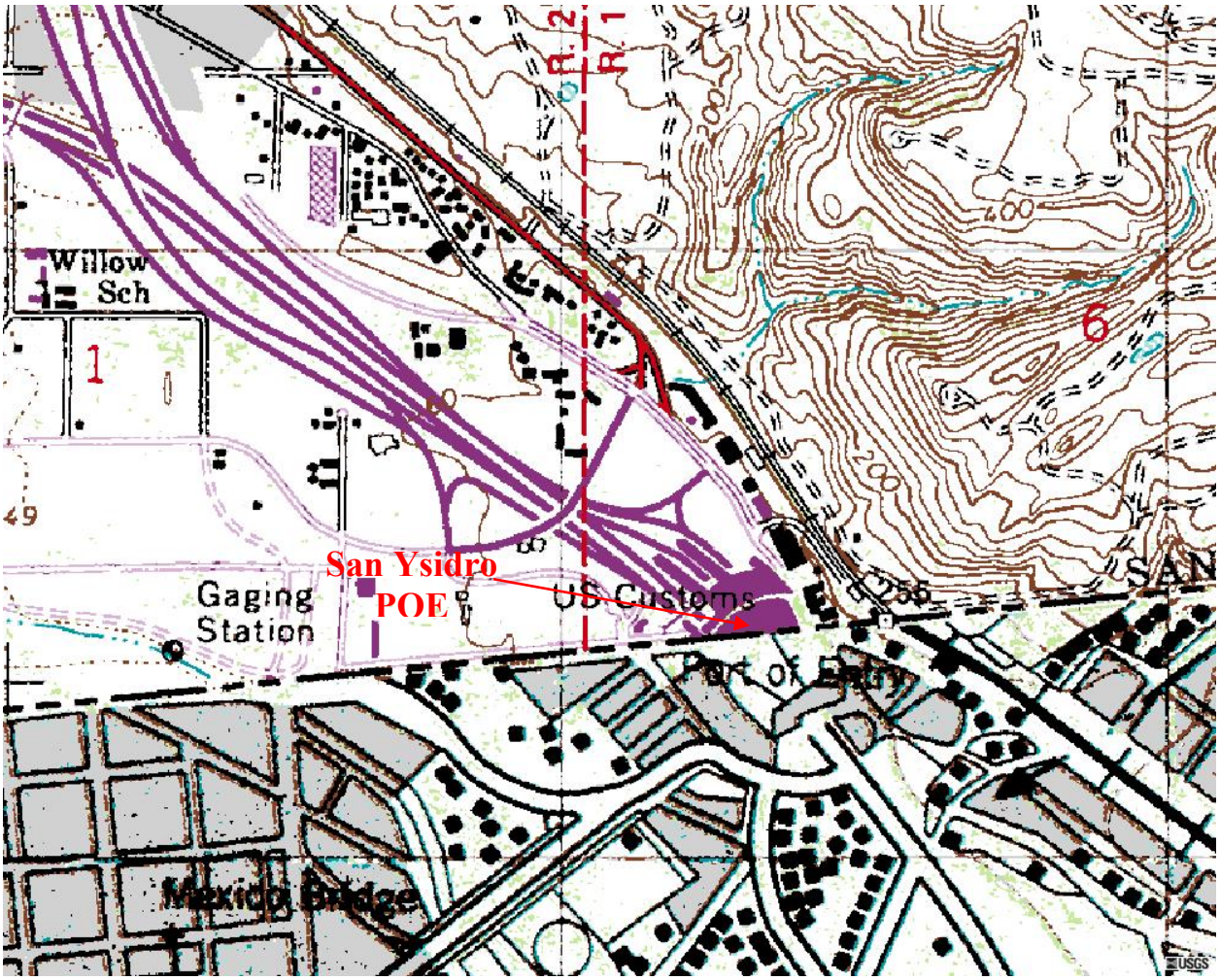
Consistency – Violators have an equal risk of detection and prevention regardless of mode of transportation or port of entry.

1.2 Purpose and Need

The purpose of the Proposed Action is the fielding and operation of two Z® Backscatter Screening Systems at the San Ysidro POE to non-intrusively inspect vehicles for the presence of low z (low density) objects after these vehicles have been directed to secondary inspection areas. The Z® Portal™ (stationary system) would be installed in the entrance lane of the secondary inspection area to screen vehicles as they enter the inspection area. The ZBV™ (mobile system) will be used to screen vehicles unable to travel through the Z® Portal™ because of size limits and will serve as a secondary inspection unit for vehicles that signal an alarm at the Z® Portal™.

More than 17 million cars passed through the San Ysidro POE during fiscal year 2006, making it the busiest land port in the nation (CBP 2007a). Z® Backscatter technology is needed because it fills a unique niche in the types of inspection tools, including gamma-ray and standard X-ray non-intrusive inspection (NII) technology, that are presently being used by CBP at the nation's POEs. Z® Backscatter Screening Systems do not use any radioactive source or byproduct material. Instead, Z® Backscatter Screening Systems use low dose electrically generated X-rays along with a unique capability of "backscatter." Backscatter detects low z (low density) objects which are not normally seen when using a transmission X-ray. In comparison to the technology currently used by CBP, the backscatter capability provides a much clearer image of low density objects that may be hidden in car fenders, tires, trunks, gas tanks, or under the hood. Due to space constraints, other NII technology currently in use at other ports of entry cannot be accommodated at the San Ysidro POE. In comparison, the small footprint required for the installation and operation of Z® Backscatter Screening Systems make them and ideal choice for the San Ysidro POE. Thus the Proposed Action adds a critical dimension to the inspection capabilities of CBP. The location of the San Ysidro POE is indicated in Figure 1.

Figure 1: San Ysidro Port of Entry and Vicinity



1.3 Public Involvement

In keeping with established policy regarding an open decision-making process, this EA and resulting decision document of either a Finding of No Significant Impact (FONSI) or a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) will be made available to agencies and the general public for review and comment. A Notice of Availability (NOA) will be published in applicable local newspapers and copies of the EA made available to the general public at local libraries and public review website: http://aerc.swf.usace.army.mil/Pages/Publicreview.cfm.

For further information on the Proposed Action or to request a copy of the EA, please contact Ms. Sharon Sharp-Harrison, Branch Director, Office of Information and Technology, Laboratories and Scientific Services, Interdiction Technology Branch, 1300 Pennsylvania Avenue, NW, Suite 1575, Washington, DC 20229.

1.4 Framework for Analysis

This EA was prepared in compliance with the National Environmental Policy Act (NEPA), (Public Law 91-190, 42 U.S.C. 4321-4347, as amended), the Council on Environmental Quality (CEQ) Regulations for implementing the procedural provisions of NEPA (40 C.F.R. Parts 1500-1508) and DHS Management Directive 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 EA is intended to be a concise public document that provides sufficient evidence and analysis for determining whether to prepare an EIS 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 section 4, "Cumulative Impacts," of this EA.

1.5 Description of the AS&E™ Z® Backscatter Technology

American Science and Engineering's (AS&E) Z® Backscatter Screening Systems employ a proprietary technology that is protected by more than 20 patents. Although these systems 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 "backscatter" X-ray technology. (A visual representation of the backscatter effect is presented in Figure 2 below).

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, objects with higher density block or absorb more X-rays than objects with lesser density. This attribute of X-rays is the basis for the creation of medical X-rays, or shadow-grams. In contrast, lower density materials, or materials that have a lower atomic number, scatter the X-rays, a phenomenon that is known as "Compton Scattering." Higher atomic number materials or elements are more likely to absorb X-rays rather than scatter them.

Z® Backscatter Screening Systems analyze these "backscatter" photons to create their unique images. In doing so, the systems 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 inspection. This enables the systems to generate high quality images of organic and "low z" (low atomic number) materials even when such substances are hidden in a complex environment. This capability distinguishes Z® Backscatter systems from traditional X-ray and gamma imaging inspection systems, which are suited to creating images of much denser substances.

Organic materials are effectively imaged by the Z® Backscatter Screening Systems because they contain low atomic number (low z) elements such as carbon, oxygen, hydrogen, and nitrogen. This ability to create images of low density materials makes Z® Backscatter technology a highly valuable tool for intercepting such materials at various POE's.

Figure 2: Concept of Backscatter X-Ray Technology

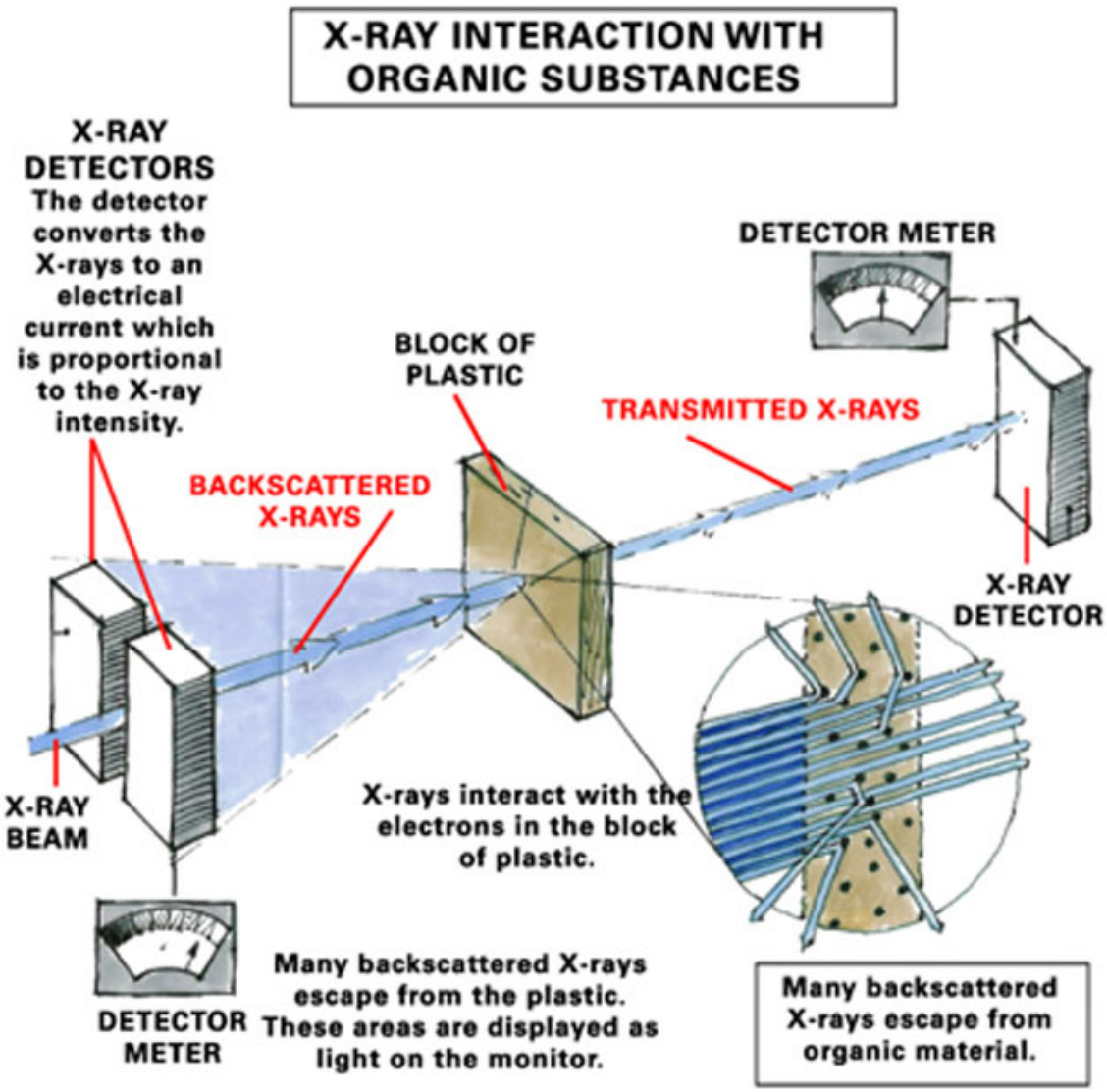


Image courtesy of AS&E

1.5.1 Z® Backscatter Van™ (ZBV™)

Figure 3 shows a photograph of the ZBV™ parked alongside a line of cars. The van itself 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 "backscatter" X-ray technology that is on board. The van measures 20 feet long by 7 feet wide.

