1.0 Introduction

1.1 Regulatory Background

On March 16, 1995, the President announced, as part of his National Performance Review Regulatory Reinvention Initiative, that the United States Environmental Protection Agency (USEPA) would develop a set of pilot projects that provide the flexibility to test alternative strategies to achieve environmental goals. The initiative gives a limited number of regulated entities an opportunity to demonstrate excellence and leadership (hence Project XL). Sponsors will be given the flexibility to develop alternative strategies that replace or modify specific regulatory requirements on the condition that they produce "superior" environmental results. In exchange for greater flexibility, regulated entities will be held to a higher standard of accountability for demonstrating project results.

Project XL has been broken down into three specific regulatory reinvention programs that coincide with the President's alternative performance-based strategies: the XL program for commercial facilities; the industry-wide or sector-based XL program; and XL programs dealing with government agencies regulated by the USEPA.

1.2 ENVVEST Overview

ENVVEST (Environmental Investment) is the Department of Defense (DoD) specific program for XL projects for government agencies. Jointly sponsored by the Department of Defense (DoD) and the USEPA, the program was formally indoctrinated on November 1995, when the DoD and USEPA signed a Memorandum of Agreement (MOA) on Regulatory Reinvention Pilot Projects. This MOA established a framework for developing ENVVEST pilot programs at 3-5 selected DoD facilities.

ENVVEST seeks to accomplish many of the same goals and objectives as Project XL. It defines performance goals and creates optimal approaches to achieve those goals. However, it will test budgeting processes while combining compliance with the unique pollution prevention and technology resources available to DoD.

ENVVEST differs from Project XL in the following primary areas: funds originally programmed for "relieved" compliance actions remain at the installation for reinvestment over the duration of the ENVVEST project's investment period; and both installations and regulators agree on alternative use of funds - typically pollution prevention projects with high environmental return on investment.

1.3 Elmendorf Participation in ENVVEST

In December 1997, the USEPA approved Elmendorf's ENVVEST proposal for implementation. A Public Outreach Plan was approved. The USEPA Region X, the State of Alaska Department of Environmental Conservation (ADEC), and Elmendorf, commonly referred to as the Parties, developed and signed an Interim Project Agreement (IPA) in August 1998. The process continued by soliciting public comment and involvement while negotiating the framework of the project. Comments received during a series of ENVVEST public meetings were incorporated into a draft Final Project Agreement (FPA), which was published in the Federal Register in November 1999 for additional public comment. Minor revisions to the draft FPA were made based on comments received during this final comment period. All parties signed the revised FPA on December 15, 1999.

With the ENVVEST program, Elmendorf proposed and has received regulatory flexibility under the Title V permitting process. Elmendorf requested that the ADEC and the USEPA apply relevant Clean Air Act policy guidance to Elmendorf. Specifically, the USEPA's policy document *Major Source Determinations for Military Installations under the Air Toxics, New Source Review, and Title V Operating Permit Programs for the Clean Air Act,* dated August 2, 1996. The ENVVEST agreement allows simplification of the application, implementation, management, and renewal processes of Title V permitting and management. Emission sources are segregated by the appropriate standard industrial classification (SIC) code with each SIC code undergoing permit applicability reviews separately. Currently, Elmendorf will require three Title V permits; Central Heat & Power Plant, Hospital, and Flightline emission sources. Others may be required in the future depending on base growth and development.

1.4 Elmendorf ENVVEST Pollution Prevention (P2) Projects

As a result of the above stated flexibility, Elmendorf has estimated that total monitoring, recordkeeping, reporting, and overall management costs will decrease by about 80 percent, yielding about $1.5 million in savings. These realized cost savings are being directed toward pollution prevention (P2) opportunities.

As part of the FPA, Elmendorf has agreed to implement an alternative-fuel vehicle program, a hazardous air pollutant (HAP) reduction program, and other possible P2 opportunities. These efforts are discussed in detail in the following sections.

2.0 Alternate-Fuel Vehicle P2 Project

2.1 Introduction

Elmendorf's primary P2 project is the introduction of a compressed natural gas (CNG) fleet and fueling program. These alternate fuel vehicles, and the supporting infrastructure should reduce levels of carbon monoxide (CO) on the base, and support the State of Alaska's efforts to reduce CO levels in the Anchorage urban area. Reduction of CO levels in Anchorage is a key goal of the ADEC because the area has been designated as a "non-attainment area" for CO.

