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POLLUTION PREVENTION OPPORTUNITY ASSESSMENT
UNITED STATES POSTAL SERVICE
STAMP DISTRIBUTION NETWORK
KANSAS CITY, MO

by

Carole O. Bell, Mary Hoel, Henry Huppert, Steven Rolander
Science Applications International Corporation
Newport, RI 02840

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Project Officers

James S. Bridges
and
N. Theresa Hoagland
Sustainable Technology Division
National Risk Management Research Laboratory
Cincinnati, Ohio 45268

This study was conducted in cooperation with the
United States Postal Service

NATIONAL RISK MANAGEMENT RESEARCH LABORATORY
OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268

DISCLAIMER

The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under EPA contract No. 68-C2-0148 WA 3-10 to Science Applications International Corporation. It has been subjected to peer and administrative review, and it has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

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CONTACT

James Bridges and N. Theresa Hoagland are the EPA contacts for this report. They are presently with the newly organized National Risk Management Research Laboratory's Sustainable Technology Division in Cincinnati, OH (formerly the Risk Reduction Engineering Laboratory). The National Risk Management Research Laboratory is headquartered in Cincinnati, OH, and is now responsible for research conducted by the Sustainable Technology Division in Cincinnati.

FOREWORD

The U.S. Environmental Protection Agency is charged by Congress with protecting the Nation's land, air, and water resources. Under a mandate of national environmental laws, the Agency strives to formulate and implement actions leading to a compatible balance between human activities and the ability of natural systems to support and nurture life. To meet this mandate, EPA's research program is providing data and technical support for solving environmental problems today and building a science knowledge base necessary to manage our ecological resources wisely, understand how pollutants affect our health, and prevent or reduce environmental risks in the future.

The National Risk Management Research Laboratory is the Agency's center for investigation of technological and management approaches for reducing risks from threats to human health and the environment. The focus of the Laboratory's research program is on methods for the prevention and control of pollution to air, land, water, and subsurface resources; protection of water quality in public water systems; remediation of contaminated sites and ground water; and prevention and control of indoor air pollution. The goal of this research effort is to catalyze development and implementation of innovative, cost-effective environmental technologies; develop scientific and engineering information needed by EPA to support regulatory and policy decisions; and provide technical support and information transfer to ensure effective implementation of environmental regulations and strategies.

This publication has been produced as part of the Laboratory's strategic long-term research plan. It is published and made available by EPA's Office of Research and Development to assist the user community and to link researchers with their clients.

E. Timothy Oppelt, Director
National Risk Management Research Laboratory

ABSTRACT

The United States Postal Service (USPS) in cooperation with EPA's National Risk Management Research Laboratory (NRMRL) is engaged in an effort to integrate waste prevention and recycling activities into the waste management programs at Postal facilities. In this report, the findings of the Pollution Prevention Opportunity Assessment of the United States Postal Service, Stamp Distribution Network (SDN) located in Kansas City, Missouri are described. This assessment was conducted during the week of March 6, 1995.

The report describes the mission of each of the functional areas of the SDN including operations performed, processes and materials employed and the wastes and emissions generated. Recommendations are then made concerning the procurement of office supplies, maintenance supplies and hazardous materials; management of hazardous materials; purchase of chemicals on EPA's 33/50 list; improvement of source separation and recycling of paper and paper products, metals, and plastics; management of unwanted equipment; and other recommendations that can lead to the elimination, reduction or improved management of the facility's solid and hazardous waste streams and emissions to air and water.

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SECTION 1.0

INTRODUCTION

The United States Environmental Protection Agency (EPA) is actively supporting the development of pollution prevention program plans for Federal facilities. Since 1988, the EPA has managed a technical support effort known as the Waste Reduction Evaluations at Federal Sites (WREAFS) Program. WREAFS was established to provide pollution prevention solutions to environmental issues through research, development and demonstration of pollution prevention techniques and technologies, and transferring lessons learned within the Federal community and related private sector support industries. WREAFS has conducted more than 37 separate RD&D efforts under funding from both EPA and nine other Federal departments and agencies via interagency agreements.

The United States Postal Service (USPS) in cooperation with EPA's National Risk Management Research Laboratory (NRMRL) is engaged in an effort to integrate waste prevention and recycling activities into the waste management programs at postal facilities. The purpose of this project is to perform pollution prevention opportunity assessments (PPOAs) at several types of Postal Service facilities, to identify the pollution prevention opportunities for those facilities, to recommend implementation strategies and to develop facility guidance that can be incorporated into a revision of the USPS Waste Reduction Guide.

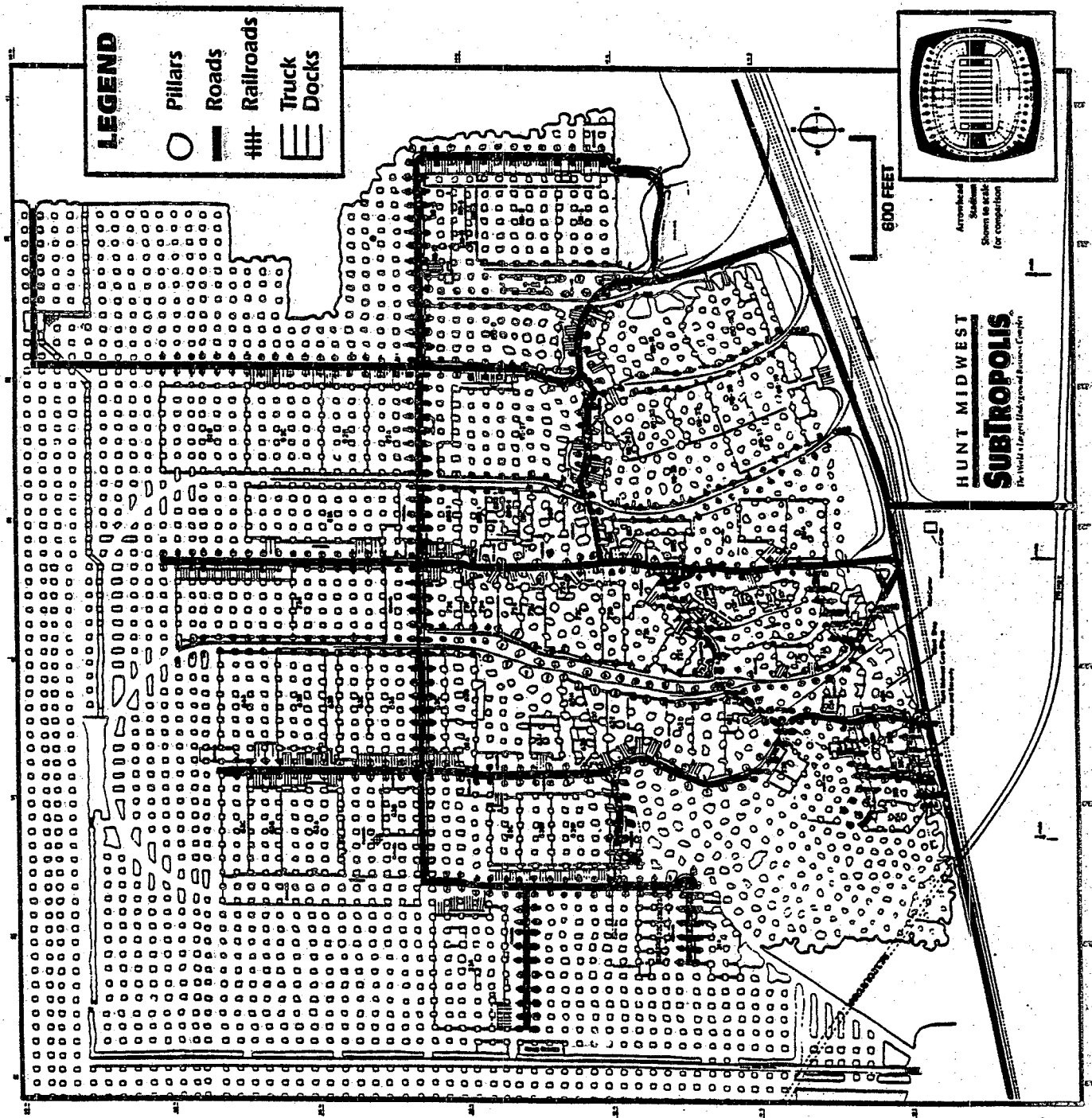
In this report, the findings of the PPOA conducted for the United States Postal Service Stamp Distribution Network located in Kansas City, Missouri are described. The site assessment was conducted during the week of March 6, 1995.

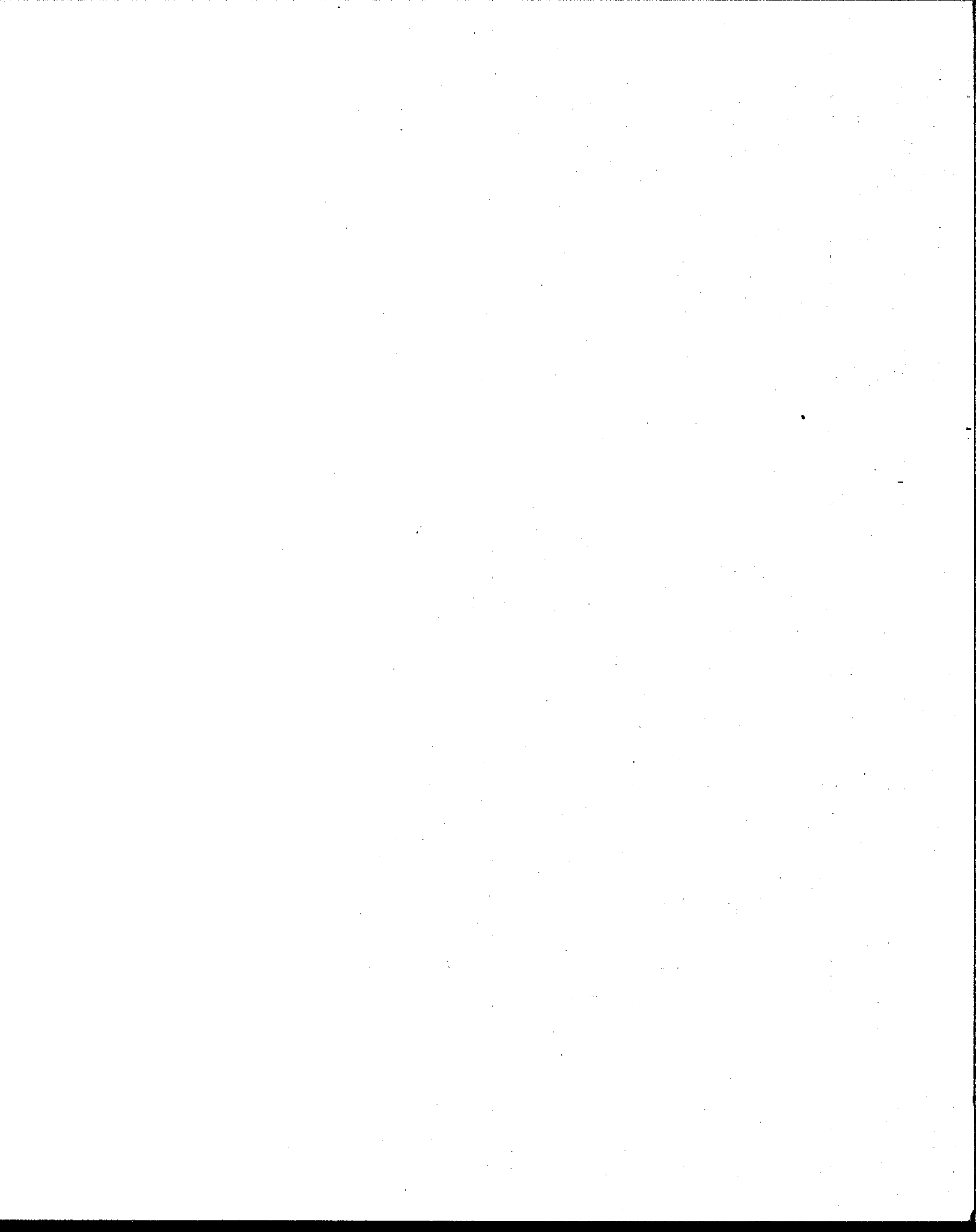
The Assessment Team performed a multi-media pollution prevention assessment. Wastes of concern included wastewater discharges; hazardous material acquisition, use and storage; hazardous waste storage and disposal; procurement; and solid waste management, including recycling. The report begins with a brief description of the facility. This is followed by descriptions of specific operations and the wastes and emissions generated. Both site-wide and operation-specific recommendations are made that may lead to the elimination, reduction, or improved management of the facility's waste streams. Mention of trade names, commercial products, or vendors does not constitute endorsement or recommendation for use.

1.1 SITE DESCRIPTION

The Stamp Distribution Network is located in North Kansas City, on Underground Drive in the Hunt Midwest Subtropolis. Subtropolis is the world's largest underground business complex, housing more than 60 local, national and international businesses in more than 10 million square feet of developed space located 100 feet underground. The developed space is used for office operations, light manufacturing, warehousing and cold storage. Subtropolis is located in a rural residential area adjacent to an urban industrial area. Appendix A provides a brochure on the Subtropolis complex. The SDN is nearly a mile from the entrance to the complex. The Postal Service selected this location for security, low rent, and consistent heating and cooling requirements. Subtropolis has a constant temperature between 65 and 72 degrees Fahrenheit. Exhibit 1.1 diagrams the Subtropolis complex. The USPS site contains two operations: the Stamp Distribution Network (SDN) and the National Stamp Depository (NSD).

EXHIBIT 1.1 MAP OF SDN LOCATION





SECTION 2.0

STAMP DISTRIBUTION NETWORK AND NATIONAL STAMP DEPOSITORY

This section addresses the operations performed within the SDN and the NSD and the wastes and emissions generated by those operations. The section includes a description of current waste management practices.