A controlled area, as designated by the CBP Radiation Safety Officer (RSO), will be established around the ZBV™. This controlled area is to prevent CBP Officers, other personnel and the public from receiving a cumulative radiation dose of greater than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. Measuring 30 feet by 36 feet, the controlled area travels with the ZBV™, is 24 feet from the side with the X-ray beam (the passenger side), and is 5 feet from the other three sides as shown in Figure 6. The vertical limit is from ground level to a height of 24 feet.

Figure 3: Z® Backscatter Van™ (ZBV™)

Image courtesy of AS&E

1.5.2 Z® Portal™ Screening System

The Z® Portal™ Screening System is a drive through inspection system capable of screening cars, vans, trucks, and buses. The Z® Portal™ is available in two sizes, the large size capable of screening buses and cargo containers and the small size for passenger vehicles. The small system is proposed for installation at the San Ysidro POE, (Figure 4). Vehicles will travel through the Z® Portal™ at approximately 3 miles per hour (similar to speeds currently attainable by vehicles traveling through secondary inspection areas). Capable of screening 120 vehicles an hour, Z® Portal™ is ideal for high traffic areas with limited space, such as the San Ysidro POE. The dimensions of the Z® Portal™ are 23.9 feet wide, 14.8 feet high and 8 feet deep. A controlled area, as designated by the CBP RSO, will be established around the Z® Portal™. This controlled area is to prevent CBP Officers, other personnel, and the public from receiving a cumulative dose of greater than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. The controlled area will extend 10 feet on each side (forward and back) of the Z® Portal™, as shown in Figure 5. The vertical limit is from ground level to a height of 15 feet. The controlled area will be

marked with paint on the pavement. Physical barriers will prevent CBP Officers, other personnel, and the public from unintentionally standing in this area.

Figure 4: Z® Portal™

Image courtesy of AS&E

1.5.3 Controlled Area

CBP will establish controlled areas around each Z Backscatter® Screening System which will limit the potential exposure to CBP Officers, other personnel and the public to below 0.00005 rem (0.05 mrem, 50 µrem), in any one hour.

The dimensions for the Z® Portal™ 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 Z® Portal™ controlled area is from ground level to a height of 15 feet. The dimensions for the ZBV™ are 30 feet in length and 36 feet in width. The controlled area travels with the ZBV™, and is 24 feet from the side where the X-ray beam is located (the van's passenger side), and is 5 feet from the other three sides as shown in Figure 6. The vertical dimension of the ZBV™ controlled area is from ground level to a height of 24 feet. At the edges of these controlled areas the radiation dose will not exceed 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. The radiation dose of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour is inclusive of background radiation which accounts for approximately half (0.0002-0.0003 rem (0.02-0.03 mrem, 20-30 µrem) in any one hour) of the radiation dose.

Figure 5: Z® Portal™ Controlled Area

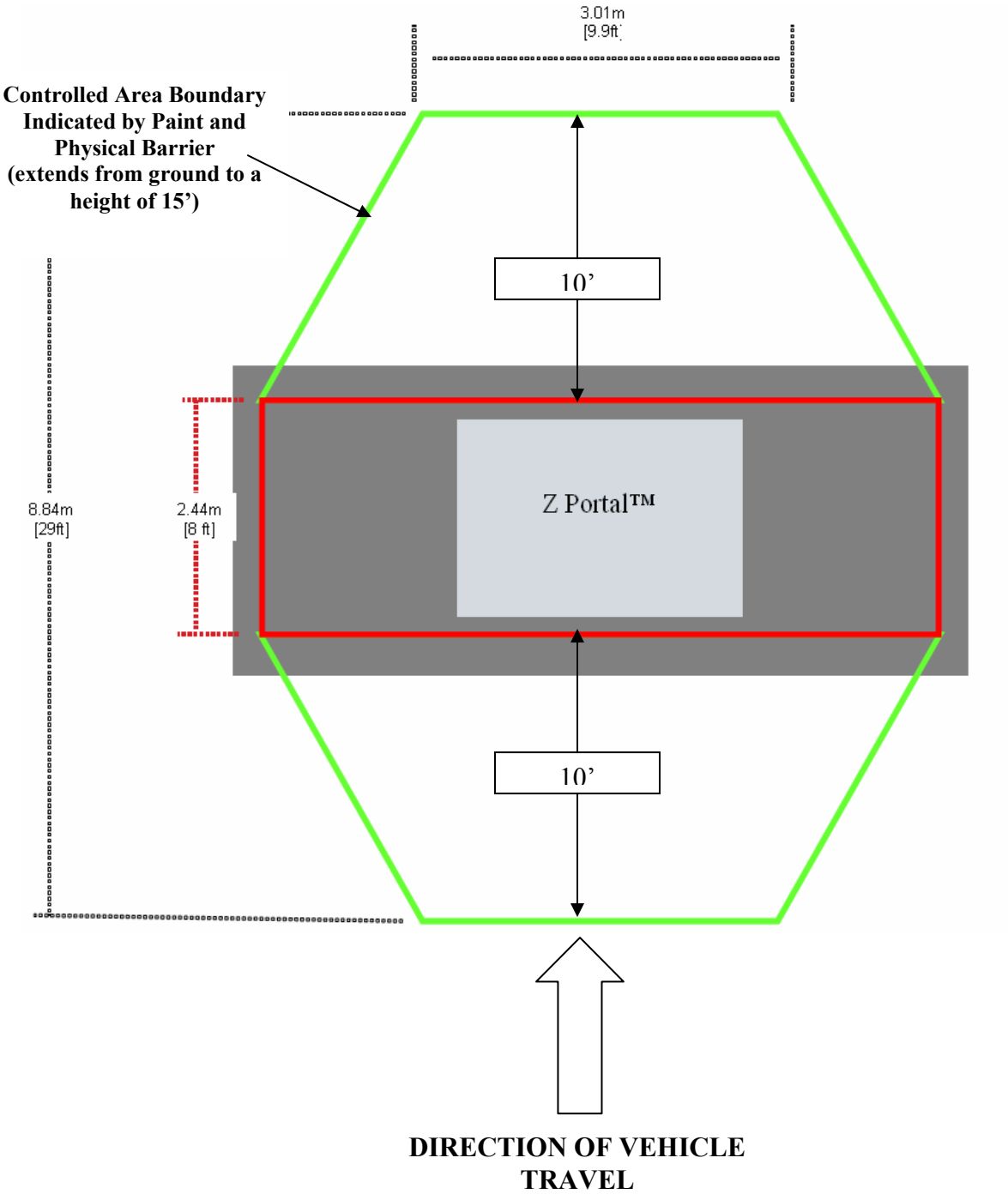
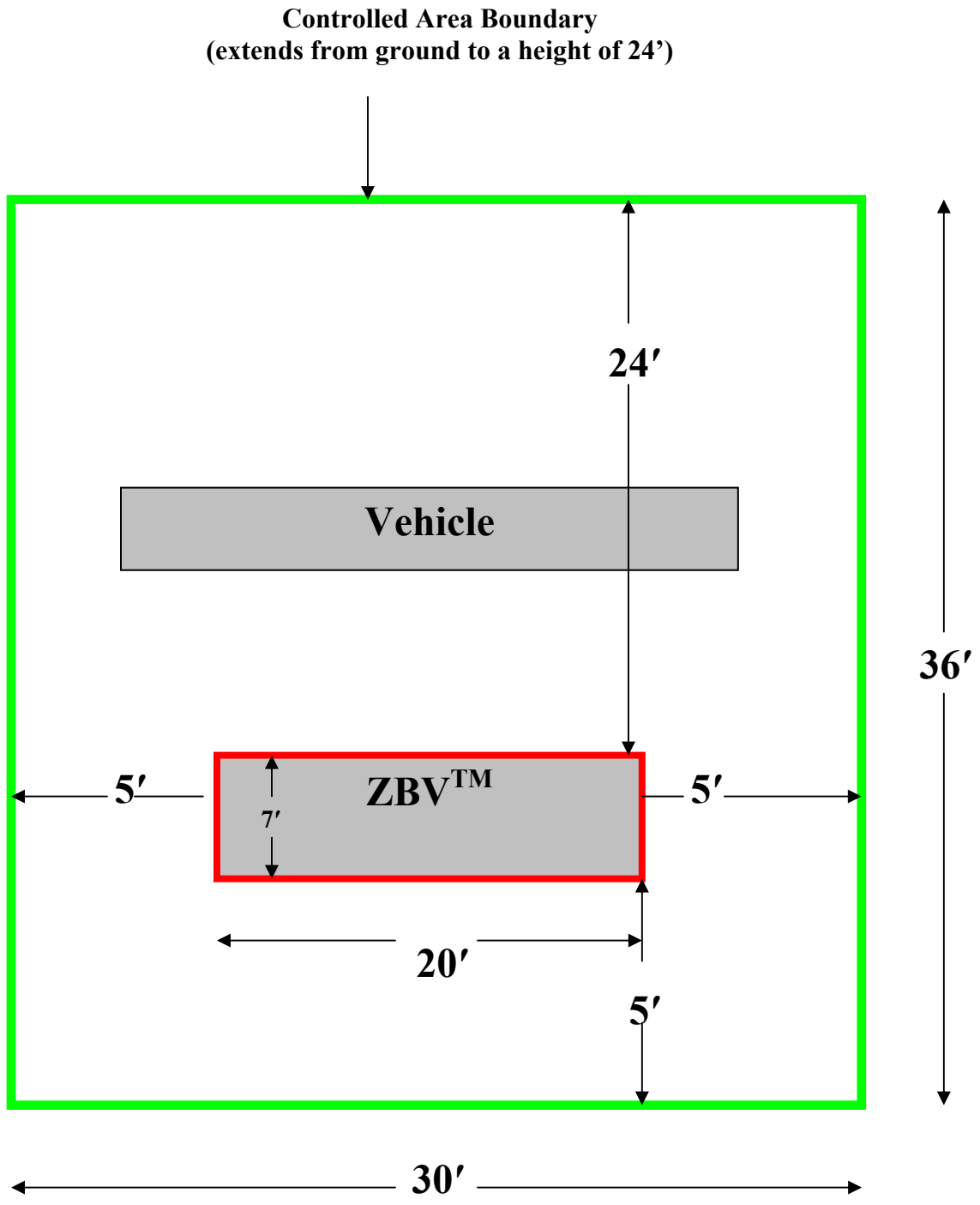


Figure 6: ZBV™ Controlled Area



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. Seven alternatives were considered, but rejected from further consideration as discussed in Section 2.3. Two alternative action scenarios were evaluated in detail for the EA.

- Alternative 1: Fielding and Operation of two Z® Backscatter Screening Systems
- Alternative 2: The No-Action Alternative

Fielding and Operation of the Z® Backscatter Screening Systems was chosen as the preferred alternative and is presented as the Proposed Action, in this EA. Analysis of the No Action Alternative is also carried forward in this EA.