Furthermore, the use of alternate-fuel vehicles by Elmendorf will assist the Municipality of Anchorage and the State of Alaska in their efforts to demonstrate and promote the feasibility of CNG technology.

The Elmendorf CNG program is being developed over a six-year period. The development of the program consists of the following activities:

- design and construction of the CNG fueling station,
- conversion of gasoline and/or diesel-fired vehicles to CNG-burning vehicles, and
- continuation of fleet growth through factory acquisition of vehicles

These activities are briefly discussed below, in the context of the progress-to-date and planned activities in each development area.

2.2 Progress to Date

CNG Fueling Station

Elmendorf obtained the services of USKH, a local engineering firm for the design of the on base CNG fueling station. The design effort was completed in September 1998, at a total cost of approximately $31,000. The CNG station consists of a 250 cubic feet per minute (CFM) compressor, a series of cascading storage tanks and two 3600 pound per square inch (PSI) fill stands. The station also contains a computerized fuel tracking and management system.

The contract for the construction of the CNG fueling station was awarded to Palmerco Construction Incorporated of Anchorage in March 1999 for approximately $494,000, with work starting later the same year. The station is located on base at the southwest corner of the 9th Street and Jerstad Avenue intersection and was opened in August 2000 with a grand opening ceremony attended by ENVVEST stakeholders.

In FY02, stakeholders approved use of ENVVEST funds (approximately $85,000.00) for the addition of a canopy over the station. The canopy completed in 2003 and provides protection from the elements as well as makes the area more user friendly.

Vehicle Conversions

Vehicle conversion contracts were awarded to Bachman NGV of Louisville, KY. The total number of vehicles to be converted to CNG was not defined in these contracts as it depended upon the per vehicle cost, which varies dependent upon make and model but is approximately $9,000.00. Vehicles were selected for conversion based on their engine type (EPA-approved CNG conversion kits are not available for all engine families), useable cargo space (ability to carry CNG tankage), frequency of use (high use vehicles are given priority) and availability at Elmendorf.

In Fiscal Year (FY) 2000, $39,000.00 was programmed for vehicle conversions with $100,600.00 added in FY01. FY02 added another $90,000.00 for light duty vehicle conversions and $53,500.00 for conversion of a diesel bus. Vehicles that have had conversion kits installed include SUVs, pickup trucks, and telephone maintenance trucks. The shuttle bus required a more extensive retrofit than the light duty vehicle kits.

Vehicle Acquisition

In addition to conversions funded by the ENVVEST program, Elmendorf received 19 factory direct CNG vehicles in late October 2002. Our current fleet size 54 vehicles plus the bus! The Logistics Readiness Squadron's Vehicle Operations Flight is supporting the CNG program by placing a standard order for CNG fleet vehicles. An additional 26 crew cab pick up trucks are scheduled for delivery in 2004. The acquisition process will be the primary source of continued fleet growth.

Training

CNG cylinders must be regularly inspected by certified inspectors. As the size of our fleet increases it will be more cost effective to perform our own operation and maintenance. Personnel in the Vehicle Operations Flight received training in 2003 on CNG cylinder inspection. The National Alternative Fuels Training Consortium provided on-site training at a cost of approximately $10,000.

2.3 Planned Activities

No CNG activities are planned other than the vehicle acquisitions discussed above.

3.0 Hazardous Air Contaminant P2 Projects

3.1 Introduction

In addition to the alternate-fuel vehicle P2 project, Elmendorf is continuing a base-wide HAP emissions reduction program. This program has been ongoing for several years and Elmendorf has made significant strides towards reducing air emissions while maintaining operational capability and flexibility.

In the summer of 1999, Elmendorf contracted the Air Quality Branch of the Institute for Environment, Safety and Occupational Health Risk Analysis (IERA/RSEQ) to conduct a comprehensive HAP emissions reduction survey for the base. The results of the survey, delivered in July 1999, provided Elmendorf with a list of project initiatives to further reduce actual and potential HAP air emissions. Several of these initiatives are now in the process of being carried out under the ENVVEST program.