2.1 STAMP DISTRIBUTION NETWORK AND NATIONAL STAMP DEPOSITORY FACILITY DESCRIPTION

The SDN facility in Kansas City includes two operations: the Stamp Distribution Network and the National Stamp Depository. These operations employ 20 people, including one manager, four supervisors, one building engineer, two custodians and 12 clerks.

The Postal Service currently distributes stamps through numerous Stamp Distribution Offices (SDO). Each SDO supplies only a few post offices and employs two to three workers. The Postal Service is in the process of switching from the local SDO system to a regional stamp distribution system with 12 to 15 regional SDNs. The Kansas City facility was the first SDN and has been in operation for nearly two years. A second SDN has recently opened in the Washington, DC area and a third, in Dallas, TX, is under construction. The Kansas City facility also houses the National Stamp Depository, which provides storage for stamps prior to distribution through the SDN, or through six Accountable Paper Depositories (APDs).

The mission of the Kansas City SDN is the distribution of stamps, stamped products such as postcards, food stamps and money orders to more than 4,000 post offices in Iowa, Missouri, Kansas and Illinois, in response to orders/requests received from individual post offices. The SDN stocks more than 1,200 different types of stamps. In addition, the facility can be the national supply point for special items. For example, the SDN was responsible for the national distribution of "G" stamps, following the recent postal rate increase.

The Kansas City SDN occupies approximately 100,000 square feet including a 35,000 square foot workroom, 5,000 square feet of office space and 60,000 square feet of bulk storage space. The facility has two loading docks for the receipt of stamp shipments from private and government printers (Bureau of Engraving or the Government Printing Office) and for the shipment of orders. Stamp shipments come in on an irregular schedule, depending on demand.

Local Post Office employees submit orders for stamps and other items by regular mail on Order Form 17. The orders are delivered to North Kansas City post office and an SDN staff person picks up the mail every morning. SDN staff open the envelopes and enter the order information into the computer. The paper orders and envelopes are held for one accounting period (four weeks) and are then discarded as waste.

Post offices typically order stamps once per four week accounting period, but larger post offices order twice per accounting period. A new computerized phone system for ordering stamps is being tested at the SDN. A local post office can use the system to order up to three items by phone. Currently this system is used for emergency orders only.

The computerized orders are sent to one of three active stamp vaults. The vault manager downloads the orders as a group and picks the stamps required to fill the orders. A fourth vault in the SDN is currently used for bulk storage, but will be converted to an active vault, shortly. The stamps pulled from the vaults are sent to a clerk who breaks down the group into individual post office orders and gets the order ready for packaging. A second clerk verifies each order and completes and seals the packaging.

Orders are packaged in a variety of corrugated cardboard cartons and jiffy bags, depending on the size of the order. Packaging requirements are set by the Postal Inspection Service. Clerks reuse some boxes and dunnage if the correct size is available. The completed orders are then sent to the shipping clerk who prepares them for final shipment by certified mail. The shipping clerk locks the orders in metal over the road (OTR) containers for shipment via the Kansas City General Mail Facility (GMF). The SDN typically fills and ships 350 to 375 boxes and 200 envelopes per day in two shipments. Depending on the day of the week, the number of orders may range from a low of 50 to a high of 500.

The NSD is primarily a warehouse for stamps and other products. The NSD occupies approximately 100,000 square feet of space in two warehouse areas. The NSD supplies stamps to six Accountable Paper Depositories (Memphis, Chicago, Denver, New York, Washington, and San Francisco) which distribute them to the SDOs. APDs are required to order full pallets of stamps, although if warehouse stock of an item is low, they may receive smaller quantities.

2.2 SDN AND NSD WASTE GENERATING OPERATIONS

Wastes generated by SDN operations include excess and obsolete equipment and supplies; corrugated cardboard; computer paper; white paper; mixed office paper, including forms and envelopes; magazines; laser toner cartridges; employee wastes including cans, bottles, wrappers and food; pallets; shrink and stretch wrap; cellophane and plastic stamp wrap; plastic and metal strapping; paper and plastic dunnage; fluorescent lighting tubes, air filters and waste oil.

2.2.1 Solid Waste Management

Solid waste from SDN activities is consolidated in one six cubic yard container that is emptied daily by the contracted waste hauler (five times per week). Deffenbaugh Disposal Service charges \$188.00 per month for this service. SDN staff stated that the container typically is not full when emptied, since they have begun separating cardboard for recycling. The SDN is negotiating a new contract that would reduce the number of pickups per week and/or reduce the container size.

The SDN reuses some cardboard boxes as well as polystyrene cushioning and cardboard pallet corners to protect palletized material during shipping. In addition, the SDN has begun a cardboard recycling program.

The SDN and NSD receive a variety of pallets from their operations. Typically, pallets arrive with deliveries of stamps or other supplies. The SDN personnel noted that the large skids from deliveries of postcards from the Government Printing Office have a label stating that they should be returned. SDN staff does not know of a mechanism for returning them. Stamps delivered from private printers often are on pine pallets that cannot be reused for stamp distribution because they are not durable enough. These pallets are discarded or recycled. The SDN typically uses the orange plastic USPS pallets, but stated that, with a full load of stamps, the plastic pallets could not be stacked more than two high because they sagged under the weight.

Mixed paper from the incoming orders, office paper, computer printouts, and other miscellaneous paper is currently discarded.

The facility also has an equipment storage cage for damaged, defective or obsolete equipment. Some equipment, such as computers, is cannibalized as needed. When no longer useful, the equipment is discarded as solid waste. The staff knew about the Central Repair Facility in Topeka, KS but expressed concern that they had not received good quality repair service from the facility in the past.

2.2.2 Hazardous Materials

The Assessment Team did not note any hazardous waste generated by the facility. Waste oil is generated in very small quantities from maintenance of machinery. The SDN has a verbal agreement with Hunt Midwest allowing them to deposit the used oil in Subtropolis' waste oil tanks.

The facility has a maintenance cage where all of the chemicals and cleaners are stored. The maintenance room contained a solvent based parts cleaner, a freon 12 reclamation system, and several flammable materials cabinet containing a variety of paints, oils, greases and lubricants. Several materials in the flammable materials cabinet contain constituents listed on

the EPA's 33/50 list. Appendix B provides a list of the 17 chemicals EPA has targeted for reduction or elimination.

2.2.3 Stamp Destruction

The SDN is an accumulation point for stamps designated for destruction. Obsolete or damaged stamps that are returned to the SDN are destroyed by the SDN and the Postal Inspection Service. Stamps destined for destruction are packaged in many ways including cellophane, plastic coil covers and cardboard boxes. Destruction of stamps must be certified by three independent employees. The SDN has tried to use a commercial shredder and baler. Staff found that the shredder allowed whole stamps to pass through undamaged, which was unacceptable to the Postal Inspection Service. In addition, the upkeep and maintenance for the shredder was extremely expensive and time consuming.

The SDN has, in the past, used an on-site hammer mill to destroy stamps prior to disposal. While the destruction of the stamps was effective, it was also very time consuming. The material generated from these destruction processes is not desirable to paper recyclers because of the plastic contamination and the short fiber length of the shredded paper.

Currently the SDN brings stamps to an incinerator in Indianapolis, IN for destruction. The transportation and processing of the stamps at the incinerator is extremely time consuming and expensive. The SDN is currently investigating a process that shreds the stamps and packaging materials and uses the resulting material for landscape mulch. This process currently is being tested and appears to be acceptable to the Postal Inspection Service.

2.2.4 Air Quality

The only source of fresh air for Subtropolis is the entrances. The location of the SDN deep in the cave prohibits increased flow of fresh air from outside sources. Blowers, located in the interior, exhaust air out of the complex. Since mining of lime is ongoing and truck access is allowed, the air contains high levels of diesel soot. Many of the underground facilities draw air from the access road through filters.

The SDN has closed off the access road air inlets because of the high levels of diesel soot. The soot is deposited on everything and the maintenance personnel clean extensively and constantly to keep the soot under control. The SDN recirculates the air in their facility, filtering it at the blower. The filters for office air are changed weekly; those in the storage areas every three weeks. The facility generates the following waste filters on a monthly basis:

Four 20"x 25" x 1" filters for office air
Four 16" x 20" x 2" filters for the NSD
Forty 20" x 25" x 2" filters for the SDN

2.2.5 Humidity Control

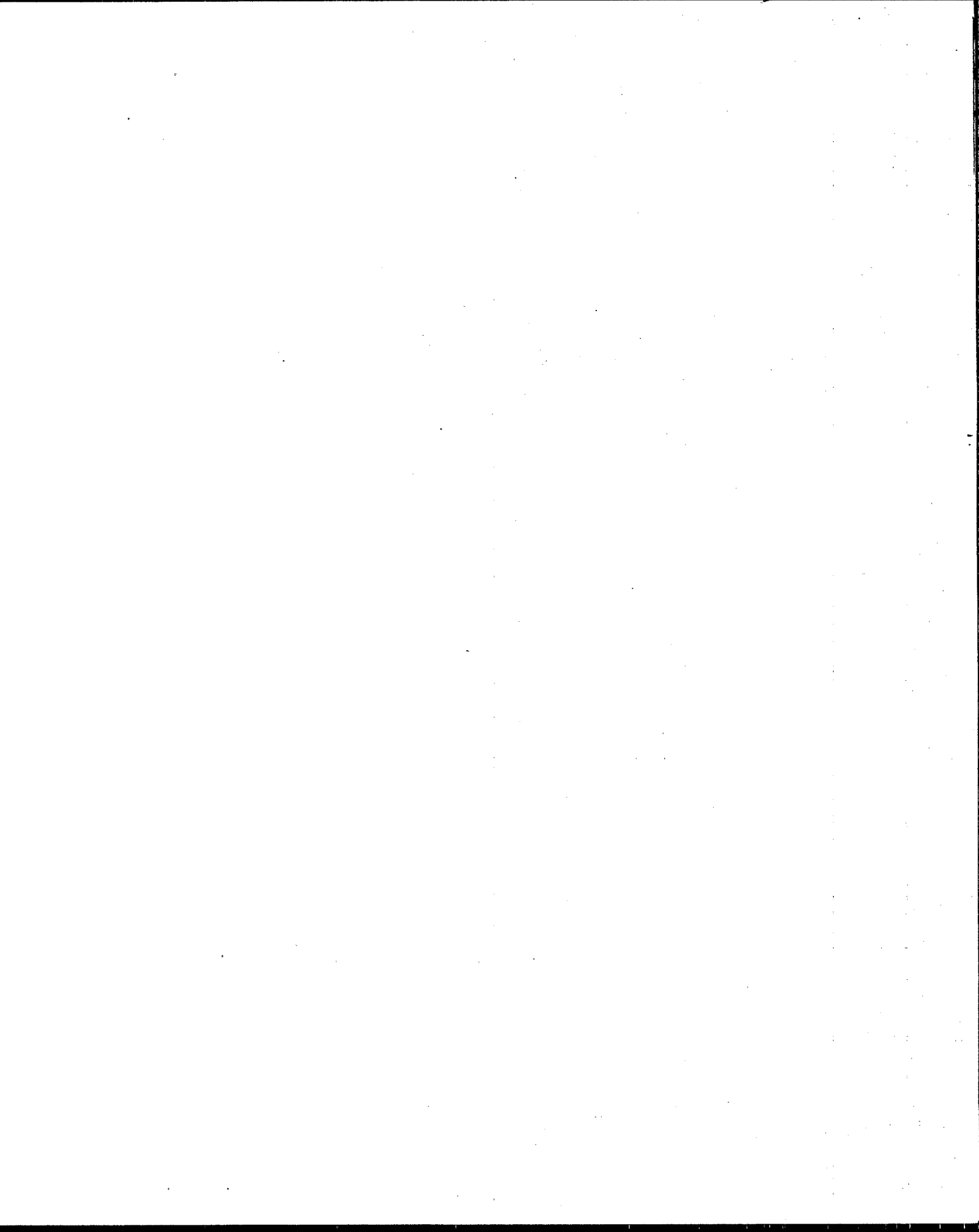
The air in the facility must be dehumidified to 50 percent humidity to protect the stamps. Filters on the dehumidifiers are replaced monthly. The coils on the dehumidifiers are cleaned periodically with a pressure washer. Wastewater is discharged via the floor drains.

2.2.6 Battery Charging

The facility has several fork lifts that are serviced on-site. There is a battery charging room where water is added to the batteries as needed. There was evidence of batteries overflowing during the charging process; apparently the overflow ran down an open drain to the sanitary sewer system.

2.2.7 Energy

The facility is lighted by fluorescent lights that are spaced in rows approximately four to six feet apart. No motion sensitive lights were in use. Lights were on at all times for safety and security reasons. The facility currently generates 15 to 30 eight foot fluorescent tubes per month, which are disposed with other solid waste.



SECTION 3.0

STAMP DISTRIBUTION NETWORK AND NATIONAL STAMP DEPOSITORY POLLUTION PREVENTION OPPORTUNITIES

This section describes pollution prevention opportunities specific to the operations of the Stamp Distribution Network and National Stamp Depository. Exhibit 3.1 presents a summary of the SDN and NSD waste generation, current management and potential pollution prevention opportunities.

3.1 REDUCE PAPER USE

Current Conditions

Personnel interviewed by the Assessment Team in offices, while aware of the double-sided copying capabilities of duplicating equipment, do not consistently use those options. Staff is not aware of any efforts to encourage reduction in the quantity of paper used and disposed. The Assessment Team observed a significant amount of computer printout (CPO) in the waste containers. White and mixed office papers and magazines are not recycled. The Post Offices and the SDN use a paper ordering system for stamps.