2.1 Alternative 1 – Proposed Action

The Proposed Action consists of the fielding and operation of one mobile and one stationary Z® Backscatter Screening System at the San Ysidro POE, for the purpose of conducting non-intrusive inspections (NIIs) of vehicles for the presence of contraband as well as for persons attempting to illegally enter the country by hiding within a vehicle. Both systems are discussed in section 1.5. There is no additional construction or infrastructure required for the operation or storage of the systems with the exception of very minimal pavement cutting.

2.2 Alternative 2 – No Action/Status Quo

The No Action Alternative is to continue to inspect vehicles entering the United States at the San Ysidro POE with existing equipment and methods. With respect to passenger vehicles at the San Ysidro POE, this inspection process involves visual and manual inspection with a limited number of tools such as small scale alternative NII technology, and canine inspection. This approach is not as efficient and effective at detecting the range of materials which could be detected with the Z® Backscatter technology in addition to current inspection techniques. Furthermore, it would not reduce the need for CBP Officers to enter potentially dangerous situations to carry out these inspections. Although the No Action Alternative does not meet the purpose and need, it serves as a basis of comparison to the Proposed Action and other alternatives.

2.3 Other Alternatives Considered

Seven additional alternatives were evaluated on their ability to provide CBP with the capability to inspect vehicles with low z (low density) merchandise:

- 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 the CBP 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 are less effective at identifying low z (low density) material; they require control areas that could not be accommodated within the limited space available at the San Ysidro POE.
- Alternative (5), trace-chemical detection systems, require either physical contact to collect samples of trace materials or use 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. This would take time, perhaps 90 seconds to 3 minutes for each test and therefore does not meet the requirements of this port at this time.
- 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 this location.
- Alternative (8), ultrasonic imaging systems, require contact with the target. At distances as low as 2 meters, ultrasonic imaging systems have difficulty in imaging metal objects and would therefore, be inadequate at detecting low-z materials. Thus, ultrasonic imaging systems do not appear to meet the requirements of the agency at this location.
- Alternative (9), quadrupole resonance imaging, is unable to scan vehicles on the move. The detector (or object) must remain stationary while making a measurement. Quadrupole resonance imaging is also 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 this location.

Given these limitations, Z Backscatter is the only available technology that meets the CBP need.

3 The Affected Environment and Consequences

This section describes the current condition of environmental resources at the San Ysidro POE, San Diego County, California and the possible impacts to these resources from the Proposed Action and No Action alternative. The descriptions represent baseline conditions for the comparison of changes caused by implementation of the Proposed Action and No Action alternative. Potential changes or impacts to the resources are described in each section as potential consequences. Cumulative impacts, or impacts attributable to the Proposed Action combined with other past, present or reasonably foreseeable future impacts regardless of the source, are presented in section 4.

3.1 Preliminary Impact Scoping

Table 1 presents the results of the preliminary impact scoping and explains why certain resources were excluded from further discussion. In keeping with the CEQ guidelines (40 C.F.R. 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 (i.e. those resources that are retained in Table 1) will be discussed in detail.

Table 1: Preliminary Impact Scoping

Resource	Potential for Impact	Retained (Y/N)
Climate	The Proposed Action will not have an adverse effect on the climate.	N
Geology and Soils	No construction is required for the fielding or operation of the ZBV™. Minimum construction is required for installation of the Z® Portal™. Construction associated with the Z® Portal™ will include removing existing pavement to place the footers of the system. The dimensions of the Z® Portal™ are 23.9 feet wide (across the traffic lane), 14.8 feet high and 8 feet deep. Excavation will occur to approximate depths of 1-2 feet into the subsurface for the Z® Portal™ footings (2 footings each measuring approximately 7 feet long by 10 feet wide). Soils associated with the San Ysidro POE are classified as Tujunga sand with 0-5 percent slopes, excessively drained soils (USDA 2007). Due to the previously disturbed location and minimally intrusive construction methods associated with installation of the Z® Portal™, no impact to soils is anticipated from the Proposed Action.	N
Hydrology and Water Quality	The Proposed Action will not affect hydrology, water resources or water quality.	N
Floodplain	The POE is not located in a floodplain. Floodplains will not be impacted as a result of the Proposed Action.	N

Resource	Potential for Impact	Retained (Y/N)
Wetlands	The Proposed Action will occur on previously paved surfaces and will not impact any wetlands.	N
Coastal Zone	The Proposed Action is not located within the California coastal zone and will not impact the coastal zone or the Tijuana River Estuary, which is protected under the National Estuarine Research Reserve Program that was established through the Coastal Zone Management program. California's coastal zone generally extends 1,000 yards inland from the mean high tide line. The San Ysidro POE is 5.5 miles from the Pacific Ocean. In addition, the San Ysidro POE is located 3.75 miles to the east of the Tijuana River Estuary.	N
Vegetation and Wildlife	The Z® Backscatter Screening Systems will be deployed and operated on existing asphalt and concrete surfaces. The Proposed Action will not have an adverse impact on vegetation or wildlife resources.	N
Threatened and Endangered Species	The POE does not support habitat conditions for any threatened or endangered species that may occur in the area, nor is it considered a critical habitat for any species. No threatened or endangered species will be affected by the Proposed Action.	N
Air Quality	Air quality impacts associated with the Proposed Action would be limited to localized effects associated with emissions generated by the Z Backscatter® Screening Systems and any idling vehicles during operations. Although emission levels are expected to be well below prescribed limits, further evaluation is discussed below. Conformity analysis conducted in accordance with 40 C.F.R. Part 93, shows emissions for criteria pollutants to be *de minimis*. No long-term air quality impacts would occur. See section 3.2 for further discussion of air quality.	Y

Resource	Potential for Impact	Retained (Y/N)
Noise	Noise impacts currently resulting from the entry of vehicles into the United States at the San Ysidro port of entry would remain unchanged under the Proposed Action. Noise impacts would be limited to short-term effects from equipment used during construction. Noise associated with construction is considered a point source, with attenuation at a rate of 6 decibels per doubling rate. The distance to the 65 Ldn noise contour (commonly used for planning purposes to identify impacts to sensitive receptors such as residences, schools, and hospitals) is approximately 450 feet. Because of the absence of any noise-sensitive receptors within 450 feet of the Z® Backscatter Screening Systems, noise generated during construction activities is anticipated to be temporary and less than significant.	N
Land Use and Zoning	The Proposed Action is consistent with current land use and zoning practices at the POE.	N
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 long-term change to the character of the area would occur as a result of the Proposed Action because the deployment site, the POE, already exists.	N
Infrastructure/Utilities	Adequate utilities exist at the POE to support the Proposed Action.	N
Traffic / Transportation	The Proposed Action will benefit the traffic flow at the POE and will not impact the parking and accessibility to the POE. There will be no additional road construction associated with the project.	N

Resource	Potential for Impact	Retained (Y/N)
Waste Management	Wastes associated with the Proposed Action are used oil and lubricants for the operation and maintenance of the Z® Backscatter Screening Systems. These will be accumulated and stored in compliance with applicable regulations at or near the point of generation and recycled by a licensed used oil recycler. 40 C.F.R. Part 279 exempts used oil and lubricants from regulation as a hazardous waste if they are recycled and not mixed with any other hazardous wastes. It is not anticipated that the operation and maintenance of the Z® Backscatter Screening Systems will generate amounts of hazardous wastes that would have any affect on the POE's current generator status. There is no radioactive source or byproduct material used in the Z® Backscatter Screening Systems therefore, there is no risk of a release of radioactive materials.	N
Historic and Archeological (Cultural) Resources	The Proposed Action will occur in an industrial facility where there is no potential to impact resources which are listed on, or potentially eligible for listing on, the National Register of Historic Places. There are no known archeological resources within the POE associated with the Proposed Action. There is minimal construction and excavation related to the Proposed Action. Implementing the Proposed Action will not have a significant impact on cultural or historic resources.	N
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 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 not quantifiable and will not be further evaluated in this document.	N
Environmental Justice	Implementation of the Proposed Action will not have any negative effect on minority and low-income populations or children. The exposure levels resulting from a scan by the Z® Backscatter Screening Systems are so low that no one (including children) who crosses the border frequently will have adverse exposure risk.	N
Irreversible and Irretrievable Commitment of	Irreversible and irretrievable commitment of resources associated with the Proposed Action will be materials, utilities, labor and time expended on the installation and	N

Resource	Potential for Impact	Retained (Y/N)
Resources	operation of the Z Backscatter® Screening Systems.	
Radiological Health and Safety	X-radiation associated with the Proposed Action has the potential to impact the health and safety of operators, officers, and the general public. Although exposures are expected to be well below the EPA and OSHA prescribed limits, further evaluation is discussed below.	Y

3.2 Air Quality

3.2.1 Criteria for Significance

The air quality analysis presented below responds to two separate federal statutes – NEPA, which is the basis of this EA, as well as the Clean Air Act (CAA). These two statutes vary considerably in terms of the analysis required as well as the mandated response to potential air quality impacts. NEPA, for instance, requires that agencies evaluate whether there will be significant air quality impacts resulting from their actions, with significance defined in terms of the "context" and "intensity" of impacts.

The CAA imposes certain duties on federal agencies. In November 1993, the Environmental Protection Agency (EPA) published the General Conformity Final Rule in the Federal Register (EPA 1993). The purpose of the rule is to ensure that all federal actions conform to any existing state implementation plan (SIP) or maintenance plan to protect air quality in the area where the Proposed Action occurs. Conformity to the purpose of the SIP means that the proposed federal action will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards (NAAQS or "standards").

Not all federal actions are required to make a formal conformity determination. If an initial investigation determines that annual emissions resulting from the Proposed Action will not reach certain threshold levels (see Tables 2 and 3), then there is no obligation to proceed with a formal conformity determination. Additionally, conformity analysis is only required for those criteria pollutants for which the area is in non-attainment.

The applicable regulations for defining "conformity" are cited in 40 C.F.R. Parts 6, 51, and 93. A "federal action" is defined in 40 C.F.R. 93.152 as "any activity engaged in by a department, agency, or instrumentality of the federal government, or any activity that a department, agency or instrumentality of the federal government supports in any way, provides financial assistance for, licenses, permits, or approves, other than activities related to transportation plans, programs, and projects developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (49 U.S.C.1601 *et seq*.)."

This analysis will present facts and conclusions in response to both NEPA and the CAA. Although these two statutes have different requirements, it is standard practice to

incorporate the CAA conformity determination into a NEPA document in order to reduce paperwork, aggregate data and analysis, and fulfill public notification requirements within one document. Equally important, the CAA conformity analysis will produce data on air emissions that can become the basis for deciding whether there are "significant" air quality impacts within the context of NEPA.

Air quality impacts resulting from the Proposed Action would be considered significant, within the NEPA context, if the following were to occur:

- The Proposed Action or the No Action alternative caused an exceedance of one or more of the NAAQS for criteria pollutants within the region of concern.
- The Proposed Action or the No Action alternative are not in conformity with section 176 of the Clean Air Act for federal actions or an approved SIP.

3.2.2 Baseline Environment

The San Ysidro POE is located in San Diego County, California. The county has a history of air quality problems, some of which persist to the present time. However, air quality in the county has also shown steady improvement over the past 15 years, due in large part to cleaner emissions from automobiles. Air quality standards throughout the state are regulated by the California Environmental Protection Agency according to California Code of Regulations, Title 17, Division 3, Air Resources.

In 1992, San Diego County was identified as a nonattainment area for carbon monoxide (CO) by the U.S. EPA. In 1998, having met the federal standards for several years, the area was redesignated by the EPA as a maintenance area. A maintenance plan was approved at that time to ensure ongoing compliance with NAAQS for carbon monoxide.

San Diego County also has a complex history of problems with ozone pollution, due in part to increasingly stringent federal standards. In 2004, San Diego County was classified as a nonattainment area for ozone according to the new federal standard that went into effect as of June 15, 2005. The new standard is based on an 8-hour average concentration.

