DOE/NV/25946--127

ANNUAL WASTE MINIMIZATION SUMMARY REPORT
for the
NATIONAL NUCLEAR SECURITY ADMINISTRATION
NEVADA SITE OFFICE

Calendar Year 2006 (CY06)

U.S. Environmental Protection Agency
(EPA) IDENTIFICATION NO. NV3890090001

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Acronym List

CY	calendar year
DOE	U.S. Department of Energy
EMS	Environmental Management System
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
m^3	cubic meters
mton	metric ton
NNSA/NSO	National Nuclear Security Administration Nevada Site Office
NSTec	National Security Technologies, LLC
NTS	Nevada Test Site
P2	Pollution Prevention
ppb	parts per billion
PPE	Personal Protective Equipment
RCRA	Resource Conservation and Recovery Act
TRU	transuranic
TSCA	Toxic Substance Control Act

Introduction

This report summarizes the waste minimization efforts undertaken by National Security Technologies, LLC (NSTec), for the U. S. Department of Energy (DOE) National Nuclear Security Administration Nevada Site Office (NNSA/NSO), during CY06. This report was developed in accordance with the requirements of the Nevada Test Site (NTS) Resource Conservation and Recovery Act (RCRA) Permit (No. NEV HW0021) and as clarified in a letter dated April 21, 1995, from Paul Liebendorfer of the Nevada Division of Environmental Protection to Donald Elle of the DOE, Nevada Operations Office.

The NNSA/NSO Pollution Prevention (P2) Program establishes a process to reduce the volume and toxicity of waste generated by the NNSA/NSO and ensures that proposed methods of treatment, storage, and/or disposal of waste minimize potential threats to human health and the environment. The following information provides an overview of the P2 Program, major P2 accomplishments during the reporting year, a comparison of the current year waste generation to prior years, and a description of efforts undertaken during the year to reduce the volume and toxicity of waste generated by the NNSA/NSO.

Pollution Prevention Program

It is the priority of the NNSA/NSO to minimize the generation, release, and/or disposal of pollutants to the environment by implementing cost-effective P2 technologies, practices, and policies. A commitment to P2 minimizes the impact on the environment, improves the safety of operations, improves energy efficiency, and promotes the sustainable use of natural resources. This commitment includes providing adequate administrative and financial materials on a continuing basis to ensure goals are achieved. When economically feasible, source reduction is the preferred method of handling waste, followed by reuse and recycling, treatment, and, as a last resort, landfill disposal.

NNSA/NSO requires contractors/laboratories to develop and maintain an Environmental Management System (EMS) per DOE Order 450.1, "Environmental Protection Program." The EMS requires that contractors must reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of Class I ozone-depleting substances through source reduction, reuse, segregation and recycling, and by procuring recycled-content materials and environmentally preferable products and services. To minimize the generation of waste, project managers are required to incorporate waste minimization into the planning phase of their projects. Waste generating processes must be assessed to determine if the waste can be economically reduced or eliminated. Waste minimization activities determined to be cost effective should be incorporated into the project plan and adequate funding allocated to ensure their implementation.

For wastes that have already been generated, an aggressive recycling program is maintained. Items recycled through the NNSA/NSO recycling program include paper, cardboard, aluminum cans, toner cartridges, inkjet cartridges, used oil, food waste from the cafeteria, scrap metal, rechargeable batteries, lead-acid batteries, fluorescent light bulbs, mercury lamps, metal hydride

lamps, and sodium lamps.

An effective method for reuse is the coordination of the Material Exchange program. Created in 1998, the Material Exchange program has diverted over 190 metric tons (mtons) of supplies, chemicals, and equipment from landfills. Unwanted chemicals, supplies, and equipment are made available through electronic mail or postings on the intranet material exchange database so that individuals can obtain supplies at no cost. These materials are destined for disposal, either as solid or hazardous waste, as a result of process modification, discontinued use, or shelf life expiration. Rather than disposing of these items, the majority of them are provided to other employees for their intended purpose, thus avoiding disposal costs and costs for new purchases. If items are not placed with another user, they can be returned to the vendor to be recycled or reused.

As required by Executive Order 13101, "Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition," NNSA/NSO maintains an Environmentally Preferable Purchasing program where specific EPA-designated items, when purchased, must contain a percentage of recycled materials. Purchasing items containing recycled materials stimulates a market for recycled content products and closes the loop on recycling.

The NNSA/NSO P2 Program also includes an employee and public awareness program. Awareness of P2 issues is accomplished by disseminating articles through electronic mail, contractor and NNSA/NSO newsletters, the maintenance of a P2 intranet Web site, employee training courses, and participation at employee and community events. These activities are intended to increase awareness of P2 and environmental issues and point out the importance of P2 for improving environmental conditions in the workplace and community.