Pollution Prevention Opportunities

1. Adopt Paper Waste Reduction Techniques

Before initiating an enhanced recycling program, facility managers and staff should adopt and promote a variety of techniques to prevent or reduce the quantity of paper generated for disposal.

- Establish a duplex copying policy for all multi-page documents and provide staff training in the use of the double-sided function on copying equipment. As equipment is replaced, specify easy to use, rapid, duplex capability.
- In office and warehouse settings, expand and encourage the use of electronic mail rather than paper memos and distribution copies.
- Limit distribution lists. If paper copies are necessary, circulate one memo or report with a cover sheet indicating distribution.

EXHIBIT 3.1 SDN SOLID WASTE GENERATION

Waste	Current Management	Opportunities
Obsolete, damaged or defective equipment	Disposed	Reduce generation, Send to CRF, send to computer recyclers
Corrugated cardboard	Some reused, most recycled	Reduce incoming boxes, Reuse boxes, Improve diversion for recycling
Computer print-out	Discarded as waste	Reduce generation, divert for recycling
White paper	Discarded as waste	Reduce generation, divert for recycling
Mixed paper	Discarded as waste	Reduce generation, divert for recycling
Magazines	Discarded as waste	Reduce generation, divert for recycling
Toner cartridges	Returned for recycling	Continue recycling
Pallets	Some reused, many discarded as waste	Reduce variety, Reuse, Establish recycling options
Plastic stretch wrap	Discarded as waste	Reduce generation, divert for recycling
Strapping	Discarded as waste	Divert for recycling
Dunnage	Discarded as waste	Reuse, divert for recycling
Fluorescent tubes	Discarded as waste	Divert for recycling
Filters	Discarded as waste	Procure more efficient filtering system

- Identify opportunities to reuse paper and paper products. Corrugated cardboard boxes, jiffy bags, manila envelopes and other packaging materials are reusable for their original function; paper can be turned over and used as scratch paper or made into message pads.
 - Encourage staff to proofread on screen and save information on disks rather than as paper file copies.
2. Establish an electronic ordering system for stamps

The SDN already has a computerized order system set up for ordering stamps on an emergency basis. The SDN staff said that the process is slow but eventually the system may be updated so that all orders can be processed by a computer system. Before the system could be expanded, however, the Postal Service must consider that not all Post Offices have a touch tone telephone system and that local staff may not be trained in computer use.

The Postal Service should develop and implement an electronic ordering system on a larger scale. An electric ordering system would simplify the ordering process, eliminate the

need to key in information from the order forms, increase the efficiency of the SDN, and reduce the amount of paper waste generated at the facility. Since many small post offices do not have computers, the electronic system could consist of a telephone voice recognition system.

3.2 RECYCLING

Current Conditions

Currently, the SDN only separates its cardboard and aluminum cans for recycling. Staff accumulates flattened cardboard in a bin on a pallet; when the bin is full, the cardboard is strapped to the pallet with metal banding and removed from the bin. The pallet loads are stored near the loading dock until sufficient quantity is accumulated for recycling. The SDN generates approximately 2,000 to 3,000 pounds per month of cardboard. The SDN has recycled one batch of cardboard. Approximately three tons of cardboard were recycled and the USPS received \$100.00 per ton. The aluminum cans are collected in a container near the soda machines and recycled.

The SDN generates other wastes which can be recycled; however, these wastes are currently disposed in the six cubic yard container located outside the SDN. The container is serviced by Deffenbaugh waste hauling company and is emptied five times per week for a cost of \$188.00 per month (\$2,256.00 per year).

Mixed paper from the incoming orders, office paper, computer printouts, and other miscellaneous paper is currently discarded. The offices in the SDN currently do not separate computer printout for recycling. The Assessment Team saw significant quantities of white paper and mixed office paper in the waste containers. In addition, other materials are discarded into the waste container that can be recycled including metal banding and shrink wrap.

Pollution Prevention Opportunities

1. Reduce Quantities of Materials Entering the Facility

See Section 3.6 for a discussion of packaging review and reusable packaging.

2. Coordinate Recycling Efforts with Other Postal Facilities

The quantity of recyclable material generated by the SDN is relatively small. Materials such as corrugated cardboard, paper or metal may not be generated in sufficient quantities to interest local recyclers or command a reasonable price. To make the recycling program more economically attractive, the SDN should consider establishing a joint recycling program with the Philatelic Order Processing Center located just down the road in Subtropolis. During the site visit, the Assessment Team noted that the Philatelic Center

generated large quantities of OCC that are currently discarded into the compactor. By consolidating the OCC collection program and dedicating a separate container to OCC, the SDN and Philatelic Center may improve the marketability of this commodity.

3. Coordinate Complex-Wide Recycling Efforts through Hunt Midwest

There are approximately 60 companies operating in the Subtropolis Complex. Since each is likely to generate similar wastes, the owner of the complex (Hunt Midwest) may be convinced to help coordinate recycling efforts site-wide for several common commodities such as OCC, paper, and metal since these are readily marketable commodities. Revenues from this type of effort may be minimal for the SDN but may produce savings through avoided disposal costs.

4. Coordinate Recycling Efforts with Kansas City GMF

SDN personnel visit the Kansas City GMF daily to pick up mail. Because the quantity of recyclable material generated by the SDN is small, the SDN may be able to combine materials with recyclables generated at the Kansas City GMF, which has an established recycling program.

5. Set Up an Office Paper Recycling System

Given the current market value of all grades of office paper, the SDN should begin separating paper for recycling. The SDN should seek a market for paper and enter into a paper recycling contract indexed to the paper market. The SDN should provide individual desktop/area collection containers for recyclable paper. These containers should be clearly labeled and/or a distinct color to distinguish them from the waste containers. A collection container for paper recycling should be located next to each printer and copying machine. Employees should be encouraged to empty their desk collection boxes into centralized consolidation containers. The recyclable paper should be regarded as a valuable commodity, not a waste. Employees need information concerning the kinds of paper that can and should be recycled. Employees should be involved in the planning and implementation of the recycling program so that they will value participating in it. Exhibit 3.2 provides information on some local companies interested in discussing paper recycling opportunities.

6. Expand the recycling program to other commodities

To expand the recycling program, the SDN should provide individual collection containers for shrink wrap and metal. These containers should be clearly labeled and/or a distinct color to distinguish them from the waste containers. Collection containers should be placed in a central location for metals and shrink wrap.

By expanding the recycling program to include metals, paper, and shrink wrap, the SDN should be able to significantly reduce the number of pulls of its six cubic yard container.

The SDN should consider revising its contract with Deffenbaugh to establish the container pulls on an on-call basis. In addition, the SDN should consider reducing the size of the container, since less material will be placed in the container. By reducing the number of container pulls by half, the SDN could potentially save \$1,080 per year on waste disposal.

7. Establish Contract with Multi-material Recycler

The SDN should identify and establish a recycling contract with a multi-material recycler in the Kansas City metropolitan area. There are several recycling companies that accept a variety of materials for recycling. Exhibit 3.2 presents information on recyclers of other commodities as well. When establishing a contract with the recycler, the SDN should enter into a long-term contract indexed to the market price for each material. In addition, each material should have a minimum price which the recycler must guarantee that the SDN will receive for the material.

For additional information concerning recycling opportunities the SDN can contact the Mid-American Regional Council Recycling Hotline at (816) 889-7827 Ext. 1211. The hotline provides specific recycling information and contacts for recycling centers.

The USPS is developing a draft recycling contract as well as guidance to assist postal facilities in selecting a recycler.

3.3 PALLETS

Current Conditions

The SDN and NSD receive a variety of pallets including pine, HDPE plastic, and heavy duty GPO pallets with deliveries of stamps, postcards and other supplies.

Pollution Prevention Opportunities

1. Return GPO Skids to Source

The Assessment Team contacted the GPO to determine a method for returning GPO pallets and skids. The Assessment Team spoke with personnel in the GPO Shipping Office (202-512-0924) who outlined the following options for returning pallets and skids:

- Pallets and skids can be returned to the driver at the time of delivery.
- GPO will arrange to pick up loads of 300 or more pallets that have been accumulated. Call GPO shipping at the above number with quantity and pick up location. They will

EXHIBIT 3.2 RECYCLERS IN THE KANSAS CITY AREA

Recycler	Material Accepted	Requirements	Material Price (April 1995)
Smurfit Recycling Kansas City, KS (913) 236-8000	Paper (office white, mixed office, cardboard, newspaper) Metal banding Plastic shrink wrap Plastic banding Aluminum cans Glass bottles & glass jars.	Paper separated by office white, mixed office, cardboard, newspaper. Cardboard must be banded. Metal banding chopped and in 55 gal drum or gaylord boxes. Shrink wrap banded, dry, clean, with no or few labels.	White paper: \$300/ton Mixed office: \$200/ton Cardboard: \$175-200/ton Newspaper: \$3.75/100 lbs Metal bands: price varies Shrink wrap \$30/ton; Aluminum cans: \$0.40/lb Glass \$0
C&H Paper Recycling Kansas City, MO (816) 224-2060	Paper (prefers white and office paper but could work with Postal Service)	Need to work with individual facility to determine most appropriate requirements.	Could not provide price information; prices depend on specific services.
Mallin Brothers Kansas City, MO (816) 483-1800	Metal banding Scrap Metals Plastic shrink wrap	Metal banding must be segregated and banded or boxed. Shrink wrap accepted only in industrial quantities.	Metal banding: \$0.01-0.02/lb Shrink wrap: price based on quantity and condition from \$0-\$5/lb.
Batliner Paper Kansas City, MO (816) 483-3343	Paper (office white, mixed office, computer, cardboard, newspaper and colored) Aluminum cans	Paper separated by type, mixed grades accepted but yield less money. Cardboard must be banded.	Office white: \$9/100 lbs Computer paper: \$9-\$12.50/100 lbs Cardboard: \$7/100 lbs Mixed: \$100/ton Aluminum cans: \$0.40/lb
Republic Recycling Kansas City, MO (816) 842-6963	Paper only (All grades, newspaper Poly-paper (from frozen foods)).	All must be sorted by type.	All prices re-evaluated per month based on Yellow Book Prices. Current dock prices: Newspaper: \$4/100 lbs White ledger: \$10/100 lbs Computer \$12.50/100 lbs Corrugated \$7/100 lbs

initiate a government bill of lading so GPO will incur the transportation costs. A local common carrier will be dispatched to pick up the pallet load.

Return of skids and pallets can include broken pallets. GPO will repair pallets with one or two broken "strings" and recirculate them. Pallets that are broken beyond repair are either sold as firewood or disposed of in a landfill.

2. Require Use of USPS Pallets on Stamp Deliveries from Private Printers

In future contracts for printing of stamps, require the stamps be delivered on USPS pallets. This would allow the reuse of the pallets and reduce the quantity of pallets discarded because of the lack of durability. USPS could also require the printers to backhaul their pallets.

3. Investigate Mulching of Pallets with Stamps Destined for Destruction

The SDN should investigate the feasibility of sending pine pallets to the mulch manufacturer with stamps destined for destruction.

3.4 FLUORESCENT LIGHTING TUBES

Current Conditions

The offices, warehouses and work areas are lighted with hundreds of fluorescent tubes arranged in pairs spaced four to six feet apart. The SDN generates approximately 15 to 30 fluorescent tubes per month. Expired lamps are disposed with other solid waste.

USPS Memorandum for Managers, Operations Support, dated December 16, 1994, states that "Under no circumstances should these lamps be mechanically crushed or ground into smaller pieces. This method of disposal increases the exposure of hazardous materials to both employees and the environment. Lamps should be boxed prior to disposal."

Fluorescent lights are one of the most energy efficient lighting sources available. However, fluorescent lighting tubes contain mercury, which is used as an element to conduct the flow of the electric current. Historically, fluorescent lighting tubes were discarded into landfills. When the tubes broke, mercury was released to the environment. This potential hazard caused many states to classify fluorescent lighting tubes as hazardous waste and require that they be managed in accordance with applicable hazardous waste laws and regulations.

Recycling spent fluorescent lighting tubes offers an environmentally sound alternative to expensive hazardous waste disposal. Additionally, recycling may relieve the generator of future liability concerns associated with tube disposal. Several companies provide recycling services for spent fluorescent lighting tubes and some of these companies also accept ballasts,

a component of the light fixture. Ballasts manufactured prior to 1980 contain polychlorinated biphenyls (PCBs), which also present disposal problems. However, ballasts produced after 1980 do not contain PCBs. The useful life of ballasts is approximately 15 years.

Some states allow ballasts that do not contain PCBs to be disposed of in sanitary landfills. However, according to Stephanie Small of DYNEX Environmental, Inc., non-PCB ballasts contain diethylhexylphthalate (DEHP). Evidence indicates that DEHP is a human carcinogen. Due to either the PCBs or DEHP content, Ms. Small recommends that customers manage all ballasts as hazardous.

Pollution Prevention Opportunities

1. Establish a recycling program

Store expired bulbs in boxes in a safe area. USPS facilities should ship expired bulbs to an approved facility for recycling of glass, metals, and mercury. Expired ballasts should be shipped to an approved facility for appropriate disposal of hazardous constituents.

Exhibit 3.3 provides information on the specific services offered by companies that provide fluorescent tube recycling services, the cost of the services and the geographic area serviced by each company. For further information on the services of each company, see Appendix C.

3.5 AFFIRMATIVE PROCUREMENT

Current Conditions

The Stamp Distribution Network does not make it a standard practice to purchase items with recycled content, such as paper. Instead, most items purchased contain virgin material. It appears that the purchasing officials at the SDN are unaware of USPS policy and Federal legislation requiring the purchase of materials with recovered content. The United States Postal Service Waste Reduction Guide (AS552, February, 1992, p. 32) directs Requiring offices to "review purchase specifications to eliminate prohibitions or limitations on use of recovered materials" and to modify specifications to encourage use of recycled products.