Since San Diego County is a maintenance area for CO and a nonattainment area for ozone, an initial review is required to determine whether emissions resulting from the Proposed Action for these pollutants would reach levels requiring a conformity determination. With respect to ozone, that analysis will require estimation primarily of nitrous oxide (NO_x) emissions. NO_x, as well as volatile organic compounds (VOCs), are designated as "ozone precursors" due to the fact that they combine in the atmosphere in complex reactions to create ozone. Accordingly, both are regulated as criteria pollutants. Although diesel exhaust contains VOCs as well as NO_x, the major concern in most cases is NO_x, and that is the pollutant that will be evaluated below.

Tables 2 and 3 below list the levels of pollutants that will require a federal agency to conduct a conformity determination in nonattainment and maintenance areas. Threshold levels are computed in terms of the number of tons of a pollutant emitted in a year.

Table 2: Threshold Conformity Criteria for Non-Attainment Areas

Pollutant	**Criterion (tons per year)**
Ozone (volatile organic chemicals or nitrogen oxides):	
• Serious nonattainment areas	50
• Severe nonattainment areas	25
• Extreme nonattainment areas	10
• Other ozone nonattainment areas outside an ozone transport region	100
• Marginal and moderate nonattainment areas inside an ozone transport region	50
Carbon Monoxide – all nonattainment areas	100
Sulfur oxides or nitrogen oxides – all nonattainment areas	100
PM10:	
• Moderate nonattainment areas	100
• Serious nonattainment areas	70
Lead – all nonattainment areas	25

(U.S. EPA Regulations 40 C.F.R. 93.153)

Table 3: Threshold Conformity Criteria for Maintenance Areas

Pollutant	**Criterion (tons per year)**
Ozone (NO_X, SO_2 or NO_2): All Maintenance Areas	100
Ozone (VOCs)	
• Maintenance areas inside an ozone transport region	50
• Maintenance areas outside an ozone transport region	100
Carbon Monoxide: All Maintenance areas	100
PM_{10}: All Maintenance areas	100
Lead: All Maintenance areas	25

(U.S. EPA Regulations 40 C.F.R. 93.153)

3.2.3 Potential Consequences

3.2.3.1 Proposed Action - Fielding and Operation of Z® Backscatter Screening Systems

All vehicles directed to secondary inspection areas will undergo inspection by the Z Backscatter® Screening Systems. The Z® Portal™ (stationary system) would be installed in the entrance lane of the secondary inspection area to screen vehicles as they enter the inspection area. ZBV™ (mobile system) will be used to screen vehicles unable to travel through the Z® Portal™ because of size limits and will serve as a secondary inspection unit for vehicles that signal an alarm at the Z® Portal™. The Z® Portal™ allows vehicles to be screened at speeds up to 3 mph (similar to speeds currently attainable by vehicles traveling through secondary inspection areas.) Since this system is capable of screening 120 vehicles an hour, it is not anticipated that vehicles will be idling in a queue awaiting inspection. Vehicles inspected by the ZBV™ will have their engines turned off once parked in the inspection area. In view of these operational features, no significant increase in vehicle emissions will result from the fielding and operation of the Z Backscatter® Screening Systems.

Minimum construction is required for two Z® Portal™ support footings. The footprint for ground disturbance required for each of the footings is approximately 7 feet long (across traffic lane) by 10 feet wide (width of system) by approximately 1 to2 feet deep. The Z® Portal™ will be placed straddling an existing roadway entrance into the secondary inspection area. Removal of pavement and limited ground scraping will be required for placement of the system.

The operation of the ZBV™ will generate air pollutants from the vehicle's diesel engine as well as an on-board diesel generator. The amount of this pollution 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 emissions analysis presented below was based on maximizing assumptions in order to present the greatest foreseeable level of emissions. Since these maximizing assumptions did not produce projected emissions levels that approach thresholds levels for conformity analysis, it was concluded that the Proposed Action will not create significant air quality effects.

The ZBV™ is a Dodge/Freightliner/Mercedes Sprinter van, which can be equipped with one of four different common-rail direct injection (CDI) diesel engines. The units already ordered by the CBP have the largest engine available, which is 156 horsepower. For the sake of this analysis, it is assumed that the ZBV™ will be equipped with this engine and operated 24 hours a day, either idling or moving at low speed.

The second source of diesel pollution will be the onboard generator that powers the backscatter screening equipment. This generator is 15kW single phase and uses diesel fuel from ZBV™'s main fuel tank. The generator's engine is a Kubota V2203 diesel engine that produces 32.5 Standby HP.

Table 4 below presents emissions estimates for the ZBV™ vehicle engine and onboard generator. Since manufacture's emissions data for the ZBV™ are not presently available, it is necessary to estimate emissions for these two engines using test data from other vehicles. For reasons stated above, the data and operational assumptions should overestimate 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 used to generate emissions estimates provided in Table 4:

- Emissions estimated for the ZBV™ engine were derived from actual idling emissions samples from heavy heavy duty diesel vehicles (HHDDV – greater than 8500 pounds.) calculated by the Center for Alternative Fuels, Engines and Emissions (CAFEE) in 2005.
- Emissions estimated for the ZBV™ generator were derived from "emissions factors" used by the EPA for small diesel engines (AP-42)
- The ZBV™ will be operated for 24 hours per day

With one exception, these data sources and assumptions will have the effect of overestimating ZBV™ emissions. For instance, CAFEE test data from HHDDVs are 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 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 underestimate ZBV™ emissions. Although the emissions estimates are based on idling emissions, the ZBV™ will also "creep" as it moves past a vehicle during a screen. "Creep", or low-speed transient operation, 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 (CARB) indicates that NO_x emissions in HHDDVs during low-speed transient operations are approximately double NO_x idling emissions across the same time frame (T. Huai 2006). Since the ZBV™ will "creep" for brief periods as it screens vehicles, a failure to account for increased emissions during such low speed operations could potentially underestimate emissions by a small amount. However, since all other data and assumptions used in the analysis tend to overestimate potential ZBV™ 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.

Table 4: ZBV™ Emissions Estimate: Engine, Generator, and Combined

ZBV™ ENGINE EMISSIONS	CO (carbon monoxide)	NO_x (nitrous oxide)
One vehicle idling (grams of emissions per hour)[1]	23.32 grams per hour	83.31 grams per hour
One vehicle, 24 hours idling/day	560 grams per day	1999 grams per day
Total annual emissions from idling vehicle (Row 2 x 365 days x .0000011 grams/ton)	**0.225 tons**	**0.804 tons**
ON-BOARD GENERATOR EMISSIONS	**CO (carbon monoxide)**	**NO_x (nitrous oxide)**
Emissions Factors for Diesel Engines (AP-42, Table 3.3-1)[2]	0.00668 lb/hp-hr	0.031 lb/hp-hr
ZBV™ onboard generator hourly emissions (lb/hp-hr x 32.5 hp)	0.2138 lb/hr	1.0075 lb/hr
Yearly generator emissions in tons (lb/hour x 24 hrs. x 365 days ÷ 2000 lb/ton	**0.9364 tons/yr**	**4.4128 tons/yr**
COMBINED GENERATOR AND VEHICLE EMISSIONS	**CO (carbon monoxide)**	**NO_x (nitrous oxide)**
Total yearly emissions ZBV™ engine	0.225 tons	0.804 tons
Yearly generator emissions in tons (lb/hour x 24 hrs x 365 days ÷ 2000 lb/ton)	0.9364 tons/yr	4.4128 tons/yr
Combined Annual ZBV™ Generator and Engine Emissions	**1.1614 tons/yr**	**5.2168 tons/yr**

1Source: Center for Alternative Fuels, Engines and Emissions, 2005
2 EPA, AP 42, Fifth Edition, Chapter 3: Stationary Internal Combustion Sources

Total emissions related to increased idling times from the Proposed Action at the San Ysidro POE would be 1.1614 tons per year for carbon monoxide and 5.22 tons per year for nitrous oxides. These quantities of emissions are well below the levels presented in Tables 2 & 3 that would require a federal agency to undertake a conformity review. Accordingly, no further obligations are required under the General Conformity requirements of the CAA.

Furthermore, given the tremendous volume of automobile traffic at the POE and in San Diego County in general, these emissions will constitute only a tiny fraction of the total emissions at the POE and in the region generally. The future of emissions problems in the region will not be measurably affected by such small incremental additions to the vehicle population; rather, regional air pollution will be determined by broader efforts to improve emissions standards on diesel engines and other sources of pollution. Air quality in the region has been improving for the past 15 years as a result of such efforts, and is expected to continue to improve. From a NEPA standpoint, therefore, these regional and state efforts to improve air quality are the context against which the Proposed Action must be measured, and accordingly, the Proposed Action will have no significant impact to air quality in the area.

3.2.3.2 No Action Alternative

No change in existing ambient air quality would occur and no new pollution sources would be introduced. No impact to air quality would be expected.

3.3 Radiological Health and Safety

3.3.1 Criteria for Significance

Evaluation of the potential effect of radiation exposure on public safety is based on both the potential for an accident and the consequences of any project-related effect associated with normal operations. Beneficial impacts may result from any direct or indirect safety improvements due to project implementation. An alternative could have a significant impact if it would increase or decrease the risk of exposure of personnel or the public to radiation hazards.

3.3.2 Baseline Environment

3.3.2.1 Ionizing Radiation

Radiation is the most complex of all considerations pertaining to the operation of the Z® Backscatter Screening Systems. The focus of this section, "Radiological Health and Safety," is "ionizing radiation." See Appendix B and C for background information on ionizing radiation.

Z® Backscatter Screening Systems employ low energy digital X-ray imaging technology which is similar to technology that has successfully been used in such applications as medicine. As radiation-producing devices, these systems are subject to review by federal radiation protection authorities. These include the Occupational Safety and Health

Administration (OSHA) and the Food and Drug Administration (FDA). The California Department of Health Services also regulates radiation-producing devices.

During normal operating conditions, the affected environment includes the vehicle being scanned as well as the area immediately surrounding the Z® Backscatter Screening Systems. Vehicle occupants, CBP Officers who operate the systems as well as POE workers in the area, and maintenance professionals are the key component of the affected environment. For purposes of discussion, people are classified into three categories:

1. General public, including vehicle occupants
2. CBP Officers and POE workers
3. Maintenance personnel

All maintenance personnel 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 the CBP system operators and members of the general public. Their potential exposure levels are monitored by their employers.

For members of the general public, CBP Officers and POE employees, CBP has adopted the same protection standard for radiation doses that the Nuclear Regulatory Commission (NRC) and the State of California prescribe for members of the general public which is 0.1 rem (100 mrem, 100,000 µrem) in a year.

3.3.3 Potential Consequences

3.3.3.1 Proposed Action - Fielding and Operation of Z® Backscatter Screening Systems

3.3.3.1.1 Exposure Pathways

The radiation exposure pathway for the general public is created from exposure to scattered radiation from the X-ray source during screening operations. However, in all cases, the radiation dose received by the general public will not exceed 0.1 rem (100 mrem, 100,000 µrem) in a year.

Radiation energy levels from this equipment are so low there is no potential for radiation to build up in surrounding soils or surfaces to any measurable degree.

Z® Backscatter Screening Systems do not use source or by-product material therefore there is no risk of release of radioactive material into the environment from accidental or intentional impacts to the equipment.

3.3.3.1.2 Normal Operations

3.3.3.1.2.1 Human Exposure

All maintenance personnel who maintain the X-ray source components are employees of the equipment manufacturer. By the nature of their jobs, they have the potential to be exposed to a higher level of radiation than the CBP system operators and members of the general public. Maintenance of the X-ray source components will have to comply with

the EPA, OSHA, and State of California's strict dose standards for Radiation Workers. For a more detailed discussion of dose standards, see Appendix B.