Major Pollution Prevention Accomplishments

- Computer equipment contains many components that are toxic to the environment. Because of these hazardous components, they are considered hazardous waste at end-of-life and are banned from municipal solid waste landfills. NSTec has an electronic stewardship program that leases most of its computers from Dell Corporation for 3 years. At end-of-life, hard drives are removed and the leased computers are returned to Dell to be refurbished and sold for reuse. NSTec-owned computers are sold at end-of-life to the public through auction via the Excess Equipment Program, usually to salvage companies that disassemble and recycle most of the parts.

  As part of the continuous improvement process through integration of NSTec's EMS, the Information Services Department now orders Electronic Product Environmental Assessment Tool (EPEAT) registered computers from Dell whenever possible as computers are replaced. EPEAT computers are considered "green" computers because they are manufactured with materials that are more easily recycled and less toxic to the environment.

- Under the NSTec Advanced Monitoring Systems Initiative program and in conjunction with Burge Environmental in Tempe, AZ, a 'Universal' platform for the deployment of analytical sensors in the field for long-term monitoring of environmental contaminants was developed.

This sensor platform is an automated version of the EPA SW-846 Standard Test Method, capable of sampling, calibrating, analyzing, and performing quality-control checks. The 'Universal' platform allows for the use of a variety of different sensors, depending on the analyte of interest. The analysis can be completed at any time of the day or night, during any season, regardless of weather, at intervals of 15 minutes or greater. At the completion of each analysis, analytical results are sent via wireless modem to the operator's computer, eliminating the 6-week laboratory turn-around time.

The system was developed to monitor Cr (VI) contamination in salmon spawning gravel beds in the Columbia River in Washington. In continuous use since June 2004, the system was first tested at the NTS and then on location at the Columbia River under a variety of temperature extremes and weather conditions. The detection limits for Cr (VI) using this system were 5 parts per billion (ppb), although they can be reduced to as low as 1 ppb through measurement adjustments. The relevant regulatory standard is 10 ppb. Results of analyses during precision testing compared very well with control samples sent to an analytical laboratory.

The sensor system has been designed to limit waste generation to the milliliter level for analysis, and incorporates its own waste treatment system. System power is furnished by solar array, and the ability to operate this system remotely, from an office, reduces disturbance to the local flora in the field. Use of this system greatly reduces costs associated with sampling, transportation, shipment, and analysis of samples as well as worker exposure to hazardous chemicals.

This system is currently proposed and under review for acceptance as an equivalent EPA standard test method. Although the automated method cannot yet be used for compliance, this sensor platform can be programmed to function as an alarm if analyte levels approach compliance levels, greatly minimizing the potential for hazardous contamination of the environment and reducing the risk of out-of-compliance fines.

- Refrigerant from old air conditioning and refrigeration units cannot be released to the atmosphere and must be collected. Non-contaminated refrigerant is stored on site and reused when needed. Contaminated refrigerant is sent off site to a local vendor for destruction. In Fiscal Year 2006, the NSTec Maintenance Department bought three refrigerant recycling machines. Two machines are located at the NTS, one at the Mercury base camp and one at the Area 6 base camp. The third machine is located at the North Las Vegas Facility. The refrigerant recycling machines send used contaminated refrigerant through a series of replaceable filters and oil separators to remove impurities, cleaning the refrigerant to virgin refrigerant quality for reuse. These machines are capable of removing wax and sludge contaminates, acid in the system, and excessive oil contaminates.

- The Material Exchange program reused 2.1 mtons of materials destined for hazardous or solid waste disposal in CY06.

Comparison of Waste Generated in CY06 to Prior Years

Waste generation activities are presented in two source categories:

1. Routine Waste is waste generated from on-going operations; i.e. production, analytical, research and development laboratory operations, "work for others," or any other periodic or recurring activity.
2. Cleanup Waste is waste generated from environmental restoration program activities, lab closeouts (i.e. discarding off-spec or out of date materials), spill cleanups, legacy wastes, wastes from Decommissioning and Demolition/transition operations, and all Toxic Substance Control Act (TSCA) wastes.

Table 1 compares radioactive waste generated on site in CY06 with prior years. NNSA/NSO has not reported radioactive waste generated routinely, except for an occasional one-time generation. Personal Protective Equipment (PPE) that is generated during routine hotline activities has been used to fill void space in containers of radioactive waste generated by cleanup activities and therefore, has not been reported as Routine Radioactive Waste in prior years. Beginning in calendar year (CY) 2007, this PPE will be tracked and reported as Routine Radioactive Waste.

Routine transuranic (TRU) waste has been generated the past few years by the Joint Actinide Shock Physics Experimental Research project. Typically, DOE Sites use waste disposal records as a means of tracking waste generation. Since this routine TRU waste is being stored in Area 5 until it can be shipped to the Waste Isolation Pilot Plant Facility for disposal, it has not been reported as waste generated in past years. Starting in CY 2007, this waste will be tracked and reported in the year it is generated.

The volume of routine and clean-up waste generated is dependent upon the number and scope of projects funded during the year.