Section 6002 of the Resource Conservation and Recovery Act (RCRA) directs Federal agencies to purchase "items composed of the highest percentage of recovered materials practicable." EPA has established procurement guidelines for paper and paper products, retread tires, re-refined lubricating oil, building insulation, and cement and concrete containing fly ash. EPA recently finalized the Comprehensive Guideline for Procurement of Products Containing Recovered Materials (60 FR 21370, May 1, 1995) adding 19 additional products including engine coolant, trash bags, toner cartridges, binders and desktop accessories.

EXHIBIT 3.3 FLUORESCENT LIGHTING TUBE RECYCLERS

Company/Address/Contact	Services Offered	Cost of Services (April, 1995)	Geographic Area Served
A-Tec P.O. Box 7391 Des Moines, IA 50309 (800) 551-4912	1. Lamp recycling: Customer to pack lamps in original box and store in safe place. 2. Pick-up service. 3. Ballasts accepted and shipped to FulCircle Ballast Recyclers.	4-ft lamp Over 4-ft/per foot High intensity discharge lamp (HID) \$2.29 \$.54 \$.72	Illinois, Missouri, Iowa, Nebraska, Kansas, Wisconsin, Minnesota
DYNEX Environmental, Inc. 4751 Mustang Circle St. Paul, MN 55112 (612) 784-4040	1. Lamp recycling: Customer to pack lamps in original box. 2. Provides reusable boxes to customer for rental. 3. Pick-up service. 4. PCB and non-PCB Ballast disposal (3 methods)	4-ft lamp (min. of 100) \$.39 Over 4 ft (min. of 100) \$.66 <u>Ballast Disposal</u> Method 1: Landfill (1 drum minimum) \$1.19/lb at \$ 795/drum Method 2: Decap (1 drum minimum) \$1.49/lb at \$ 1,100/drum Method 3: Incinerate (1 drum minimum) \$2.59/lb at \$ 2,000/drum	Nationwide
Lighting Resources, Inc. 386 South Gordon Street Pomona, CA 91766 (800) 572-9253	1. Lamp recycling: Customer to pack lamps and prepare bill of lading. 2. Pick-up service 3. Ballast recycling	Per lamp \$.07 to .10 Per HID \$.75 to \$2.75 <u>Ballasts</u> \$.75/lb at \$ 700 to \$ 750/drum	Nationwide
Mercury Technologies International 1940 Westwood Blvd., No. 218 Los Angeles, CA 90025 (310) 475-4684	1. Lamp recycling 2. Pick-up service	Per linear ft/lamp \$.07 to .10 Per HID \$3.00	Nationwide

EXHIBIT 3.3 FLUORESCENT LIGHTING TUBE RECYCLERS

Company/Address/Contact	Services Offered	Cost of Services (April, 1995)	Geographic Area Served
Recyclelights 2010 East Hennepin Avenue Minneapolis, MN 55413-2799 (800) 831-2852 or (612) 378-9568	1. Lamp recycling 2. Pick-up service	4-ft lamp \$.40 to .60 over 4 ft/lamp \$.60 to .83 Per HID \$2.50 to \$5.00	Nationwide
Mercury Refining Company 1218 Central Avenue Albany, NY 12205 (518) 459-0820	1. Lamp recycling 2. Pick-up service	Per linear ft/lamp \$.08 Crushed lamps per 55 gallon drum \$ 650 HID/gal. with 1.5" diameter \$ 15 HID/gal. with less than 1.5" \$ 20	Nationwide
Bethlehem Apparatus Company, Inc. 890 Front Street P.O. Box Y Hellertown, PA 18055 (610) 838-7034	1. Lamp recycling: customer to ship whole tubes in original box or crushed lamps in 55 gallon drums.	4-ft lamp whole (1-3000) \$3.00 (3000-6000) \$2.25 (over 6000) \$1.50 8-ft lamp whole (1-3000) \$4.50 (3000-6000) \$3.50 (over 6000) \$2.25 1 to 5 Drums \$1,235/each 6 to 10 Drums \$ 930/each over 10 Drums \$ 650/each	Nationwide
USA Lights Environmental Inc. 2007 Country Road C-2 Roseville, MN 55113 (612) 628-9370	1. Lamp recycling: Customer to pack lamps in original boxes, secure box with tape, and record number of lamps on the box. 2. Pick-up service. 3. Pollution Liability Insurance coverage	4-ft lamp \$.44 8-ft lamp \$.62 Per HID \$2.29	Nationwide

These guidelines provide information about the recommended percentage of recovered material, product availability and performance, and specification language.

In Executive Order 12873, dated October 22, 1993, President Clinton directs agencies to develop and implement affirmative procurement programs for all EPA guideline items and ensure that these programs require that 100 percent of their purchases of products meet or exceed the EPA guideline standards. While the USPS is not an Executive Agency, USPS policy requires compliance with Executive Orders to the maximum extent feasible. Exhibit 3.4 presents products for which EPA has established minimum recovered content levels.

The SDN was not able to document successful implementation of EPA procurement guidelines for products manufactured with recovered content. In addition, the operations cannot demonstrate successful elimination of the seventeen products on EPA's 33/50 list. Purchasing officials are not sure whether procurement specifications have been updated to include recycled content in paper products. Current supplies of printing, duplicating and computer paper do not contain any recovered content.

Pollution Prevention Opportunities

1. Purchase products with recycled content and train staff

The SDN should establish preference programs and adopt specifications for the purchase of products made with the percentages of recovered materials specified in EPA Guidelines. The GSA catalog has special sections for environmentally sound products, such as paper with recycled content. These items are highlighted in green throughout the catalog. The SDN purchasing official should make it a standard practice to purchase items with the highest amount of recycled content. Changes in the procurement system will create staff training opportunities and staff will need training on Federal affirmative procurement requirements.

3.6 PACKAGING

Current Conditions

The SDN receives stamp shipments from private and government printers on an irregular schedule depending on demand. According to Mr. Al Fatah, a materials engineer in the USPS Stamps Services Office, because of the value of stamps, the USPS has developed strict packaging and labeling requirements for shipping stamps. Special receipt requirements have been developed. The requirements include:

EXHIBIT 3.4 PRODUCTS WITH MINIMUM RECOVERED CONTENT LEVELS

Category/Product	Percent Recovered Content
Paper	
High grade bleached printing and writing paper	50%
Mimeo and duplicator paper	50%
Computer paper	50%
Envelopes	50%
Tissue Products	
Toilet tissue	20%
Paper towels	40%
Paper napkins	30%
Facial tissue	5%
Unbleached packaging	
Corrugated boxes	35%
Vehicular Products	
Lubricating Oil (re-refined oil)	25%
Tires	retread tires
Construction Products	
Fiberglass (glass cullet)	20-25%
Cellulose loose-fill and spray-on (post-consumer paper)	75%
Structural fiberboards	80-100%
Laminated paperboards	100%
Cement and Concrete (coal fly ash)	0-40%
Cement and Concrete (ground granulated blast furnace slag)	25-50%
Polyester Carpet Face Fiber (PET resin)	25-100%
Patio blocks (rubber or rubber blends)	90-100%
Patio blocks (plastic or plastic blends)	90-100%
Floor tiles (rubber)	90-100%
Floor tiles (plastic)	90-100%
Transportation products	
Traffic cones (PVC, LDPE, Crumb Rubber)	50-100%
Traffic barricades (HDPE, LDPE, Pet Steel)	80-100%
Traffic barricades (Fiberglass)	100%
Park and Recreation Products	
Playground surfaces (rubber or plastic)	90-100%
Running tracks (rubber or plastic)	90-100%
Landscaping Products	
Paper-based hydraulic mulch (post-consumer recovered paper)	100%
Wood-based hydraulic mulch (recovered wood and/or paper)	100%
Non-paper Office Products	
Office recycling containers and waste receptacles (plastic)	20-100%
Office recycling containers and waste receptacles (steel)	25-100%
Plastic desktop accessories (polystyrene)	25-80%
Plastic-covered binders (plastic)	25-50%
Chipboard, paperboard, pressboard binders	80%
Plastic trash bags	10-100%

- Stamps must be shipped in boxes; all seams must be sealed with tape.
- The boxes must contain one or two covered windows enabling Postal Service employees to lift the cover and count the sets of stamps without breaking the seal.
- The box must include a bar code that lists the item number, printer, date of printing, and the total value of stamps contained in the box.
- The sets of stamps contained in the box must be packaged in secure bundles to enable the individual sheets, rolls or books of stamps to be counted without breaking the seal.

To ship the stamps to the post offices, the SDN must send the packages by registered mail to ensure the delivery of the stamps. SDN staff place the orders into either cardboard boxes or jiffy bags, depending on the number of stamps being shipped. Then, the packages must be wrapped in brown paper, each seam must be sealed with tape, and ink seals must be stamped over tape and brown paper. These precautions are made to prevent tampering with the shipments. At each post office en route, a Postal employee must examine the integrity of the packages to certify that they have not been tampered with. In many cases, there may be direct shipments which eliminates the need to certify the packages at each stop. For these types of shipment, the packages are placed into metal mail transport equipment called over the road containers or OTRs and locked with a special lock.

The SDN purchases thousands of single use corrugated boxes to ship stamps to post offices. Once the shipments from the SDN are received at their final destination, the packages become waste. The USPS incurs additional costs for the labor to unpack and manage the boxes as well as the costs associated with their ultimate recycling or disposal.

According to the USPS Waste Reduction Guide (AS552, February, 1992, p. 36) USPS priorities for packaging are (1) no packaging, (2) minimal packaging, (3) refillable or reusable packaging, and (4) packaging that is recyclable and contains recycled materials. USPS policy states, "Returnable packaging--such as some shipping containers--can be returned to suppliers for reuse and redistribution. Refillable or reusable packaging may be refilled or reused by postal employees, manufacturers and consumers . . . Requirements-generating offices should investigate the potential for using these types of packaging. Packaging that can be refilled or reused for its original purpose is preferable . . ."

The USPS has addressed the question of how to move mail between or among facilities and, at the same time, reduce the generation of waste and the cost and labor to manage that waste. The USPS maintains an inventory of more than 75 million pieces of reusable mail transport equipment ranging from trays and hampers to rolling stock. Wire containers, OTRs, and multi-purpose containers are considered desirable because the increased

capacity of these containers reduces the number of trips, resulting in savings from reduced labor and transportation costs.

At present, each USPS facility must document its requirements for mail transport equipment (MTE). Local areas are encouraged to establish "closed loop" systems to ensure the availability of containers (Container Methods Handbook PO-502, pp. 116f). However, imbalances in container availability affect facility operations and inventory control remains a complex problem. To improve inventory control, the USPS plans to establish a network of 31 Mail Transport Equipment Service Centers (MTESC). The MTESC will provide computerized inventory tracking and maintain repair records. Facilities will be able to call the MTESC to find out where excess MTE should be sent as well as to order additional MTE.

Pollution Prevention Opportunities

1. Review stamp packaging requirements for stamp producers

Review all packaging requirements for redundancy. Develop a policy that minimizes the packaging of the product yet maintains security.

2. Initiate cost/benefit analysis on reusable packaging

The USPS should apply the same policy to the movement of USPS materials and supplies that they have applied to the movement of mail. USPS should initiate a study to determine the cost/benefit of replacing single use corrugated boxes in certain USPS shipping operations with distribution packaging that can be reused hundreds of times.

According to a 1994 report entitled Delivering the Goods: Benefits of Reusable Shipping Containers (INFORM Inc., 1994), reusable distribution packaging is most effective:

- for frequent deliveries,
- over short distances,
- between a small number of parties, and
- using company-owned or "dedicated" vehicles.

Since there are defined shipping destinations, the SDN could initiate closed loop packaging systems, especially for the larger receiving facilities.

The five major obstacles to expanding reuse of distribution containers include: 1) capital expense, 2) tracking containers, 3) cost of returning containers to point of origin, 4) lack of storage space and 5) resistance to change. Storage space should not provide a major obstacle since the containers will move in and out of the facility on a daily basis.

3. Establish closed loop network for reusable packaging

Specifically, the SDN should establish a closed loop network for stamp distribution packaging. Since the stamps are distributed within a confined geographic area (Missouri, Kansas, Iowa, and Illinois), the SDN should be able to establish a closed loop system for returning stamp packaging to the SDN for reuse. See Appendix D for USPS instructions for completing and implementing "Closed Loops".

3.7 SDN MAINTENANCE SHOP

Current Conditions

The SDN has its own maintenance shop where parts and equipment are stored. This shop has a solvent sink. The SDN uses several products that contain either ozone depleting chemicals (ODCs) or chemicals on EPA's 33/50 list for materials targeted for reduction. Exhibit 3.5 provides a list of materials used by the SDN that contain these constituents. The parts washer is a solvent-based unit and SDN personnel state that the solvent has not been changed.

EXHIBIT 3.5 LIST OF SDN PRODUCTS WITH ODCs OR 33/50 CHEMICALS

Trade Name/Company	Use	ODC or 33/50 Chemical
Dry Spice Dymon Inc.	Bathroom cleaner	5.2-8.7 % 1,1,1-trichloroethane
AR-94 Ant and Roach Spray	Ant and Roach Spray	1-5 % 1,1,1-trichloroethane
3.5 lb VOC Lead & Chromate Free Quick Dry Enamel	Paint	35% xylene
Hard Hat Primers and Topcoats	Paint	15-25% Xylene 10-25% toluene 0-3% methyl ethyl ketone

Pollution Prevention Opportunities

1. Replace Products containing ODCs and EPA 33/50 Chemicals

The SDN provided MSDS for all of the products used. The Assessment Team identified four materials that contained constituents of concern, either ozone depleting chemicals or others on EPA's 33/50 list.