The Z® Backscatter Screening Systems are designed so that the radiation dose levels within the CBP Officers' work-station (Z® Portal™) and the CBP driver's cab (ZBV™) will be below the NRC prescribed limits of 0.1 rem (100 mrem, 100,000 µrem) in a year. Detailed radiation surveys, performed by or under the supervision of the CBP Radiation Safety Office, have confirmed that these design criteria have been met. As the Z® Backscatter Screening Systems are delivered, exposure measurements will be made in all cabs and work-station areas to ensure that the system is in compliance with exposure limits.

For its Officers, CBP has decided to adopt the same effective radiation dose protection standard that the Nuclear Regulatory Commission (NRC) and the State of California prescribe for members of the general public (i.e. 0.1 rem (100 mrem, 100,000 µrem) in a year). CBP has adopted the NRC standard because the Occupational Safety and Health (OSH) Act only addresses occupational dose exposure limits. Although CBP Officers are "occupationally exposed," as defined by the International Commission on Radiological Protection (ICRP) (ICRP 2007) because their assigned duties involve exposure to radiation or to radioactive material, CBP has decided to act conservatively to limit their "occupational dose" to no more than that allowable for members of the public. The reason that CBP can do this is because X-rays and gamma rays of the same energy and intensity have the same effect on human tissue (and other materials).

This limit applies to all CBP employees or contractors who operate the Z® Backscatter Screening Systems. Personnel who maintain the X-ray source components are employees or contractors of the manufacturer and exposure levels are monitored and regulated by their employer. This means that, as far as radiation dose standards are concerned, CBP system operators are the same as members of the general public. For a more detailed discussion of dose standards, see Appendix B. Occupational exposure to the effective radiation dose standard CBP has adopted is not expected to cause a significant increase in the risk of cancer. For a more detailed discussion of information concerning risks from occupational radiation exposure, see Appendix C.

To meet the threshold radiation dose limit, CBP establishes controlled areas for the Z® Backscatter Screening Systems. Controlled Area is defined by 10 C.F.R 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 screening systems are not in continuous screening mode. Further, the traditional wording of "restricted" area has other uses at the POE and does not accurately describe the level of caution that CBP desires to communicate to the public.

The dimensions for the Z® Portal™ controlled area will extend 10 feet on each side (forward and back) of the Z® Portal™, as shown in Figure 4. The vertical dimension of the Z® Portal™ controlled area is from ground level to a height of 15 feet. The

dimensions for the ZBV™ are 30 feet in length and by 36 feet in width. The controlled area travels with the ZBV™, is 24 feet from the side where the X-ray beam is located (the van's passenger side), and is 5 feet from the other three sides as shown in Figure 5. The vertical dimension of the ZBV™ controlled area is from ground level to a height of 24 feet. At the edges of these controlled areas the radiation dose will not exceed 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. The radiation dose of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour is inclusive of background radiation, which accounts for approximately half (0.0002-0.0003 rem (0.02-0.03 mrem, 20-30 µrem) in any one hour) of the radiation dose. By comparison, a person receives a dose of approximately 0.006 rem (6 mrem, 6,000 µrem) per test from a chest X-ray and a dose of approximately 0.001 rem (1 mrem, 1,000 µrem) per test from a dental X-ray (American Nuclear Society 2008).

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 receive more than the limits prescribed by the NRC and the State of California. The controlled areas ensure that the systems conform to the radiation protection guidelines of reducing the radiation levels As Low as is Reasonably Achievable (ALARA).

An independent radiation survey to measure exposure levels to vehicle occupants that could occur from a screen by the Z® Portal™ was conducted by a Certified Health Physicist. Vehicle screens were conducted on a 4-door sedan automobile. A total of eight passes through the Z® Portal™ were completed for the purpose of measuring the integrated exposure per screen. 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 screen to evaluate whether the exposure in the vehicle was uniform or variable. The highest reading obtained from a single screen was 0.000003 rem (0.003 mrem, 3 µrem). This dose is 120,000 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 33,333 times less than the levels permissible to the general public (0.1 rem (100 mrem, 100,000 µrem) in a year). This means that a person would have to be screened by the Z® Portal™ more than 33,333 times in a year to exceed the exposure limits set by the NRC and the State of California for members of the general public. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the Z® Portal™ will not have a significant impact to persons who are screened by the Z® Portal™.

The CBP Radiation Safety Officer also conducted testing to determine the absorbed dose that CBP Officers that operate the ZBV™ could receive. The measured dose for ZBV™ operators is 0.000000493 rem (0.000493 mrem, 0.493 µrem) per screen, or an average of 0.000012 rem (0.12 mrem, 12 µrem) per hour. If the maximizing assumption is made that a CBP Officer could spend 2,000 hours operating the ZBV™ in a year, the greatest potential exposure in a year would be 0.024 rem (24 mrem, 24,000 µrem) [(0.000012 rem (0.12 mrem, 12 µrem) per hour x 2,000 hours = 0.024 rem (24 mrem, 24,000 µrem)]. This is less than one fourth the permissible maximum exposure rate of 0.1 rem (100 mrem, 100,000 µrem) in a year and one forth of the maximum exposure rate of 0.00005

rem (0.05 mrem, 50 µrem) in any one hour that has been established by NRC and the State of California.

3.3.3.1.2.2 Effects of Irradiation on Food

CBP's Radiation Safety Office has conducted tests to determine the worst-case scenario of radiation doses to food as a result of implementing the Proposed Action. The total absorbed dose deposited in food subjected to screening by a Z® Backscatter Screening Systems would be the same as that received by vehicle occupants from the Z® Portal™ 0.000003 rem (0.003 mrem, 3 µrem) per screen or the ZBV™ (0.000043 rem (0.043 mrem, 0.43 µrem) per screen. This dose is minute relative to the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem). It is also much lower than the limit set by the Food and Drug Administration in 21 C.F.R. 179.21., which limits the irradiation of food to an absorbed dose of less than 0.5 grays (50,000,000 µrad [equivalent to 50,000,000 µrem]). The absorbed dose from the Z® Backscatter Screening Systems is approximately 116 million times less than this limit.

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

3.3.3.1.2.3 Maintenance

CBP personnel will not perform any maintenance of the X-ray source components. CBP personnel will periodically perform maintenance only of the detectors and will test the system using procedures described in the Operator's Manual. Non-routine maintenance of X-ray source components will be performed by the manufacturer.

3.3.3.1.2.4 Radiation Safety Engineering Controls

The Z® Backscatter systems incorporate redundant safety controls, such as emergency shutoff pushbuttons, at several locations on the systems. The personnel assigned to operate the systems will be specifically trained for safe x-radiation system operations according to CBP Office of Training and Development standards. Training for the system operators will consist of lectures, courses and a written examination in basic radiation physics, radiation safety, biological effects of radiation, instrumentation, radiation control and operating procedures during normal and emergency conditions.

3.3.3.1.3 Abnormal Events

3.3.3.1.3.1 Effects of Irradiation on Persons Hidden in Vehicles

As stated in section 3.3.3.1.2.1 (Human Exposure), the NRC and the State of California have established the maximum allowable value of radiation dose that may be received by individuals (individual members of the general public) to be 0.1 rem (100 mrem, 100,000 µrem) in a year.

It is possible that people will hide themselves in vehicles in order to surreptitiously enter the United States. While a person concealed in a vehicle that is screened by a Z® Portal™ or a ZBV™ will be exposed to radiation, the total absorbed dose from a Z® Portal™

screening is the same as for other passengers in the vehicle, or approximately 0.000003 rem (0.003 mrem, 3 µrem) per screen. By comparison, a person receives a dose of approximately 0.006 rem (6 mrem, 6,000 µrem) per test from a chest X-ray and a dose of approximately 0.001 rem (1 mrem, 1,000 µrem) per test from a dental X-ray. In other words, chest and dental X-rays expose a person to 300 to 2,000 times more radiation than the Z® Backscatter Screening Systems.

Assuming a total absorbed dose of 0.000003 rem (0.003 mrem, 3 µrem) per screen (which is the highest level found in the independent study discussed in section 3.3.3.1.2.1 above) the absorbed dose is 120,000 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 33,333 times less than the levels permissible to the general public (0.1 rem (100mrem, 100,000 µrem) in a year). To reach the maximum allowable "in a year" radiation dose, a person would have to be screened 33,333 times in a year. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the Z® Portal™ will not have a significant impact on people hidden in vehicles that are screened by the Z® Portal™.

The CBP Radiation Safety Officer conducted testing to determine the absorbed dose that a person hidden in a vehicle would receive from a ZBV™ screen. When conducting inspections of vehicles with the ZBV™, vehicle operators and occupants will be escorted to waiting areas outside the boundary of the ZBV™ controlled area. The total radiation absorbed by any person concealed within the vehicle would be approximately 0.000000844 rem (0.000844 mrem, 0.844 µrem) per ZBV™ screen. This dose is 426,540 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 118,483 times below levels permissible to the general public (0.1 rem (100mrem, 100,000 µrem) in a year).

Assuming 0.000000844 rem (0.000844 mrem, 0.844 µrem) per screen, to reach the maximum allowable "in a year" radiation dose, a person would have to be screened 118,483 times in a year. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the ZBV™ will not have a significant impact on people hidden in vehicles that are screened by the ZBV™.

3.3.3.1.3.2 Mitigation Measures

Since CBP will limit the exposure of its employees to the same permissible level as that established for the general public, CBP Officers will not be designated as "occupational radiation workers." CBP has chosen the criterion of 2000 hours per year as the maximum expected exposure time (i.e., 8 hours a day, five days a week, 50 weeks per year) for its personnel (which is considered the maximum possible exposure time for any individual, general public or otherwise). Based on this time of exposure, and based on the public dose criterion of 0.1 rem (100 mrem, 100,000 µrem) in a year, a CBP Officer who is assigned to a Z® Backscatter Screening System will not experience a cumulative radiation dose greater than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour.

Safety warnings and precautions are incorporated into technical manuals and will be used to ensure that operator personnel, and the general public at large, are not exposed to

harmful levels of radiation. During routine use of equipment that produces radiation, standard precautions, supervision, and training will be employed to ensure that no humans are inadvertently harmed.

3.3.3.2 No Action Alternative

Under the No Action Alternative, the inspection process at the San Ysidro POE will continue to be conducted with current techniques and equipment, including small scale alternative NII technology, visual and manual inspections, and the use of canines to detect contraband. Persons entering the United States would not be exposed to radiation levels above those that are naturally occurring if the No Action Alternative is implemented

Alternatively, "low z" materials that the Z® Backscatter Screening Systems are designed to detect could pass through the POE unnoticed. As a consequence, there will be no health, public safety, and environmental benefits to society that could theoretically result from intercepting a higher percentage of contraband at the U.S. border. Moreover, CBP Officers would continue to engage in the same rate of potentially risky inspections of confined spaces to intercept contraband and prevent illegal entry into the United States.

4 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations stipulate that the cumulative effects analysis in an Environmental Assessment (EA) should consider the potential environmental impacts resulting 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" 40 C.F.R. 1508.7. Recent CEQ guidance (CEQ 1997) addressing cumulative effects affirms this requirement, stating that the first steps in assessing cumulative effects involves 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 EA, an effort has been made to identify all actions that are being considered and are in the planning phase at this time that could affect the area in the vicinity of the proposed Z® Backscatter Screening Systems at the San Ysidro POE. To the extent that details regarding such actions exist and the actions have a potential to interact with the Proposed Action in this EA, 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.

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

No past or present actions relevant to the Proposed Action were identified.