Table 1 - Radioactive Waste Generated

	Routine	Clean-up	Total
CY06	0 m^{3*}	1663.7 m^3	1663.7 m^3
CY05	0 m^3	601.8 m^3	601.8 m^3
CY04	0 m^3	334.7 m^3	334.7 m^3
CY03	0.23 m^3	647.2 m^3	647.4 m^3
CY02	0 m^3	1,270.3 m^3	1,270.3 m^3

*m^3 = cubic meters

Table 2 compares the amounts of hazardous waste generated in CY 2006 with the previous

4 years. Routine hazardous waste generation decreased in CY 2006 after a gradual increase over the previous 4 years. The volume of clean-up waste generated is dependent upon the number and scope of clean-up projects funded during the year.

Table 2 - Hazardous Waste Generated

	Routine	Clean-up	Total
CY06	11.2 mtons*	354.5 mtons	365.7 mtons
CY05	23.2 mtons	5.0 mtons	28.2 mtons
CY04	18.4 mtons	36.0 mtons	54.4 mtons
CY03	10.4 mtons	518.9 mtons	529.3 mtons
CY02	7.0 mtons	127.5 mtons	134.5 mtons

* mtons=metric tons

Table 3 compares solid waste generation to prior years. Both routine and clean-up solid waste generation decreased from the previous year. The volume of clean-up waste generated is dependent upon the number and scope of clean-up projects funded during the year.

Table 3 - Solid Waste Generated

	Routine	Clean-up	Total
CY06	4,824 mtons	6,175 mtons	10,999 mtons
CY05	5,380 mtons	11,193 mtons	16,573 mtons
CY04	4,092 mtons	6,346 mtons	10,438 mtons
CY03	4,502 mtons	16,975 mtons	21,477 mtons
CY02	3,305 mtons	14,006 mtons	17,311 mtons

Comparison of Volume and Toxicity Reductions of Waste in CY06 to Prior Years

P2 techniques and practices are implemented for all activities that may generate waste. These P2 activities result in reductions to the volume and/or toxicity of waste actually generated on site. Table 4 compares the amounts of radioactive, hazardous, and solid wastes reduced in CY06 to prior years.

Table 4 - Waste Reduced through P2 Activities

	Radioactive Waste Reduced	Hazardous Waste Reduced	Solid Waste Reduced
CY06	0 m^3	147 mtons	803 mtons
CY05	0 m^3	13,992 mtons	1194 mtons
CY04	0 m^3	115 mtons	1430 mtons
CY03	40 m^3	207 mtons	1,547 mtons
CY02	63 m^3	177 mtons	904 mtons

The following tables show an overview of the estimated volume reductions accomplished during CY 2006, through implementation of P2/waste minimization activities. Table 5 shows an estimated 147-mton reduction of RCRA, TSCA, and state-regulated hazardous waste. Table 6 shows an estimated 803-mton reduction of sanitary waste.

Table 5 – CY06 Hazardous Waste Reductions

Waste Minimization Activity	Activity	Volume Reduction (mtons)
Recycle/Reuse	Bulk used oil was sent to an off-site vendor for recycle.	98.2
Recycle/Reuse	Lead acid batteries were shipped to an off-site vendor for recycle.	34.5
Recycle/Reuse	Computer equipment was returned to the vendor where it is refurbished and sold for reuse.	5.8
Recycle/Reuse	Lead scrap metal was sold for recycle/reuse.	3.2
Recycle/Reuse	Spent fluorescent light bulbs, mercury lamps, metal hydride lamps, and sodium lamps were sent to an off-site vendor for recycle.	3.1
Recycle/Reuse	Rechargeable batteries were sent to an off-site vendor for recycle.	1.6
Recycle/Reuse	Lead tire weights were reused instead of being disposed as hazardous waste.	0.7
Recycle/Reuse	The Material Exchange program found new users for hazardous chemicals destined for disposal.	0.3
TOTAL		**147.4**

Table 6 – CY06 Solid Waste Reductions

Waste Minimization Type	Activity	Volume Reduction (mtons)
Recycle/Reuse	Mixed paper and cardboard was sent offsite for recycle.	154.4
Recycle/Reuse	Scrap ferrous metal was sold to a vendor for recycle.	538.7
Recycle/Reuse	Food waste from the cafeterias was sent offsite to be reused as pig feed for a local pig farmer.	67.0
Recycle/Reuse	Scrap non-ferrous metal was sold to a vendor for recycle.	17.4
Recycle/Reuse	Shipping materials including pallets, styrofoam, bubble wrap, and shipping containers were reused.	20.7
Recycle/Reuse	Spent toner cartridges were sent offsite for recycle.	2.6
Recycle/Reuse	Non-hazardous chemicals, equipment, and supplies were relocated to new users through the Material Exchange program, diverting them from landfill disposal.	1.8
Recycle/Reuse	Aluminum cans were sent offsite for recycle	0.4
TOTAL		**803.0**