3.2 Progress to Date

Under the IERA/RSEQ survey, the base's existing Air Emission Inventory (AEI) and Title V Permit Application were reviewed to determine those processes responsible for the greatest actual and potential HAP emissions, and those processes that would benefit the most from a project designed to reduce emissions.

The survey identified initiatives for the following source-groups: surface coating operations, internal combustion engines, incinerators, gasoline distribution, and aircraft engine testing. Of these source-groups, surface coating operations are a large contributor to the base's HAP emissions, and have received the greatest attention to date.

Surface Coating HAP Reduction Strategy

The majority of Elmendorf's surface coating operations involve the application of paints and primers at the Corrosion Control, Transportation, Aerospace Ground Support Equipment, and Civil Engineering Vertical Repair Shops. Elmendorf's surface coating HAP reduction strategy is based on implementing the following changes in these areas (areas in parentheses have been completed):

- installation of automatic paint gun washers (Corrosion Control)
- switch to high solids/low VOC paints (basewide)
- switch to high volume/low pressure paint application (Transportation & Corrosion Control)
- personnel training to increase paint transfer efficiencies (Transportation & Corrosion Control)
- installation of a paint partition and mixing system (Transportation)

- install carbon adsorption units in paint booths (Corrosion Control)

High solids/low VOC paints contain significantly lower levels of HAP solvents such as toluene, xylene and methyl ethyl ketone (MEK). Through its Hazardous Materials Management Process (HMMP) Team, Elmendorf has implemented an across-the-board move to high solids/low VOC paints where technically feasible. The base hazardous materials/hazardous waste management plan (O-Plan 19-3) provides links to websites that list environmentally friendly substitutes for paints and other hazardous materials. Shop level personnel are required to consult these lists before requesting approval to purchase any paint or other hazardous material.

High volume/low pressure (HVLP) spray guns, personnel training in paint application techniques to improve the transfer efficiency, paint partition and mixing systems, and automatic spray gun washers all reduce HAPs emitted during the painting process. Carbon adsorption units will remove approximately 85% of solvents from paint booth vent emissions.

Along with purchase and installation of the HVLP spray guns, Elmendorf technicians received training in HVLP painting techniques. The training program also provided an audit of the overall surface coating operations in place at Elmendorf. The contractor inspected the equipment used, the infrastructure in place, and provided a list of recommendations for improvements designed to increase the transfer efficiency of surface coating operations and reduce emissions. These recommendations are being incorporated into current operations and facility designs.

Elmendorf had also proposed to replace several of the existing shop paint booths with new booths equipped with carbon adsorption units. The Corrosion Control facility was selected for such an upgrade that was completed in 2003. The project was slightly delayed due to a design modification required for ease of use within the facility. The paint booth at the Vehicle Maintenance shop was also considered but during the design phase it was discovered that bearing walls in the facility would not accommodate the new filter system. Major construction will be required at a cost much greater than originally estimated reducing the feasibility of this project.

Medical Waste Disposal Unit Replacement

Although not funded with ENVVEST funds, the medical waste incinerator was replaced with a steam sterilization and maceration unit (SSM). The SSM unit simultaneously sterilizes medical waste with steam and super heated water while chopping it with a proprietary cutting system. The SSM process results in sterilized, unrecognizable waste that is significantly reduced in volume and can be disposed in any sanitary landfill.

Unfortunately, operational problems necessitated shutting down of the SSM system. Hospital personnel now ship out all medical wastes through a permitted waste disposal company.

Takeoff and Landing Emissions Inventory

Public comments submitted by The Trustees for Alaska expressed concern about emissions from aircraft operations at Elmendorf and requested ENVVEST funds be used to quantify the air emissions from our airfield operations. These inventories are routinely performed at Air Force installations when required by more stringent air quality regulation provisions. A takeoff and landing emissions inventory was completed in July 2001. The study was based on actual 1999 flying data and included aircraft stationed at Elmendorf as well as transient aircraft. Total emissions for CY99 are shown below.