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

The San Ysidro POE is a U.S. Government Services Administration (GSA) owned facility. Due to the large number of vehicles that travel through the POE, expansion of the POE is planned to increase the efficiency, security, and safety for federal agencies and traveling public at the POE. Four expansion options have been developed during a feasibility study performed during winter 2001 and spring 2002. Construction of the POE expansion is tentatively scheduled for spring 2008 through fall 2012. GSA is working in cooperation with the California Department of Transportation (Caltrans) to prepare a combined Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in compliance with both NEPA and the California Environmental Quality Act (CEQA). The combined EIS/EIR will document the impacts associated with the POE expansion and include traffic, air quality and socioeconomic effects (GSA 2007).

Once the POE renovation is complete, CBP tentatively plans to deploy additional NII technologies at the San Ysidro POE. Depending on which system is deployed, there is a potential to generate additional small amounts of air pollution as well as to expose

additional numbers of CBP Officers and the public to minimal radiation from the NII equipment.

4.3 Analysis of Cumulative Effects

An analysis was done of the potential for cumulative impacts resulting from the actions described above when combined with the Proposed Action in this EA. The scope of this cumulative effects analysis is limited to the resources analyzed in section 3 of this EA.

4.3.1 Air Quality

A few additional vehicles in operation at the POE due to the Proposed Action or possible future additions of NII equipment will not create measurable effects in an environment which is dominated by tens of thousands of vehicles and where air pollution control technologies such as those required to meet Tier 2 emissions standards for cars and light trucks are continually reducing pollution per vehicle.

4.3.2 Radiological Health and Safety

NII equipment has little potential to create cumulative health impacts under normal operating conditions when it is used for its intended purpose by qualified personnel under the supervision of a radiation safety officer in accordance with applicable health and safety regulations.

For any NII equipment that is added in the future, mitigation measures similar to those for the ZBV™ and Z® Portal™ will be implemented. Controlled areas will be calculated and verified for each NII system and will be designed to provide adequate separation from other NII operating areas, adjacent structures, work areas and traffic flows to protect workers and the general public. Limiting access to the controlled areas will ensure that the general public, CBP Officers and POE workers are not exposed to radiation above protective levels prescribed by federal regulations (see Appendix B and Appendix C). Since potential radiation exposure evaluated in this document assumes a maximum exposure time of 2000 working hours per year, individual workers are very unlikely to work more than that amount of time, and will therefore not be affected by the addition of any other similar equipment at the POE.

5 Findings and Conclusions

5.1 Findings

The evaluation of the Proposed Action, fielding and operation of two Z® Backscatter Screening Systems at the San Ysidro POE, San Diego, California establishes indicates that the physical and socioeconomic environments at the POE will not be significantly affected. The predicted consequences on resource areas are briefly described below.

This EA documents that the Proposed Action will result in no significant environmental impacts, direct, indirect, cumulative or otherwise.

Climate – The Proposed Action will not have an adverse effect on the climate.

Geology and Soils – No construction is required for the fielding or operation of the ZBV™. Minimum construction is required for installation of the Z® Portal™. Construction associated with the Z® Portal™ will include removing existing pavement to place the footers of the system. The dimensions of the Z® Portal™ are 23.9 feet wide (across the traffic lane), 14.8 feet high and 8 feet deep. Excavation will occur to approximate depths of 1-2 feet into the subsurface for the Z® Portal™ footings (2 footings each measuring approximately 7 feet long by 10 feet wide). Soils associated with the San Ysidro POE are classified as Tujunga sand with 0-5 percent slopes, excessively drained soils (USDA 2007). Due to the previously disturbed location and minimally intrusive construction methods associated with installation of the Z® Portal™, no impact to soils is anticipated from the Proposed Action.

Hydrology and Water Quality – The Proposed Action will not affect hydrology, water resources or water quality.

Floodplains – The POE is not located in a floodplain. Floodplains will not be impacted as a result of the Proposed Action.

Wetlands – The Proposed Action will occur on previously paved surfaces and will not impact any wetlands.

Coastal Zone – The Proposed Action is not located within the California coastal zone and will not impact the coastal zone or the Tijuana River Estuary, which is protected under the National Estuarine Research Reserve Program that was established through the Coastal Zone Management program. California's coastal zone generally extends 1,000 yards inland from the mean high tide line. The San Ysidro POE is 5.5 miles from the Pacific Ocean. In addition, the San Ysidro POE is located 3.75 miles to the east of the Tijuana River Estuary.

Vegetation and Wildlife – The Z® Backscatter Screening Systems will be deployed and operated on existing asphalt and concrete surfaces. The Proposed Action will not have an adverse impact on vegetation or wildlife resources.

Threatened and Endangered Species – The POE does not support habitat conditions for any threatened or endangered species that may occur in the area, nor is it considered a critical habitat for any species. No threatened or endangered species will be affected by the Proposed Action.

Air Quality – Air quality impacts associated with the Proposed Action would be limited to localized effects associated with emissions generated by the Z® Backscatter Screening Systems and any idling vehicles during operations. Conformity analysis conducted in accordance with 40 C.F.R. Part 93 shows emissions for these criteria to be *de minimis*. No significant adverse air quality impacts would occur. See section 3.2 for further discussion of air quality.

Noise – Noise impacts currently resulting from the entry of vehicles into the United States at the San Ysidro port of entry would remain unchanged under the Proposed Action. Noise impacts would be limited to short-term effects from equipment used during construction. Noise associated with construction is considered a point source, with attenuation at a rate of 6 decibels per doubling rate. The distance to the 65 Ldn (day-night noise level) noise contour (commonly used for planning purposes to identify impacts to sensitive receptors such as residences, schools, and hospitals) is approximately 450 feet. Because of the absence of any noise-sensitive receptors within 450 feet of the Z® Backscatter Screening Systems, noise generated during construction activities is anticipated to be temporary and less than significant.

Land Use and Zoning – The Proposed Action is consistent with current land uses and zoning at the POE.

Aesthetics and Visual Resources – The Proposed Action will 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 long-term change to the character of the area would occur as a result of the Proposed Action because the deployment site; the POE, already exists.

Infrastructure and Utilities – Adequate utilities exist at the POE to support the Proposed Action.

Traffic and Transportation –The Proposed Action will benefit the flow of traffic at the POE by reducing wait times in secondary inspection. There will be no construction of additional traffic lanes associated with the Proposed Action.

Waste Management – Wastes associated with the Proposed Action are used oil and lubricants for the operation and maintenance of the Z® Backscatter Screening Systems. These will be accumulated and stored in compliance with applicable regulations at or near the point of generation and recycled by a licensed used oil recycler. 40 C.F.R. Part 279 exempts used oil and lubricants from regulation as a hazardous waste if they are recycled and not mixed with any other hazardous wastes. It is not anticipated that the

operation and maintenance of the Z® Backscatter Screening Systems will generate amounts of hazardous wastes that would have any affect on the POE's current generator status. There is no radioactive source or byproduct material used in the Z® Backscatter Screening Systems therefore, there is no risk of a release of radioactive materials.

Historic and Archeological (Cultural) Resources – The Proposed Action will occur in an industrial facility where there is no potential to impact resources that are listed on, or potentially eligible for listing on, the National Register of Historic Places. There are no known archeological resources within the POE associated with the Proposed Action. There is minimal construction and excavation related to the Proposed Action. Implementing the Proposed Action will not have a significant impact on cultural or historic resources.

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 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 not quantifiable and will not be further evaluated in this document.

Environmental Justice – Implementation of the Proposed Action will not have any negative effect on minority and low-income populations or children. The exposure levels resulting from a scan by the Z® Backscatter Screening Systems are so low that no one (including children) who crosses the border frequently will have adverse exposure risk.

Irreversible and Irretrievable Commitment of Resources – Irreversible and irretrievable commitment of resources associated with the Proposed Action will be materials, utilities, labor and time expended on the installation and operation of the Z® Backscatter Screening Systems.

Radiological Health and Safety – Analysis shows that exposures are expected to be well below NRC, Occupational Safety and Health Administration (OSHA) and State of California prescribed limits, therefore the health and safety impacts from radiological exposure were found to not be significant. There will be no adverse impacts to the health and safety of the traveling public, CBP Officers, and POE employees because the Z® Backscatter Screening Systems are designed and operated to avoid these impacts. As promulgated by the Nuclear Regulatory Commission (NRC) in 10 C.F.R. Part 20, the maximum permissible level of radiation dose to the general public is 0.1 rem (100 mrem, 100,000 µrem) in a year. This same standard has been adopted by the State of California. CBP will use this protective limit for the general public, CBP employees, and other POE workers.

Vehicle Occupants – An independent radiation survey to measure the dose to vehicle occupants that could occur from a screen by the Z® Portal™ was conducted by a Certified Health Physicist. Vehicle screens were conducted on a 4-door sedan automobile. Screens last for approximately one second. The highest reading obtained from a single screen was

0.000003 rem (0.003 mrem, 3 µrem). This dose is 120,000 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 33,333 times less than the levels set by the NRC to protect the general public (0.1 rem (100 mrem, 100,000 µrem) in a year). This means that a person would have to be screened by the Z® Portal™ more than 33,333 times in a year to exceed the exposure limits set by the NRC and the State of California for members of the general public. It is not reasonable to expect that a person would make 33,333 trips a year across the border.

Based on this testing and analysis, radiation exposure levels from the Z® Portal™ will be so low that it is concluded that radiation from the Z® Portal™ will not have a significant impact on vehicle occupants who are screened by it.

Radiation exposure from the mobile van (ZBV™) is even less than the Z® Portal™ because drivers and passengers exit their vehicles before the screen occurs and remain outside of the controlled area during the screen. Therefore, drivers and passengers would not be exposed to radiation from a ZBV™ screen. To determine whether a person hidden in a vehicle was at risk, the CBP Radiation Safety Officer conducted testing to determine the exposure that such a person would receive from a ZBV™ screen. Testing revealed that the total absorbed dose to any person hiding in a vehicle would be approximately 0.000000844 rem (0.000844 mrem, 0.844 µrem) per ZBV™ screen. This dose is 426,540 times less than the average annual background dose in the United States of 0.36 rem (360 mrem, 360,000 µrem) and 118,483 times below levels permissible to the general public (0.1 rem (100 mrem, 100,000 µrem) in a year.

Assuming 0.000000844 rem (0.000844 mrem, 0.844 µrem) per ZBV™ screen, to reach the maximum allowable "in a year" radiation dose, a person would have to be screened 118,483 times in a year. Since the chance of this frequency of exposure is remote, it is concluded that radiation from the ZBV™ will not have a significant impact on persons hiding in screened vehicles.

CBP Officers and POE Employees – Due to the nature of their work, CBP Officers and POE employees who work around the Z® Backscatter Screening Systems have the potential to be "occupationally exposed"[2] to radiation. The Nuclear Regulatory Commission (NRC) and the Occupational Safety and Health Administration (OSHA) allow a higher permissible exposure level (Occupational Dose) for radiation workers in restricted areas (5 rem (5,000 mrem, 5,000,000 µrem) in a year) but CBP has elected to use the general public protection standard of 0.1 rem (100 mrem, 100,000 µrem) in a year as the maximum permissible level of radiation dose not only for the general public, but also for CBP officers and POE employees This standard is 50 times more stringent than occupational dose limits. The radiation dose from the Z® Backscatter Screening Systems will be no more than 0.00005 rem (0.05 mrem, 50 µrem) in any one hour since personnel will stand behind a marker delineating a "controlled area." An analysis of potential exposure was based on 2,000 work hours per a year as the maximum exposure time. This assumes that an individual spends all of a forty-hour work week, 50 weeks a year, standing at the boundary of the Z® Backscatter Screening Systems controlled area. Even

[2] As defined by the International Commission on Radiological Protection (ICRP) (ICRP, 2007)

under those circumstances, neither CBP Officers nor POE employees will experience a cumulative dose greater than the NRC limit for protecting the general public. By comparison, a person receives a dose of approximately 0.006 rem (6 mrem, 6,000 µrem) per test from a chest X-ray and a dose of approximately 0.001 rem (1 mrem, 1,000 µrem) per test from a dental X-ray (American Nuclear Society, 2008).