Dry Spice produced by Dymon Inc. is used as a bathroom cleaner and contains between 5.2 and 8.7 percent 1,1,1-trichloroethane. There are numerous bathroom cleaners that do not contain EPA 33/50 chemicals that can be used instead of this material. GSA

offers numerous cleaning products that are environmentally preferable and in many cases biodegradable. Systems are available that use cleaning product dispenser units that measure exact amounts of product for use. These systems reduce the quantity of cleaning products purchased and used and save money.

AR-94 Ant and Roach Spray is used as a pesticide and contains 1 to 5 percent 1,1,1-trichloroethane. There are over the counter pesticides that do not contain EPA 33/50 chemicals. Please note that only personnel trained and certified for pesticide application should be allowed to use pesticide products.

The SDN uses paints in small quantities for spot painting of equipment or other small items. Specifically they use many paints that contain EPA 33/50 chemicals. For example MSDS were provided that showed that they used 3.5 lb VOC Lead & Chromate Free Quick Dry Enamel Paint that contains 35 percent xylene and Hard Hat Primers and Topcoats that contain 15 to 25 percent xylene, 10 to 25 percent toluene, and 0 to 3 percent methyl ethyl ketone. There were several other off-the-shelf paints in the maintenance flammable materials cabinet. The SDN should strive to purchase low-VOC products from GSA or off-the-shelf. These paints do not dry quickly but the applications for the SDN do not require quick dry times.

2. Eliminate solvent sink or replace with an aqueous washer

Eliminate the parts washer in the maintenance room or replace with a non-petroleum based or an aqueous cleaning system. The SDN should evaluate the frequency of use of the parts cleaner and make a determination concerning the need for a parts cleaner in this shop. If the SDN ever chooses or is required to replace this parts cleaner, they should select an aqueous cleaning system. The USPS has already conducted an evaluation of six aqueous parts cleaning systems and compared them to the standard solvent-based cleaning system. Exhibit 3.6 summarizes the results of this study. For a more complete description of the study please see Environmental Compliance Model Vehicle Maintenance Facility, United States Postal Service, Northeast Area, Hartford, CT: Vehicle Maintenance Alternative Technologies Demonstrations and Evaluations, February 28, 1994.

3.8 BATTERY CHARGING

Current Conditions

The SDN uses several battery powered forklifts for the movement of materials. These forklifts are stored in the battery charging room. When needed, the batteries are filled with water and recharged. The Assessment Team noted, and the maintenance supervisor confirmed, that batteries have been overfilled and, on occasion, have overflowed during the battery charging. This acid battery overflow runs down a nearby drain to the sanitary sewer system without any neutralization.

EXHIBIT 3.6 SUMMARY RESULTS ON PARTS CLEANERS EVALUATED BY THE USPS

Product Name	Safety Kleen: 105	Natures Way: Marine Clean	Shop Master: Liquescent Alpha	Bio-T: Parts Washer NR	Chem Station: TASC	Safety Kleen: Exxon Actrel PC-95	Water Works: Ram Kicker
Product Type	Aliphatic Hydrocarbon	Aqueous with Microbes	Aqueous/Alkaline	Terpene	Aqueous/Alkaline	Aliphatic Hydrocarbon	Aqueous/Alkaline
Performance Rating (10 = best performance)	8	10	9	9	7	5	5
Listed RCRA Haz. Waste	No	No	No	No	No	No	No
Characteristic Hazardous Waste	Yes	No	No	Yes	No	No	No
CERCLA List of Hazardous Substances	Yes	No	No	No	No	No	No
SARA List of Toxic Substances	Yes	No	No	No	No	No	No
OSHA list of Hazardous and Toxic Substances	Yes	No	No	No	No	No	No
OSHA physical Hazard	Yes	No	No	No	No	No	No
CAA list of Hazardous Air Pollutants	Yes	No	No	No	No	No	No
pH below 5.5 or greater than 9.5	No	No	Yes	No	Yes	No	No
Tangible Costs (\$/year) (Based on VMF usage rates)	Service Contract: 2659 Own/Maintain: 1807	Own/Maintain and WW discharge: 2705 Own/Maintain and Off-site Disp.: 2215	Own/Maintain and WW discharge: 2808 Own/Maintain and Off-site Disp.: 2318	Own/Maintain and Off-site Disp.: 2151	Own/Maintain and WW discharge: 2534 Own/Maintain and Off-site Disp.: 2134	NA	NA
Intangible Cost \$ = Low Risk \$\$ = Moderate Risk \$\$\$ = High Risk	Service Contract: \$\$\$ Own/Maintain: \$\$\$	Own/Maintain and WW discharge: \$1/2 Own/Maintain and Off-site Disp.: \$	Own/Maintain and WW discharge: \$\$ Own/Maintain and Off-site Disp.: \$	Own/Maintain and Off-site Disp.: \$\$	Own/Maintain and WW discharge: \$\$ Own/Maintain and Off-site Disp.: \$	NA	NA

Pollution Prevention Opportunities

1. The drain in the battery room should be diked to prevent the accidental discharge of battery acid to the sanitary sewer. There are devices commercially available to dike drains. Once spills are contained, staff should neutralize the battery acid with sodium bicarbonate (baking soda) and then wash the neutralized acid down the drain with water. Neutralizing the acid will reduce the likelihood of corrosion of pipes.
2. Review procedures on the proper charging of batteries to prevent accidental acid overflows.

3.9 LIGHTS AND ENERGY

Current Conditions

Since the SDN is located underground, sufficient internal lighting is very important for SDN activities. However, the Assessment Team observed that lights were routinely left on in restrooms, break rooms, and offices. In addition, the warehouses have several lights that remain on constantly. There are two reasons for this: (1) many of the lights are emergency lights, and (2) several rows of lights are connected to the lighting switch outside the warehouse. The SDN staff is aware of the lighting problems in the warehouses and plans to reduce the number of emergency lights and to rewire the lights. Based on information provided by the SDN staff, the USPS facility in Kansas City pays more than \$89,000 for electricity per year. This expense breaks down as follows: SDN \$72,096.94 and NSD \$17,054.90.

The Federal government is a major consumer of energy, using more than two percent of all energy consumed in the United States. The Energy Policy Act of 1992 requires Federal agencies to reduce energy consumption per gross square foot 20 percent by the year 2000 and Executive Order 12902 requires Federal agencies to reduce energy consumption 30 percent by the year 2005. Both reductions are from a 1985 baseline. In addition, Federal agencies must conduct comprehensive energy audits and install cost-effective energy conservation measures; agencies are encouraged to audit 10 percent of their facilities each year, using "no-cost" audits where practicable. These requirements are summarized in Exhibit 3.7.

EXHIBIT 3.7 FEDERAL ENERGY POLICIES

Energy Policy Act of 1992	Executive Order 12902
Reduce energy consumption per gross square foot 10 percent by 1995 (1985 baseline)	Reduce energy consumption per gross square foot 30 percent by 2005 (1985 baseline)
Reduce energy consumption per gross square foot 20 percent by 2000 (1985 baseline)	Reduce energy consumption per gross square foot 20 percent in industrial facilities by 2005 (1990 baseline)
Conduct comprehensive facility audits and install cost-effective energy conservation measures	Conduct surveys and comprehensive audits
In Federally owned buildings, install all energy and water conservation measures that have payback periods of less than 10 years	Implement recommendations for energy efficiency, water conservation and renewable energy that have payback periods of less than 10 years

Pollution Prevention Opportunities

1. Motion sensitive lighting

Install motion sensitive lighting in warehouses and other infrequently used areas. In warehouses, turn lights off in unused sections or maintain only low-level security lighting. Install motion sensitive lighting in restrooms and breakrooms to conserve energy. A Postal facility in Merrifield, Virginia has placed motion sensitive lighting in its restrooms and staff has been pleased with the change and the amount of energy conserved.

2. Establish a "Lights Out" policy

Establish a policy of turning off lights and equipment when leaving an area. Where machine design permits, turn photocopiers to low power when not in use. Each kilowatt hour saved prevents the formation of air pollutants, including 0.7 kg of carbon dioxide, 5.8 g of sulfur dioxide and 2.5 g of nitrogen oxides.

3. SDN lighting plans

The SDN should move ahead with its plans to reduce the number of emergency lights and to rewire the lighting in the warehouses. This will help to reduce the amount of energy that the SDN consumes.

4. Install energy efficient lighting

In many Federal buildings, approximately 25 percent of the energy consumed is for lighting; hence, replacement of inefficient lighting systems results in substantial energy and

cost savings. EPA operates Green Lights, a voluntary, non-regulatory program promoting pollution prevention through the installation of energy efficient lighting. Federal partners agree to upgrade lighting to maximize energy savings wherever it is profitable. The Green Lights program benefits participants by lowering electricity bills, improving lighting quality, and increasing worker productivity. Energy efficiency also reduces the quantity of pollutants released in the generation of electricity. For example, EPA estimates that if Green Lights were fully implemented, where profitable, in the United States, it would save over 65 million kilowatts of electricity annually, reducing the national electric bill by \$16 billion per year. The program would also result in reductions of carbon dioxide, sulfur dioxide, and nitrogen oxides equivalent to 12 percent of U.S. utility emissions, curbing acid rain and smog and helping to slow the greenhouse effect.

According to the New York Times of Wednesday, February 22, 1995, "One of the first Federal agencies to try this green technology was the Postal Service, which installed \$300,000 worth of energy-efficient lighting in its Reno office in the early 1980s. Postal officials say that office has saved \$52,000 a year in electricity bills in the years since, more than covering the initial costs. Moreover, a study of the Reno office in the late 1980s found that the better lighting helped make the mail sorters there the most productive in the Western United States. The officials said that the better lights helped reduce the errors the workers were making, allowing them to achieve a productivity gain that the Postal Service calculated to be worth \$400,000 to \$500,000 a year."

5. Become a Federal Partner in the Green Lights Program

Federal organizations can become Green Lights Partners by signing a Memorandum of Understanding (MOU) with EPA (see Appendix E) agreeing to:

- Survey agency facilities and identify lighting upgrades that will reduce energy use 50 percent,
- Upgrade 90 percent of the square footage of agency facilities no later than September 1, 2005, and
- Appoint a coordinator to oversee participation in the program and document annual energy efficiency improvements.

Green Lights provides free technical assistance to participants through written materials, information hotlines, and thorough survey and analysis software products that allow Green Lights participants to analyze their options for installing energy-efficient lighting. The system helps participants survey the lighting systems in their facilities, assess their retrofit options, select the option that maximizes energy and pollution savings while simultaneously rating or improving lighting quality and meeting the Green Lights profitability criteria, and produces reports suitable for use by facility managers, financial staff, and senior management.

EPA provides the following support systems to help Green Lights participants obtain information on energy-efficient lighting technology, financing options, and public recognition opportunities.

- *Lighting Services Technical Support:* provides extensive technical support through a hotline, a comprehensive Lighting Upgrade Manual, and workshops.
- *Survey and Analysis Tools:* state-of-the-art computer software helps participants survey facilities and select lighting upgrade options that maximize energy savings and meet profitability goals.
- *Financing Directory:* Federal agencies may utilize third party financing or traditional procurement mechanisms. In addition, however, Federal participants may consider utility financing, energy savings performance contracts and the Federal Energy Efficiency Fund. EPA can also provide survey and analysis services through an inter-agency agreement.
- *The National Lighting Product Information Program:* objective source of current performance and price information on energy- efficient lighting products.
- *Public Recognition:* participants receive public recognition for their environmental leadership through EPA-generated news articles, media events, and public service advertisements. EPA encourages participants to promote their own Green Lights activities by distributing free, ready-to-use promotional materials.

In the MOU, EPA and the Federal agency agree: "that the commitment to survey buildings and complete lighting upgrades is contingent upon the availability of appropriated funds or third-party financing resources."

The USPS can commit to the Green Lights program by signing a Memorandum of Understanding with EPA agreeing to assign a coordinator, survey facilities and begin installation of energy efficient lighting. The Green Lights Federal Program Manager, Gwendolyn Taylor, is confident that the USPS could realize annual savings in the \$40,000 range for the Kansas City facility, based on average savings of \$.22 per square foot currently being realized by all Green Lights participants. Even if the facility does not join the Green Lights program, it should strive to incorporate the goals of the program into its lighting plans. For further information on Green Lights for Federal Facilities contact:

Gwendolyn Taylor, Federal Program Manager
Green Lights & Energy Star Programs
501 3rd Street, NW (Mail Code 62 02J)
Washington, DC 20001
Telephone: (202) 233-9472
Fax: (202) 233-9578

6. Procure computers that meet Energy Star requirements

Future computer equipment purchases should specify equipment that is energy efficient. Executive Order 12845 requires Federal agencies to purchase computer equipment that meets EPA Energy Star requirements for energy efficiency. The EPA Energy Star Program is a voluntary partnership with the computer industry to promote energy-efficient personal computers, monitors and printers. Participating companies have committed to develop computer equipment that powers down when not in use. The "sleep" feature cuts energy use by 50 to 75 percent. Energy Star also includes a category for controlling devices, external retrofit products that reduce the energy consumption of existing computer equipment by automatically turning them off when not in use. The Federal Supply Service offers a product called the Intelligent Energy Saver, a PC add-on device that controls electrical power to the PC and its peripherals. The complete PC system can be powered on and off at user-defined dates and times. Appendix F provides information on how to purchase Energy Star equipment and a list of participating companies and manufacturers of equipment that meets Energy Star requirements.

3.10 INDOOR AIR QUALITY

Current Conditions

The assessment raised concerns about air quality because of the underground location, regular truck traffic, the continuous presence of a fine black dust on equipment and surfaces, and the quantity and condition of the particulate filters. A lack of fresh air sources and potential need for additional filter systems was noted.