	NOx (tons/yr)	**CO (tons/yr)**	**THC (tons/yr)**	**PM-10 (tons/yr)**	**SO_2 (tons/yr)**
Winter Mixing Height (952 ft)	**332.16**	**519.42**	**172.56**	**100.94**	**46.1**
Summer Mixing Height (1908 ft)	**372.10**	**527.49**	**172.68**	**104.77**	**48.08**

Road Paint Truck Replacement

Road and airfield painting operations are a significant source of HAPs for Elemendorf AFB. The HAPs Emission Inventory prepared in December 2000 documented that actual emissions during the 1998 season was nearly 6 tons. New paint and application technologies are available that would allow us to drop these emissions to nearly zero. Waterborne paints with low to no VOC content are available but require a new application truck due to their different components and consistency. Purchase of such a truck with ENVVEST funds was considered with an original estimate of $225,000.00. Although it seems a high cost, the emission reductions that can be achieved made this proposal especially appealing.

However, in late FY02, Elmendorf was awarded grant funds for the new truck from Federal level Air Force pollution prevention programs. The truck was delivered during the summer of 2003 and used for the remainder of the painting season. The truck was also shipped to other Air Force installations in Alaska for their use, furthering the air quality benefits beyond Elmendorf. Initial reports from the paint shop have been very positive. They are pleased with the operation of the truck and the paint quality and durability. The old truck has been decommissioned and we will be using the new truck and paints exclusively in the future. The cost of the new truck was approximately $250,000.00.

Clean Cam Technology Systems

The U.S. Air Force has recently initiated the Comprehensive Aerospace Ground Support Equipment Emission Reduction Program (CAGSEERP). As part of this effort, Clean Cam Technology Systems (CCTS) is being evaluated as an emissions reduction technology for

A/M32A-86 (-86) generators, which are used widely for Aerospace Ground Support at Air Force installations nation-wide. The Clean Cam Technology Systems (CCTS) technology is a non-intrusive method for emissions reduction in older, in-service diesel-powered engines, such a s the –86 generators. This emission reduction technology uses replacement parts requiring very little change in the structural appearance of the engine, and the modification does not have a significant impact on operations or maintenance. Based on limited testing at Brooks Air Force Base, Texas, the CCTS modification reduces nitrogen oxide emissions by 76%, carbon monoxide and total hydrocarbon emissions by 43%, and particulate emissions by 32%.

To assist in the evaluation of the effectiveness of CCTS in cold weather duty, Elmendorf participated in a demonstration spanning FY02 and FY03. Funding for the demonstration project was provided through a Wright-Patterson AFB pollution prevention initiative. CCTS was installed on two –86 generators at Elmendorf and continued normal operations. Personnel from Brooks AFB came to Elmendorf to conduct two emissions test on these units, once during summer conditions and the other during winter. The results of the field study are not yet available nut will be included in a future report.

3.3 Planned Activities

Fuel Cell Technology

Although fuel cell technology was not discussed as a potential project at the early stages of ENVVEST, Elmendorf Environmental and Civil Engineering personnel toured a fuel cell powered facility in the Anchorage area (U.S. Post Office at the Anchorage airport) and were duly impressed. Fuel cells are often not considered based upon a common perception that the technology is far too expensive to implement, however, costs continue to decrease over time. A bit of research was done to evaluate if a small scale fuel cell project could be accomplished with remaining ENVVEST funds. It was found to be feasible and was presented as an option and approved by stakeholders in 2003.

A contract in the amount of $264,000.00 was awarded in 2003. The contract includes a facility and equipment analysis, purchase and installation, one year of operation and maintenance, and a summary report. Fire Station 3 has been selected for installation of a 5 kW fuel cell manufactured by Plug Power in New York state. The fuel cell will provide supplemental power and heat for the facility. We expect delivery of the fuel cell in June 2004. Elmendorf utility shop personnel are scheduled to receive training on the operation of the unit so they can assist during the contract period and ultimately take over operations after the contract period ends. Training will be provided by Plug Power for an approximate cost of $9,500.00.

4.0 Expiration Of The ENVVEST Agreement

The ENVVEST Agreement will expire in December 2004. With the award of the fuel cell project and personnel training, total expenditures will reach $1,511,615.00, fulfilling the Air Force's funding commitment. Additional funds will be used for preparation of a final report to include documentation and analysis of all projects accomplished. Elmendorf is coordinating with stakeholders to address any official requirements for the closure of the agreement.