The CBP Radiation Safety Officer also conducted field testing to determine the dose that CBP Officers who operate the ZBV™ could receive. The measured absorbed dose for ZBV™ operators is 0.000000493 rem (0.000493 mrem, 0.493 µrem) per screen, or an average of 0.000012 rem (0.12 mrem,12 µrem) per hour. If the maximizing assumption is made that a CBP Officer could spend 2,000 hours operating the ZBV™ in a year, the greatest potential exposure in a year would be 0.024 rem (24 mrem, 24,000 µrem) (0.000012 rem (0.12 mrem,12 µrem) per hour x 2,000 hours = 0.024 rem (24 mrem, 24,000 µrem). This is less than one fourth the level established by the NRC to protect the general public, 0.1 rem (100 mrem, 100,000 µrem) in a year and one fifth of the maximum exposure rate of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour that CBP will enforce through the utilization of controlled areas.

Controlled Areas – The side panels and top of the Z® Portal™; through built-in shielding, limit the radiation to background levels, therefore, the only possible exposure is at the entrance and exit of the installation. A controlled area will be clearly marked at the entrance and exit to establish the proximity within which CBP officers and POE employees may stand. The dimensions for the Z® Portal™ controlled area will extend 10 feet at the entrance and exit of the Z® Portal™. The vertical dimension of the Z® Portal™ controlled area is from ground level to a height of 15 feet. In the extreme, a system operator could be situated at the edge of the controlled area closest to the Z® Portal™ eight hours a day, every workday of the year (that is to say, 2,000 hours per year) and not receive more than the limits prescribed by the NRC and the State of California. The controlled areas ensure that the systems conform to the radiation protection guidelines of reducing the radiation levels As Low as is Reasonably Achievable (ALARA). ALARA is defined in 10 C.F.R. 20.1003 as: "(acronym for "as low as is reasonably achievable") means making every reasonable effort to maintain exposures to radiation as far below the dose limits in this part as is practical consistent with the purpose for which the licensed activity is undertaken, taking into account the state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest." In addition, 10 C.F.R. 20.1101(b) requires that: "[t]he licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA)."

The controlled area for the ZBV™ travels with the van itself. The dimensions of the ZBV™ are 30 feet in length and 36 feet in width. The controlled area is 24 feet from the side where the X-ray beam is located (the van's passenger side), and 5 feet from the other three sides. The vertical dimension of the ZBV™ controlled area is from ground level to

a height of 24 feet. At the edges of this controlled area, the radiation dose will not exceed 0.00005 rem (0.05 mrem, 50 µrem) in any one hour. The radiation dose of 0.00005 rem (0.05 mrem, 50 µrem) in any one hour is inclusive of background radiation, which accounts for approximately half (0.0002-0.0003 rem (0.02-0.03 mrem, 20-30 µrem) in any one hour) of the radiation dose.

Analysis and testing for this Environmental Assessment shows that exposures are expected to be well below the maximum levels of exposure set by the NRC, OSHA and State of California to protect workers and the general public; therefore, the health and safety impacts from radiological exposure for the Proposed Action were found to not be significant. See section 3.3 for further discussion of radiological health and safety.

5.2 Mitigation

Mitigation actions would be expected to reduce, avoid, or compensate for most adverse effects. Refer to section 3 for an explanation of proposed mitigation measures.

5.3 Conclusions

Based upon the results of the EA, implementation of the Proposed Action, coupled with the identified mitigation measures, will result in no significant adverse effects on the human or natural environment. Therefore, no further environmental impact analysis is warranted.

6 References

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8 Acronyms and Abbreviations

^{137}Cs	Cesium 137
^{60}Co	Cobalt 60
A	Ampere
AAPA	American Association of Port Authorities
AAQS	Ambient Air Quality Standards
ALARA	As Low As is Reasonably Achievable
AS&E®	American Science & Engineering
BEIR	Biological Effects of Ionizing Radiation
CAA	Clean Air Act
CARB	California Air Resources Board
CBP	Customs and Border Protection
CEQ	Council on Environmental Quality
C.F.R.	Code of Federal Regulations
CO	Carbon Monoxide
CSI	Container Security Initiative
dB	Decibel
dBA	Audio decibel
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
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
Gy	Gray
HHDDV	Heavy Heavy Duty Diesel Vehicle
hp	Horse Power
hr	Hour
H_T	Dose equivalent
ICRP	International Commission on Radiological Protection
INS	Immigration and Naturalization Service
lb	Pounds
Ldn	Day-Night average sound level
mrad	millirad
mrem	millirem
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
NOI	Notice of Intent

NOx	Nitrogen Oxides
NRC	Nuclear Regulatory Commission
O_3	Ozone
OFO	Office of Field Operations
OPA	Oil Pollution Act
OSHA	Occupational Safety and Health Administration
PEA	Programmatic Environmental Assessment
PM_{10}	Particulate Matter 10 micrometers or smaller in diameter
POE	Port of Entry
rad	Radiation Absorbed Dose
rem	Roentgen Equivalent Man
RSO	Radiation Safety Officer
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SOx	Sulfur Oxides
Sv	sievert
TEDE	Total Effective Dose Equivalent
µrad	microrad
µrem	microrem
U.S.	United States
U.S.C.	United States Code
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation
USDA	United States Department of Agriculture
yr	Year

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Name	Discipline/Expertise	Experience	Role
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U.S. Customs and Border Protection

July 31, 2007

Mr. Milford Donaldson
State Historic Preservation Officer
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1416 9th Street, Room 1442-7
Sacramento, CA 95814

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Mr. Donaldson:

The United States Customs and Border Protection (CBP) is notifying you of the Proposed Action noted above. An Environmental Assessment (EA) is being drafted to evaluate the potential environmental effects of the Proposed Action. As soon as the draft EA is available you will be sent a copy for your immediate review and comment. If you do not wish to have a copy of the draft EA for review, please notify Ms. Audra Upchurch at (202) 393-8441 extension 232.

The Proposed Action consists of the fielding and operation of one mobile and one fixed Z® Backscatter Cargo and Vehicle Screening System at the San Ysidro POE in San Diego County for the purpose of conducting non-intrusive inspections of vehicles entering the United States. These system utilizes a patented "backscatter" X-ray technology that generate high quality images of organic and "low Z" (low atomic number) materials such as explosives, drugs, and people, even when such substances are hidden in a complex environment. The images created by this X-ray technology will be scrutinized by CBP Officers for the presence of illegal substances as well as for people attempting to enter the country illegally.

No x-rays will be produced when the systems are not being operated. No construction is required for the mobile system. Limited construction is required for the fixed system. Construction will consist of removing pavement and minimal grading for installation of the fixed systems footing and barriers. Approximate overall dimensions of the fixed system are 23.6 feet in width and 14.8 feet in height.

Included are a topographical map and aerial photo of the location of the POE and representative pictures of the mobile and fixed systems. We have determined that no historic properties will be adversely affected by the Proposed Action. We request your concurrence with our determination.

Please provide your response to:

Ms. Audra Upchurch
Organizational Strategies, Inc.
1331 Pennsylvania Avenue NW Suite 1415
Washington, DC 20004

If you have any questions to the above, please feel free to contact Ms. Audra Upchurch at (202) 393-8441 extension 232 or e-mail aupchurch@orgstrategies.com. Thank you in advance for your assistance.

Sincerely,

Sharon Sharp-Harrison

Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Mr. Jim Bartel
Field Supervisor
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SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Mr. Bartel:

The United States Customs and Border Protection (CBP) is notifying you of the Proposed Action noted above. An Environmental Assessment (EA) is being drafted to evaluate the potential environmental effects of the Proposed Action. As soon as the draft EA is available you will be sent a copy for your immediate review and comment. If you do not wish to have a copy of the draft EA for review, please notify Ms. Audra Upchurch at (202) 393-8441 extension 232.

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No x-rays will be produced when the systems are not being operated. No construction is required for the mobile system. Limited construction is required for the fixed system. Construction will consist of removing pavement and minimal grading for installation of the fixed systems footing and barriers. Approximate overall dimensions of the fixed system are 23.6 feet in width and 14.8 feet in height.

Included are a topographical map and aerial photo of the location of the POE and representative pictures of the mobile and fixed systems. We have determined that no threatened or endangered species will be affected by the Proposed Action. We request your concurrence with our determination.

Please provide your response to:
Ms. Audra Upchurch
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Washington, DC 20004

If you have any questions to the above, please feel free to contact Ms. Audra Upchurch at (202) 393-8441 x232 or e-mail aupchurch@orgstrategies.com. Thank you in advance for your assistance.

Sincerely,

Sharon Sharp-Harrison
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U.S. Customs and Border Protection

July 31, 2007

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SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairwoman Welch-Scalco:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Included are a topographical map and aerial photo of the location of the POE and representative pictures of the mobile and fixed systems.

If you have any questions to the above, please feel free to contact Ms. Audra Upchurch at (202) 393-8441 x232 or e-mail aupchurch@orgstrategies.com. Thank you in advance for your assistance.

Sincerely,

Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Ralph Goff
Campo Band of the Kumeyaay Nation
36190 Church Road
Campo, CA 91906

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairman Goff:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Sincerely,

Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Harlan Pinto Sr.
Ewiiaapaayp Band of Kumeyaay Indians
P.O. Box 2250
4054 Willows Road
Alpine, CA 91903-2250

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairman Pinto:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairperson Rebecca Osuna
Inaja - Cosmit Band of Indians
1040 East Valley Parkway
Escondido, CA 92025

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairperson Osuna:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Sincerely,

Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Kenny Mesa
Jamul Indian Village
PO Box 612
Jamul, CA 91935

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairman Mesa:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Tribal Chairperson Gwendolyn Parada
La Posta Band of Mission Indians
PO Box 1048
Boulevard, CA 91905

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairperson Parada:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Sincerely,

Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Leroy Elliott
Manzanita Band of the Kumeyaay Nation
PO Box 1302
Boulevard, CA 91905

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Mr. Elliott:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Howard Maxcy
Mesa Grande Tribal Office
PO Box 270
Santa Ysabel, CA 92070

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairman Maxcy:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Spokesman Allen E. Lawson, Jr.
San Pasqual Band of Indians
PO Box 365
Valley Center, CA 92082

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Mr. Lawson:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Office of Information and Technology
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Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Brandie Taylor
Santa Ysabel Band of Diegueño Indians
PO Box 130
Santa Ysabel, CA 92070

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Ms. Taylor:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Tribal Chairwoman Georgia Tucker
Sycuan Band of the Kumeyaay Nation
5459 Dehesa Road
El Cajon, CA 92019

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairwoman Tucker:

The U.S. Customs and Border Protection (CBP), Office of Information Technology, Laboratories and Scientific Services, Interdiction Technology Branch is notifying you of the Proposed Action noted above. In accordance with Section 106 of the National Historic Preservation Act and its implementing regulations, 36 CFR Part 800, CBP wishes to continue our consultation process with the appropriate federally recognized Native American tribes who historically used this region or continue to use this area. We welcome your comments on this undertaking and look forward to hearing from you regarding known sacred sites or other traditional cultural properties within the proposed project area. CBP is also preparing an Environmental Assessment (EA) for the Proposed Action mentioned above. As soon as the draft EA is available, you will be sent a copy for your immediate review and comment.