The location of the USPS SDN and NSD facilities in an underground, active, limestone and shale mine raises questions regarding the indoor air quality (IAQ) of the space. Observation reveals that the USPS has all the potential chemical release sources of typical office space (hydrocarbons from computers, printers, and other electrical equipment; hydrocarbons from carpet glues and upholstery etc.) as well as diesel exhaust from mining equipment, trucks and other vehicles. The USPS also utilizes fork lifts, which may affect the air quality or present explosion hazards, depending on the type of lift and battery charging procedures. Given the unusual office ventilation configuration (the only entry point for outside air is one mile away), the potential for poor air quality exists. Poor IAQ can manifest itself as complaints of headaches, eye or lung irritation, or fatigue. Unhealthy IAQ can produce more serious health effects.

Pollution Prevention Opportunities

1. Perform An Indoor Air Quality Study

The Assessment Team believes that an indoor air quality study would provide hard data to support recommendations for additional ventilation or improvements to the particulate

filter system and the addition of other air treatment units. Of particular concern in such a study would be unburned hydrocarbons and carbon monoxide from vehicle exhaust. In addition, the forklift battery charging operation may release hydrogen, a potential explosive. This may be an OSHA issue.

Since the air handler units (AHUs) serving the USPS space cannot deliver "outdoor air," and can only ventilate the space with either air from the road space or recirculated air that has passed through particulate filters, the USPS should monitor the air for specific pollutants. Normally, indoor air quality can be improved by increasing the volume of "outdoor air" to a space to dilute or remove airborne chemicals in an office area. Since this is not currently possible, the airborne concentrations of suspected pollutants should be monitored to determine if the levels are harmful or irritating. Specifically, diesel-powered mining equipment, trucks, and cars will release diesel exhaust. The air should be monitored for the following exhaust constituents:

- Carbon monoxide, an odorless, asphyxiant gas is a common air contaminant. While high concentrations can result in death, repeated exposure up to 100 parts per million (ppm) is generally believed to cause no sign of poisoning. Carbon monoxide is not filtered easily from the air, and high concentrations can collect in poorly ventilated spaces.
- Carbon dioxide, an odorless, asphyxiant gas that can be used as a rough guide of air quality.
- Nitrogen dioxide, a toxic gas that will effect the human pulmonary system and cause death at elevated concentrations.
- Nitrogen monoxide, a gas that can cause severe irritation of eyes, skin and mucous membranes.
- Diesel soot, contains benzo[a]pyrene which is an potential carcinogen. The soot can contain hundreds of hydrocarbons and particulates including carbon and oxidized carbon compounds, metal oxides, oil additives, and fuel additives. Some of these soot constituents (e.g., PNAs) are carcinogens.
- Hydrogen, a gas that can asphyxiate or explode, if encountered in sufficiently high concentrations. Fork-lift batteries of a particular type can produce hydrogen during re-charge.

2. Install Monitors

Where toxic gases are present and gases do not possess adequate physiological warning properties (e.g., carbon monoxide), continuous environmental monitors should be installed. These will warn the occupants should the engineering controls fail.

3. Evaluate Filter Effectiveness.

The USPS should also conduct an evaluation of the USPS ventilation system. This is based on visual observation of the filters, the contaminants suspected to be present, and the lack of outdoor air. The filters observed at the USPS facility will collect some of the particulates in the air. The USPS should evaluate the ventilation system and seek to improve its efficiency. The frequency with which the filters become black with particulate (5 to 10 days) suggests an unusually high particulate concentration in the air.

The filters presently in use will not decrease the airborne gases in the space. If monitoring results indicate high gas levels, then decreasing the concentrations for some of the gases may need to be investigated. The space may have sufficient amounts of outdoor air delivered by the current system. If additional air is needed, this could be accomplished by increasing mechanical ventilation or opening holes to the outdoors through drilling. This can be determined through a ventilation system evaluation.

3.11 POLLUTION PREVENTION INFORMATION ON THE INTERNET

Current Conditions

During the site visit, USPS staff indicated that they would like information on accessing pollution prevention information through the Internet.

Pollution Prevention Opportunities

There are several sources of pollution prevention information on the Internet. Perhaps, the best source is EnviroSense. This Internet-based information source is funded by the Environmental Protection Agency and the Strategic Environmental Research and Development Program. EnviroSense allows those implementing pollution prevention programs or developing research and development projects to benefit from the experience, progress, and knowledge of their peers. EnviroSense includes a pollution prevention forum for all levels of government, researchers, industry, and public interest groups. EnviroSense has been developed to host an expert architecture known as the Solvent Umbrella. The Solvent Umbrella will allow users to access solvent alternative information through a single, easy-to-use command structure. EnviroSense is also modem accessible via Bulletin Board System (BBS). Through Netscape, EnviroSense address is:

<http://wastenot.inel.gov/envirosense>.

The EPA also has a World Wide Web Server (WWW), which is being run as a prototype system to provide Public Access to EPA information. The EPA provides the comprehensive Access EPA document describing environmental information, as well as a number of other pointers to Information Locators that can be obtained from the EPA and related organizations. In addition to this document, the EPA's Public Information Center is

available to provide assistance in accessing environmental information. An experimental EPA People Locator is also available. Through Netscape, EPA's WWW server can be accessed through <http://www.epa.gov>.

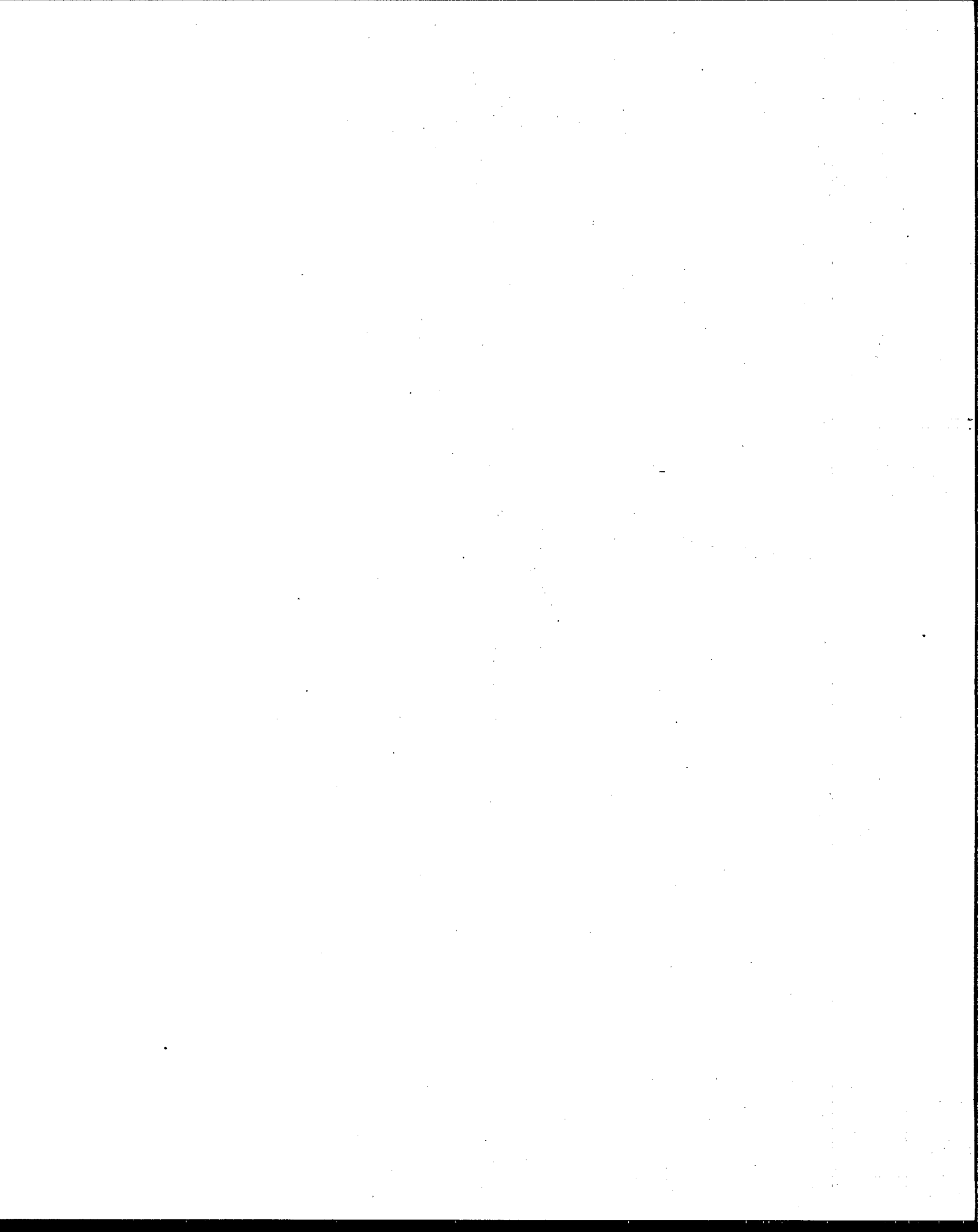
The EPA WWW server provides information on EPA Agency information and environmental data, including:

- Press Releases, Calendar, Announcements, Speeches,
- EPA Offices and Regions,
- Consumer Information,
- EPA Initiatives, Policy and Strategy Documents,
- Rules, Regulations and Legislation,
- EPA Standards,
- Science, Research and Technology,
- Information about Grants, Contracts (RFPs), and Job Vacancies,
- Newsletters and Journals and
- Software and Databases.

Another source of environmental information is the Air Force Center for Environmental Excellence (AFCEE), Pollution Prevention Directorate, located at Brooks AFB in Texas. AFCEE produces PRO-ACT fact sheets on various pollution prevention topics, ranging from corrugated cardboard pallets to a summary of environmental executive orders. Through Netscape, the PRO-ACT fact sheets can be accessed through:

http://chppm-meis.apgea.army.mil/pro-act/index_txt.html.

Appendix G provides information on a variety of additional pollution prevention information sources.

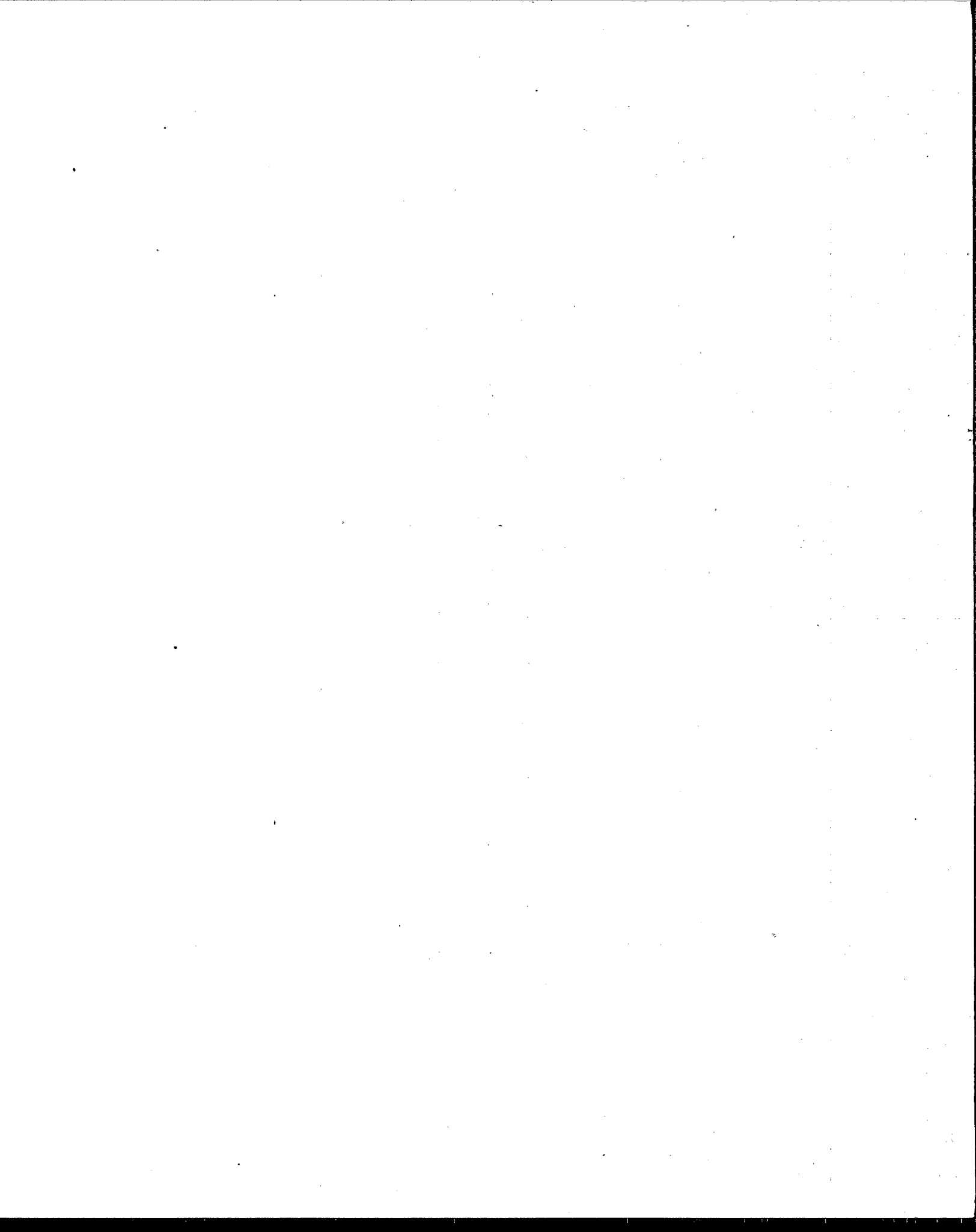


SECTION 4.0

CONCLUSIONS AND RECOMMENDATIONS

This Pollution Prevention Opportunity Assessment report documents the processes performed, wastes generated and current waste management practices at the USPS Stamp Distribution Network in Kansas City, Missouri. During the assessment process, the Assessment Team identified opportunities to reduce both the quantity and toxicity of the wastes generated by this facility and recommended techniques for implementation of those pollution prevention options. The opportunities described in the previous sections constitute the recommendations of the Assessment Team. Exhibit 3.1 presents a summary of the major facility-specific and facility-wide recommendations.