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Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

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

U.S. Customs and Border Protection

July 31, 2007

Chairman Anthony R. Pico
Viejas Tribal Office
1 Viejas Grade Road
Alpine, California 91901

SUBJECT: Fielding and Operation of Z® Backscatter Cargo and Vehicle Screening Systems at the San Ysidro Port of Entry (POE), San Diego County, California

Dear Chairman Pico:

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Sharon Sharp-Harrison
Branch Director
Office of Information and Technology
Laboratories and Scientific Services
Interdiction Technology Branch

Enclosures

Appendix B: Background Information on Ionizing Radiation

The background material contained in this appendix is an excerpt of 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 U.S. while sieverts are used internationally. Eventually, the U.S. 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.[3]

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 C.F.R. Part 20)**

The Nuclear Regulatory Commission (NRC) promulgates regulations and establishes standards for protection against radiation arising out of activities conducted under licenses issued by the Commission. NRC regulations control the receipt, possession, use, transfer, and disposal of licensed material by any licensee. CBP currently holds an NRC Materials License for Cs^{137}/Co^{60} sealed sources. The Z® Backscatter Screening Systems 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 the systems.

- **Occupational Safety and Health Administration (OSHA) (29 C.F.R. 1910.1096)**

OSHA regulations establish standards for protection against ionizing radiation that result in an occupational risk, but do not affect the safety of licensed radioactive materials.

- **Food and Drug Administration (FDA) (21 C.F.R. 1020) Performance Standards for Ionizing Radiation Emitting Products)**

The Food and Drug Administration (FDA) promulgates regulations and establishes standards for the protection against radiation by setting performance standards that manufacturers of ionizing radiation emitting products must meet.

- **Environmental Protection Agency (EPA) (Radiation Protection Guidance to Federal Agencies for Occupational Exposure, 52 Fed. Reg. 2822 (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 Nuclear Regulatory Commission, the Occupational Safety and Health Administration, 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 Environmental Protection Agency. The guidance provides general principles, and specifies the numerical primary guides for limiting

[3] For the X-rays such as those currently utilized in the Z® Backscatter Screening Systems the quality factor is 1, meaning that 1 rad of absorbed dose results in 1 rem of dose equivalent.

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.

State Regulations

Many states have adopted regulations modeled on the *Suggested State Regulations for Control of Radiation*.

State of California (17 California Code of Regulations §30100, et Seq.)

The California Department of Health Services regulates ionizing and non-ionizing sources of radiation to the extent authorized by the NRC. The California Radiation Control Law [Health Safety Code §§ 114960, *et seq.*] and the regulations of the Department [17 CCR § 30100, *et seq.*] govern the regulatory program for any person who is licensed to receive or process radioactive materials, as defined, and not exempted. County health departments are authorized to participate in the regulatory process in their jurisdiction based on a memorandum of understanding with the department. The regulatory program includes the licensing requirement, payment of fees, inspections, employee exposure controls and monitoring, and facility and administrative requirements.

Without Congressional expression that sovereign immunity is waived, a federal agency would not be subject to these state regulations. California implicitly recognizes this in California Health and Safety Code § 115095, which provides state regulators with the authority to enter premises to enforce the radiation control law (California Health and Safety Code §§ 114960 *et seq.*), but cannot enter the areas under federal jurisdiction unless the federal government concurs.

Regulatory Jurisdiction

As it applies to the operation of the Z® Backscatter Screening Systems at the San Ysidro port of entry the applicable regulations are FDA [21 C.F.R. Part 1020] and OSHA [29 C.F.R. 1910.1096].

- The NRC Guidance provided in 10 C.F.R. Part 20 Standards for Protection Against Radiation apply to persons licensed by the Commission to receive, possess, use , transfer, or dispose of byproduct, source, or special nuclear material or to operate a production or utilization facility. The Z® Backscatter Screening Systems do not require source or byproduct material for their operation; therefore these regulations do not apply. However, as discussed above CBP used the levels provided by the NRC as a conservative approach for limiting radiation exposure by the systems.

- The EPA guidance provided in FR 52 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 bound limit 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 C.F.R. Part 20 and 17 C.C.R. § 30253, *et seq*., the NRC and the State of California identify 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 C.F.R. 20.1003 and 17 C.C.R. 30253. 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 (5,000 mrem, 5,000,000 µrem) 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 rems (0.5 Sv). 10 C.F.R. 20.1201 and 17 C.C.R. 30253. Dosage limits for minors and embryos or fetuses are addressed in 10 C.F.R. 20.1207 and 1208, and are discussed more fully in Appendix C.

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 C.F.R. 20.1003 and 17 C.C.R. 30253. The total effective dose equivalent to individual members of the general public from the licensed operations shall not exceed 0.1 rem (100 mrem, 100,000µrem) in a year. 10 C.F.R. 20.1301 and 17 C.C.R. 30253. A summary of pertinent dose limits is presented below in Table 5.

Table 5: Summary of Regulatory Dose Limits

Dose Limit by Agency and Regulation (rems in a year)				
	NRC 10 C.F.R 20	**EPA 52 FR 2822**	**California 17 CCR § 30253**	**OSHA 29 C.F.R 1910.1096**
"Occupational Dose" = "Radiation Workers" in "Restricted Areas"				
Whole Body	5	5	5	5 (1.250 rem/calendar quarter)
Lens of Eye	15	15	15	5 (1.250 rem/calendar quarter)
Skin, Hands and Feet	50	50	50	
Skin of Whole Body				30 (7.5 rem/calendar quarter)
Hands and forearms; feet and ankles				75 (18.75 mrem/calendar quarter)
Minors 10 C.F.R 20.1207	10% of above limits	10% of above limits	10% of above limits	10% of above limits
Pregnant Women* 10 C.F.R 20.1208	10% of above limits	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	0.1 rem in a year	Not Addressed
Radiation Levels in Unrestricted (Uncontrolled) Areas				
Member of the General Public	0.002 rem in any one hour		0.002 rem in any one hour	Not Addressed

*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 (ALARA).
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 (ALARA)

"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 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 "as low as is reasonably achievable" 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 including: 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.

Customs and Border Protection Dose Limits

In conformance with ALARA principles, CBP has adopted for its workers the same dose limit as the NRC and the State of California prescribe for the general public – i.e. 0.1 rem (100 mrem,

100,000 µrem) in a year. As a result, CBP establishes controlled areas around the Z® Backscatter Screening Systems as described in the section 3.3.3.1.2.1 (Human Exposure) to equally protect the general public and CBP personnel from radiation emissions in accordance with the maximum dose permitted pursuant to NRC and the State of California. CBP has taken care to model and explore potential exposure to employees working around these systems, and has even made measurements if someone were to be scanned by this or other NII systems. See "Radiation Dose Equivalent to Stowaways in Vehicles," Khan, et al, Health Physics Journal, Volume 86, No. 5, p. 483, May 2004.

Health Risks

In their August 2004 revised position statement on radiation risk, the Health Physics Society recommended against the quantitative estimation of health risks below an individual dose of 5 rem (5,000 mrem, 5,000,000 µrem) in a year or a lifetime dose of 10 rem (10,000 mrem, 10,000,000 µrem) above that received from natural sources. Doses from natural background radiation in the United States average about 0.360 rem (360 mrem, 360,000 µrem) 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.

While there is substantial and convincing scientific evidence for health risks following high-dose exposures, below 5-10 rem (which includes occupational and 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. 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).

Appendix C: Background Information Concerning Risks from Occupational Radiation Exposure

The background material contained in this appendix is excerpted of from the U.S. Nuclear Regulatory Commission Regulatory Guide 8.29, "Instruction Concerning Risks From Occupational Radiation Exposure," February 1996 and the Health Physics Society "Radiation Basics" http://www.hps.org/publicinformation/ate/faqs/radiation.html. This material 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?

A single high-level radiation exposure (i.e., greater than 10,000 mrem) delivered to the whole body over a very short period of time 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 possibly negative genetic effects. To protect the public and radiation workers (and environment) from the potential effects of chronic low-level exposure (i.e., less than 10,000 mrem), 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 and policies have been established by

international and national radiation protection organizations (e.g., International Commission on Radiological Protection and National Council on Radiation Protection and Measurements) to control and limit potential harmful radiation effects.

Both public and occupational regulatory dose limits are set by federal agencies (i.e., Environmental Protection Agency, Nuclear Regulatory Commission, and Department of Energy) and state agencies (e.g., agreement states) to limit cancer risk. Other radiation dose limits are applied to limit other potential biological effects with workers' skin and lens of the eye.

Annual Radiation Dose Limits	Agency
Radiation Worker - 5,000 mrem	(NRC, "occupationally" exposed)
General Public - 100 mrem	(NRC, member of the public)
General Public - 25 mrem	(NRC, D&D all pathways)
General Public - 10 mrem	(EPA, air pathway)
General Public - 4 mrem	(EPA, drinking-water pathway)

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 and Hagemeyer 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.[4] 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

[4] Given the CBP 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 workers chance of dying from cancer from 20 percent to 20.005 percent. The average measurable dose for radiation workers reported to the NRC was 0.31 rem (0.0031 Sv) for 1993 (Raddatz and Hagemeyer, 1995). Today, very few CBP employees ever accumulate 100 rem (1 Sv) in a working lifetime, and the average career dose of workers at NRC-licensed facilities is 1.5 rem (0.015 Sv), which represents an estimated increase from 20 to about 20.06 percent in the risk of dying from cancer.

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 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.

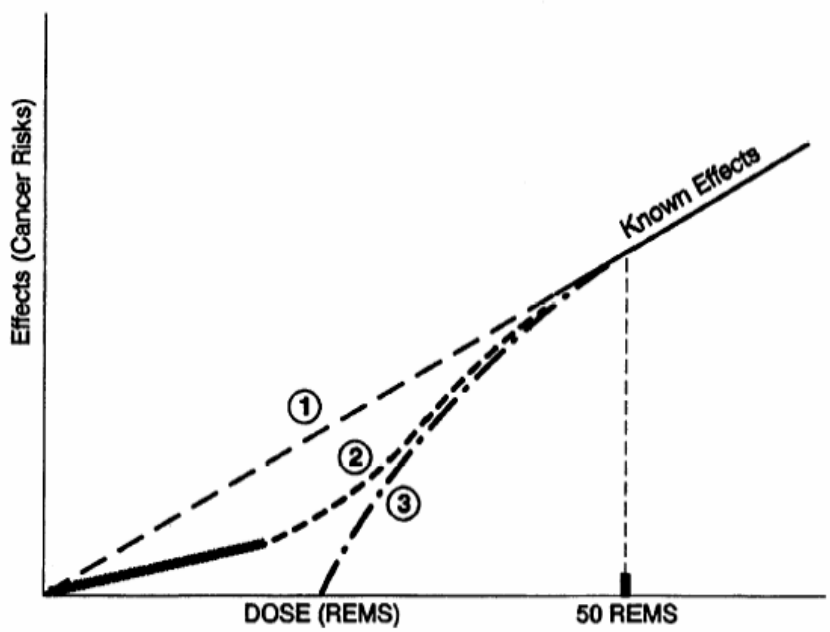
If I Receive A Radiation Dose That Is Within Occupational Limits, Will It Cause Me To Get Cancer?

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 (Curve 2 in Figure 1). We have data on cancer probabilities only for high doses, as shown by the solid line in Figure 1. 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 1 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 1. 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 and Lee 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 2 shows average days of life expectancy lost as a result of fatal work-related accidents. Table 2 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 1 Estimated Loss of Life Expectancy from Health Risks

Health Risks	Estimate of Life Expectancy Lost (Average)
Smoking 20 cigarette 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 and Lee, 1991)

Table 2 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 and Lee, 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

3, 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 3 Average Annual Effective Dose Equivalent to Individuals in the U.S.

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 360 mrems/year

(NCRP, 1987).

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