Dissemination of this report will encourage application of the pollution prevention opportunities in USPS Stamp Distribution Network operations.



BROCHURE FROM SUBTROPOLIS COMPLEX

WHAT IS SUBTROPOLIS?



THE WORLD'S LARGEST
UNDERGROUND
BUSINESS COMPLEX

HUNT MIDWEST

SUBTROPOLIS

The World's Largest Underground Business Complex

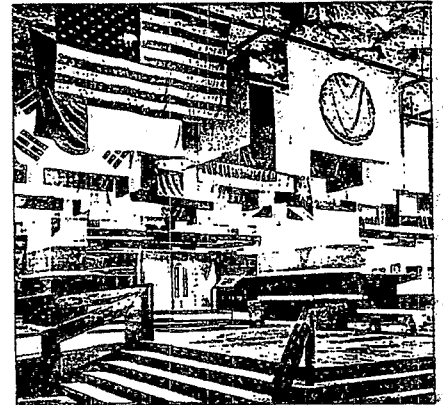
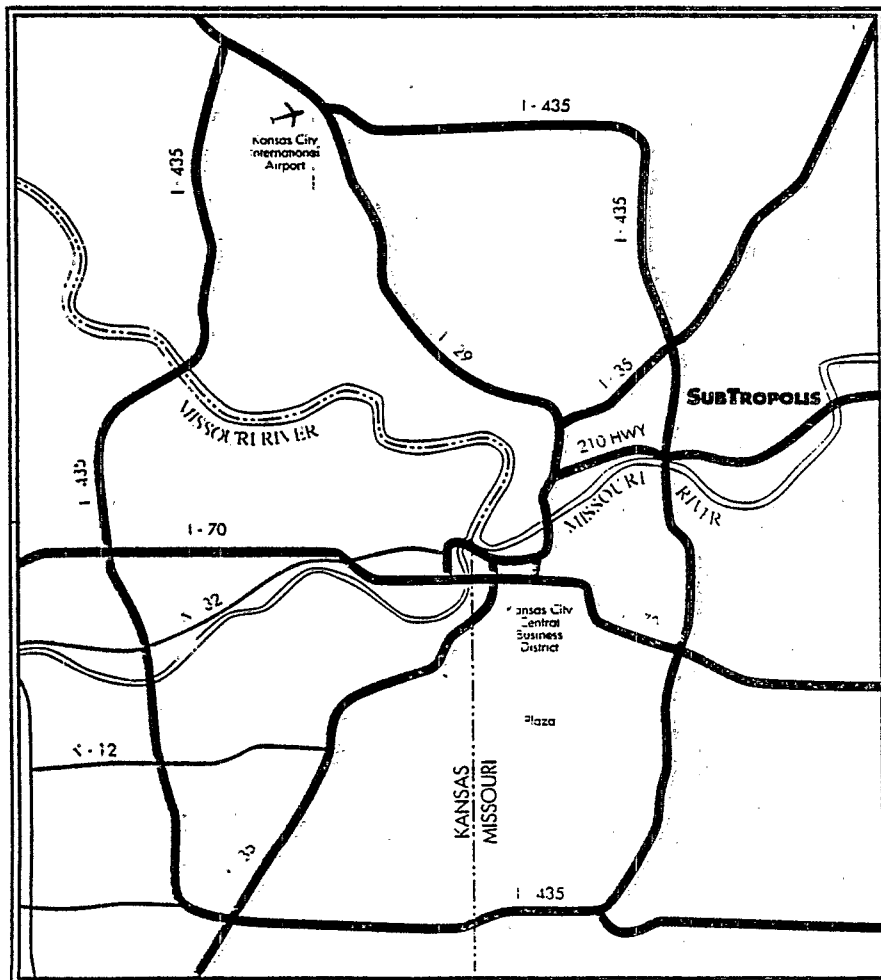
Hunt Midwest SubTropolis is...

The world's largest underground business complex with over 10 million square feet of developed space located 100 feet underground. Hunt Midwest SubTropolis will have more than 50 million square feet available when fully developed. This subsurface development, with its constant 65-72 degree year-round temperature, is now home to more than 60 local, national and international businesses.

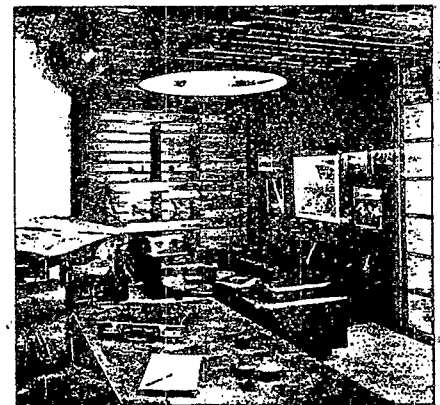
SubTropolis was created through the mining of a 270-million-year-old limestone deposit. When mining, limestone is removed by the "room and pillar" method. By working on an exact 65-foot grid system, a series of "rooms" are created with evenly spaced, 25-foot-square pillars to support the 10-foot-thick, solid rock ceiling. This mined space is then used for office operations, light manufacturing, warehousing and cold storage.

Tenant spaces in SubTropolis range in size from 300 square feet up to nearly 500,000 square feet. By locating underground, companies take advantage of:

- ▼ Low rental rates
- ▼ Low utility costs
- ▼ Safe and secure environment
- ▼ Controlled climate
- ▼ Maximum flexibility
- ▼ Improved employee productivity



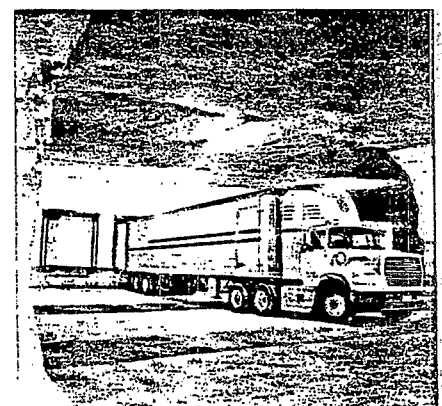
Hunt Midwest corporate offices



Underground executive office



Underground warehouse space



Underground truck dock

SubTropolis Facts...

- ▼ 4 million leasable square feet
- ▼ 4 miles of lighted, wide paved streets
- ▼ 1.9 miles of railroad track
- ▼ 314 truck dock locations served by 200 national truck lines
- ▼ 16 foot ceiling height
- ▼ 1,300 plus total employees
- ▼ 1,500 parking spaces
- ▼ 10,000 stone pillars
- ▼ Fire protected
- ▼ Strength of limestone is 10,000 to 12,000 pounds per square inch, which is three times stronger than concrete
- ▼ 1 million square feet (tons of rock) are now mined every year
- ▼ 38 million square feet (tons of rock) have been mined out since mining began in 1945
- ▼ Crushed limestone is used to make asphalt, concrete and general construction materials
- ▼ Finely ground limestone is rich in calcium, and is also used as mineral filler in cereals and foodstuffs

Hunt Midwest Enterprises (owner of SubTropolis) is made up of 3 subsidiaries:

Hunt Midwest Real Estate Development, Inc.

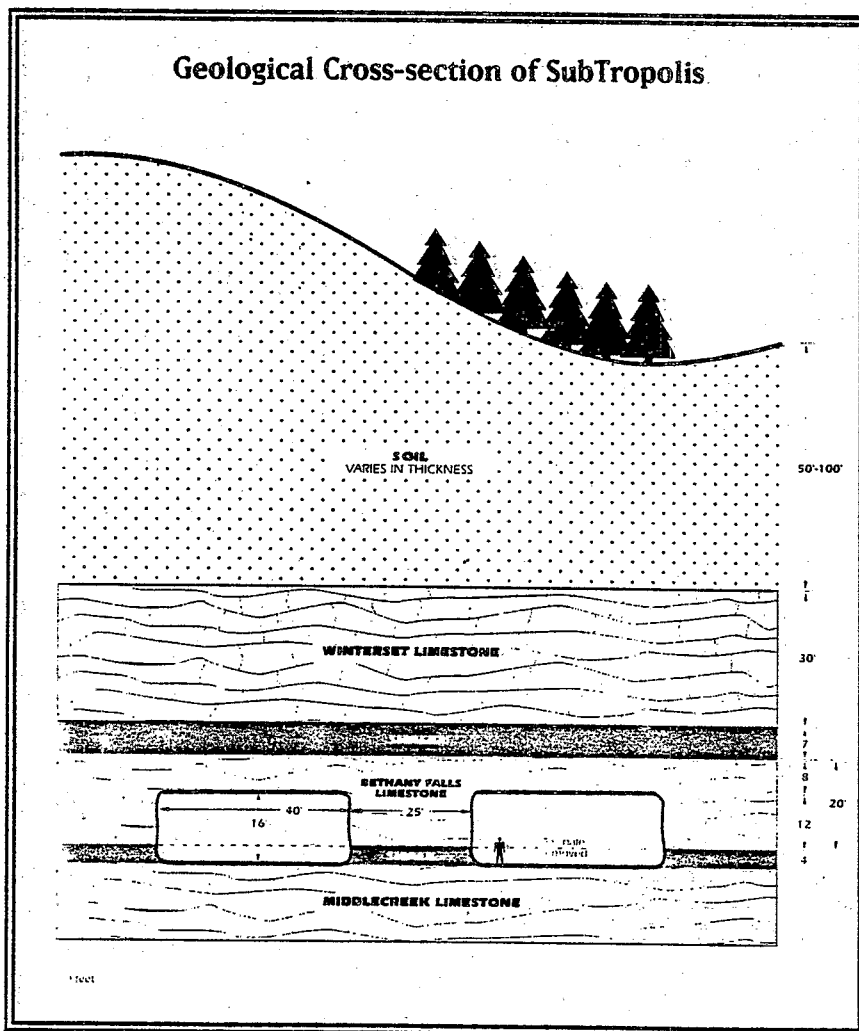
A multi-faceted real estate development company with residential, commercial, industrial and underground developments on over 3,500 acres of land in Kansas City, North

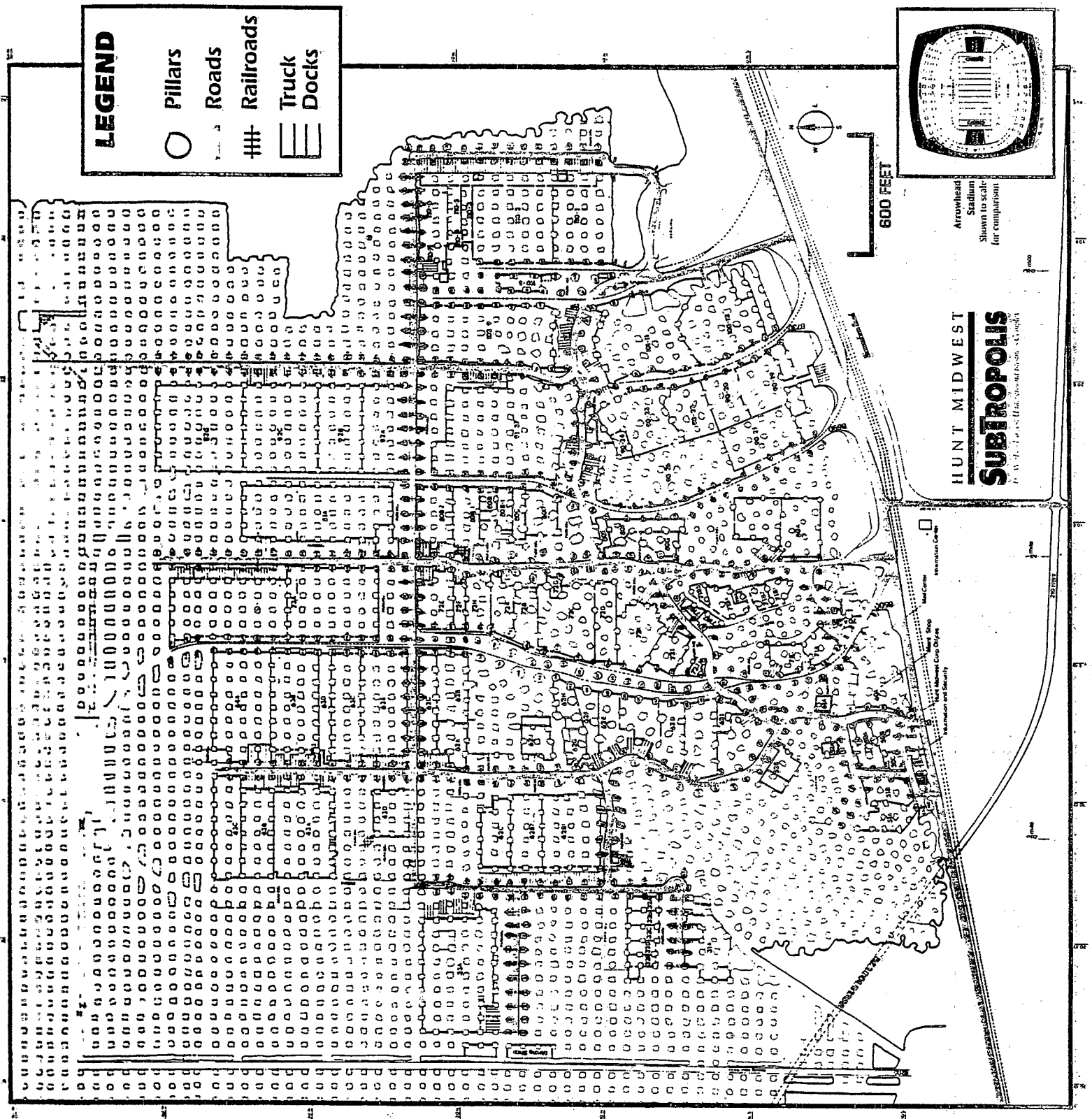
Hunt Midwest Mining

The mining operation within Hunt Midwest Underground began in 1945. Underground mining has proceeded at a rate of approximately 25 acres per year and is calculated to continue for the next 15 to 20 years.

Hunt Midwest Entertainment, Inc.

Hunt Midwest Entertainment is the operator of Missouri's number one theme park complex. Worlds of Fun and Oceans of Fun. Construction of Worlds of Fun began in 1971 and opened in 1973 with 60 rides, shows and attractions. Now the entertainment complex has over 140 rides, shows and attractions. Oceans of Fun is America's number one waterpark. Over 3.5 million people have visited Oceans of Fun since it opened in 1982.





FOR LEASING INFORMATION, call Dick Ringer or Connie Kamps at (816) 455-2500.
Hunt Midwest Real Estate Development, Inc., 8300 NE Underground Drive, Kansas City, MO 64161.

APPENDIX B.

LIST OF OZONE DEPLETING CHEMICALS AND EPA 33/50 CHEMICALS

OZONE DEPLETING CHEMICALS

Halocarbon Number	Chemical Name	Primary Uses*
<u>CLASS I ODCs</u>		
CFC-11	Trichlorofluoromethane	1,2,3,4,5
CFC-12	Dichlorodifluoromethane	1,2,4
CFC-113	Trichlorotrifluoroethane	2,3,4
CFC-114	Dichlorotetrafluoroethane	1,2,3,4,6
CFC-115	Chloropentafluoroethane	6
Halon 1211	Bromochlorodifluoromethane	3,7
Halon 1301	Bromotrifluoromethane	1,3,5
Halon 2402	Dibromotetrafluoroethane	1,3
CFC-13	Chlorotrifluoromethane	6,7
CFC-111	Pentachlorofluoroethane	0
CFC-112	Tetrachlorodifluoroethane	4
CFC-211	Heptachlorofluoropropane	0
CFC-212	Hexachlorodifluoropropane	0
CFC-213	Pentachlorotrifluoropropane	0
CFC-214	Tetrachlorotetrafluoropropane	0
CFC-215	Trichloropentafluoropropane	0
CFC-216	Dichlorohexafluoropropane	0
CFC-217	Chloroheptafluoropropane	0
Carbon Tetrachloride	Tetrachloroethane	1,4,5,8
Methyl Chloroform	Trichloroethane (all isomers)	4,5,8
Methyl Bromide		4,5,8
<u>CLASS II ODCs</u>		
HCFC-21	Dichlorofluoromethane	1,4
HCFC-22	Chlorodifluoromethane	1,4,5
HCFC-121	Tetrachlorofluoroethane	0
HCFC-122	Trichlorodifluoroethane	0
HCFC-123	Dichlorotrifluoroethane	1,3
HCFC-124	Chlorotetrafluoroethane	1,3
HCFC-131	Trichlorofluoroethane	0
HCFC-132	Dichlorodifluoroethane	0
HCFC-133	Chlorotrifluoroethane	0
HCFC-141	Dichlorofluoroethane	2
HCFC-142	Chlorodifluoroethane	1,4,5

* The eight use categories are as follows:

- | | |
|---|--|
| 1. Refrigeration; Air Conditioning | 5. Intermediate for Synthesis of Other Compounds |
| 2. Blowing Agents for Plastics | 6. Dielectric Gas |
| 3. Fire Extinguishing Agent | 7. Aerospace Chemical |
| 4. Solvent: Dry Cleaning Agent; Degreaser | 8. Fumigant: Pesticide |

CHEMICALS ON EPA'S 33/50 LIST

Benzene
Cadmium and Cadmium compounds
Carbon Tetrachloride
Chloroform
Chromium and Chromium compounds
Cyanide compounds and Hydrogen Cyanide
Lead and Lead compounds
Mercury and Mercury compounds
Methylene Chloride
Methyl Ethyl Ketone
Methyl Isobutyl Ketone
Nickel and Nickel compounds
Tetrachloroethylene (Perchloroethylene)
Toluene
1,1,1-Trichloroethane
Trichloroethylene
Xylenes

APPENDIX C.

FLUORESCENT TUBE RECYCLERS

FLUORESCENT LIGHTING TUBE RECYCLING SERVICES

This Appendix summarizes information from several fluorescent tube recycling companies. The information was developed in April, 1995.

A-TEC Recycling, Inc.
P.O. Box 7391
Des Moines, IA 50309
(800) 551-4912

A-TEC Recycling offers complete fluorescent lighting tube recycling services. The company's service area includes Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska and Wisconsin. The company requires that the generator pack used lamps in a box, preferably the original box in which the tubes were received, and store the boxes in a safe manner (i.e., a properly marked area in which they are unlikely to be damaged). A-TEC Recycling will pick up the boxes containing the lamps and bring them to its facility for processing.

The tubes are fed into a machine which breaks the tube and separates the mercury from the glass. The mercury is further processed to be used in other applications, such as new fluorescent tubes, thermometers, thermostats, etc. The glass is processed and used in other applications, such as asphalt or cement. In addition, metals from the end caps of the tube also are recovered.

A-TEC Recycling also accepts ballasts. The ballasts are shipped to FulCircle Ballast Recyclers for processing. FulCircle Ballast Recyclers is an EPA-approved facility located in New York City.

The cost of A-TEC's recycling services is dependent upon volume and the type and size of the lamps. General prices for A-TEC Recycling services are: 54 cents per 4 foot lamp; 72 cents per lamp over 4 feet; and \$2.29 per high intensity discharge (HID) lamp.

DYNEX Environmental, Inc.
4751 Mustang Circle
St. Paul, MN 55112
(612) 784-4040

DYNEX Environmental provides lamp recycling and ballast disposal services. DYNEX can arrange for lamp pick up or the lamps may be delivered. The company requests that the generator place the lamps back into the boxes in which they were received. If the

customer does not have the original boxes, DYNEX provides a rental service for reusable boxes.

DYNEX maintains a nationwide service area. The lamps are processed in the company's Milwaukee, WI facility where they are placed in a lamp machine. The machine breaks the glass and separates the glass, mercury and metal into separate containers. The metals are recovered for reuse, the recovered glass is used in products, such as fiberglass, and the mercury is purified and reused in various commercial applications.

The company accepts PCB and non-PCB ballasts. As mentioned above, the company's representative recommends that generators manage all ballasts as hazardous. DYNEX offers the following three options for ballast disposal:

1. Environmental Protection Agency (EPA) Approved Landfill Method - the ballast is transported in Department of Transportation (DOT) approved drums to an EPA approved hazardous waste landfill. This option is the least expensive of the three (disposal cost: \$1.19 per pound, 1 drum minimum at \$795); however, future liability concerns remain because the waste has not been destroyed.
2. EPA Approved Reclamation Decap Method - The capacitor within the ballast contains the PCB oil. Under this method, the capacitor, which comprises approximately 20 percent of the total weight of the ballast is transported to an EPA-approved facility for incineration, eliminating future liability. The remaining 80 percent of the ballast contains metals that are recovered and reused. This decap process is conducted at DYNEX's Detroit, MI facility. This method is not an option if the ballast is leaking. The disposal cost is \$1.49 per pound, 1 drum minimum at \$1100.
3. EPA-Approved Total Incineration - The whole ballast is transported in DOT approved drums to an EPA approved facility for total incineration, eliminating any future liability for the waste. This is the only option available for leaking ballasts. The disposal cost is \$2.59 per pound, 1 drum minimum at \$2000.

The price of DYNEX's recycling services are dependent upon volume, lamp type and transportation. General price information, excluding transportation, is: 39 cents per 4 foot lamp, with a minimum of 100 lamps; 66 cents per lamp over 4 feet, with a minimum of 100 lamps; and \$2.89 per HID.

Lighting Resources, Inc.
386 S. Gordon Street
Pomona, CA 91766
(800) 572-9253

Lighting Resources is an ally of EPA's Green Lights Program, which is a voluntary program to encourage American corporations to assist with pollution prevention by using

more efficient lighting systems. Lighting Resources provides complete lamp recycling services throughout the continental United States. The company picks up lamps from the generator. Lighting Resources requires that the customer pack the lamps and prepare the bill of lading.

The lamps are processed in a manner similar to the processes described above. The glass recovered from the process is sent to a cullet broker and is ultimately used in products, such as fiberglass. The aluminum recovered from the lamp end caps is also recovered for reuse. After an initial distillation process, the recovered mercury is sent to Bethlehem Apparatus Company for additional processing and ultimate reuse (for more information on Bethlehem Apparatus Company, see the contact summary below).

Lighting Resources accepts ballasts and processes them at two of its three facilities. The company's Greenwood, IN facility handles both lamps and ballasts. The PCB ballasts are disassembled and the capacitors are incinerated or landfilled. The remaining metals are recovered for reuse.

Cost for services provided by Lighting Resources is dependent on lamp and ballast volume and shipping distances. Jerry Balch provided a price range for the recycling services: 7 to 10 cents per lamp; 75 cents to \$2.75 per HID; and approximately 75 cents per pound of ballasts or \$700 to \$750 per 55 gallon drum of ballasts.

Mercury Technologies International
1940 Westwood Blvd., No. 218
Los Angeles, CA 90025
(310) 475-4684

Mercury Technologies International (MTI) also is an ally of EPA's Green Lights Program. MTI provides complete fluorescent lighting tube recycling services. The company's facilities located in California, Florida and Pennsylvania provide nationwide service. However, MTI does not accept ballasts.

MTI can arrange for lamp pick up. The lamps are processed in-house and all materials are recycled; according to Sandy Factor, nothing is land disposed. MTI also performs a triple distillation process to prepare the mercury for immediate commercial reuse.

The recycling fees vary based on volume and shipping distance. Generally, MTI charges between 7.5 and 10.5 cents per linear lamp foot. For HIDs, MTI charges \$3.00 each.

Recyclights
2010 E. Hennepin Avenue
Minneapolis, MN 55413-2799
(800) 831-2852 or (612) 378-9568

Recyclights offers lamp recycling services on a nationwide basis, but does not handle ballasts. The company can arrange to pick up the spent lamps. The lamps are processed

within 24 hours after arriving at the Recyclights facility. The materials recovered from the process include purified liquid mercury, aluminum, metals, soda-lime glass and a calcium/iron-based powder. Following processing, Recyclights provides the customer with a certificate of conversion, a formal record of disposal in accordance with regulatory requirements.

The price of the services provided by Recyclights depends upon the type and quantity of the lamps and transportation requirements. Generally, Recyclights charges 40 to 60 cents per 4 foot lamp. Lamps measuring longer than 4 feet cost between 60 and 83 cents per lamp and HID's cost between \$2.50 and \$5.00 per lamp.

Mercury Refining Company
1218 Central Avenue
Albany, NY 12205
(518) 459-0820

The Mercury Refining Company provides fluorescent lighting tube recycling services on a nationwide basis. The company does not accept ballasts.

Mercury Refining Company can arrange for pick up of the spent lamps. The company, a permitted treatment, storage and disposal facility, processes the lamps, recovers the metals for reuse and processes the mercury using a thermal distillation process, called retorting, for future commercial use. The glass is disposed of in a hazardous waste landfill, even though the glass is not considered hazardous. According to Steve Graves, this option avoids future liability concerns.

The prices of the recycling services, which do not include transportation, are: 8 cents per linear foot for whole tubes; and \$650 per 55 gallon drum containing crushed lamps. The price of processing HID's received in 55 gallon drums are: \$15 per gallon for HID's with a diameter larger than 1.5 inches; and \$20 per gallon for HID's with a diameter of less than 1.5 inches.

Bethlehem Apparatus Company, Inc.
890 Front Street
P.O. Box Y
Hellerton, PA 18055
(610) 838-7034

The Bethlehem Apparatus Company, Inc. provides fluorescent lighting tube recycling services on a nationwide basis. The company does not accept ballasts.

Bethlehem Apparatus does not provide or arrange for any transportation/pick up services. The customer may ship whole tubes in their original box or another appropriate box, or ship crushed lamps in 55 gallon drums. The company processes the lamps, recovers the mercury and disposes of all other materials including the glass and metals.

Bethlehem Apparatus charges the following for various volumes and types of lamps:

Quantity	Whole 4 ft Fluorescent Lamps	Whole 8 ft Fluorescent Lamps
1-3000 Lamps	\$3.00 each	\$4.50 each
3000-6000 Lamps	\$2.25 each	\$3.50 each
> 6000 lamps	\$1.50 each	\$2.25 each

Number of 55 Gallon Steel Drums	Crushed Fluorescent Lamps
1 - 5 Drums	\$1235 each
6 - 10 Drums	\$910 each
> 10 Drums	\$650 each

USA Lights Environmental Inc.
2007 Country Road C-2
Roseville, MN 55113
(612) 628-9370

USA Lights provides complete fluorescent lighting tube recycling services on a nationwide basis. The company claims that it is the only fluorescent lamps recycling company that owns and operates its own transportation system, which services only facilities located in Minnesota and Wisconsin. USA Lights would arrange for pick up and transportation services from facilities located in other states.

USA Lights requests that the customer pack the spent lamps in the original box and secure the box with tape, if necessary. The customer should record the number of lamps on the box.

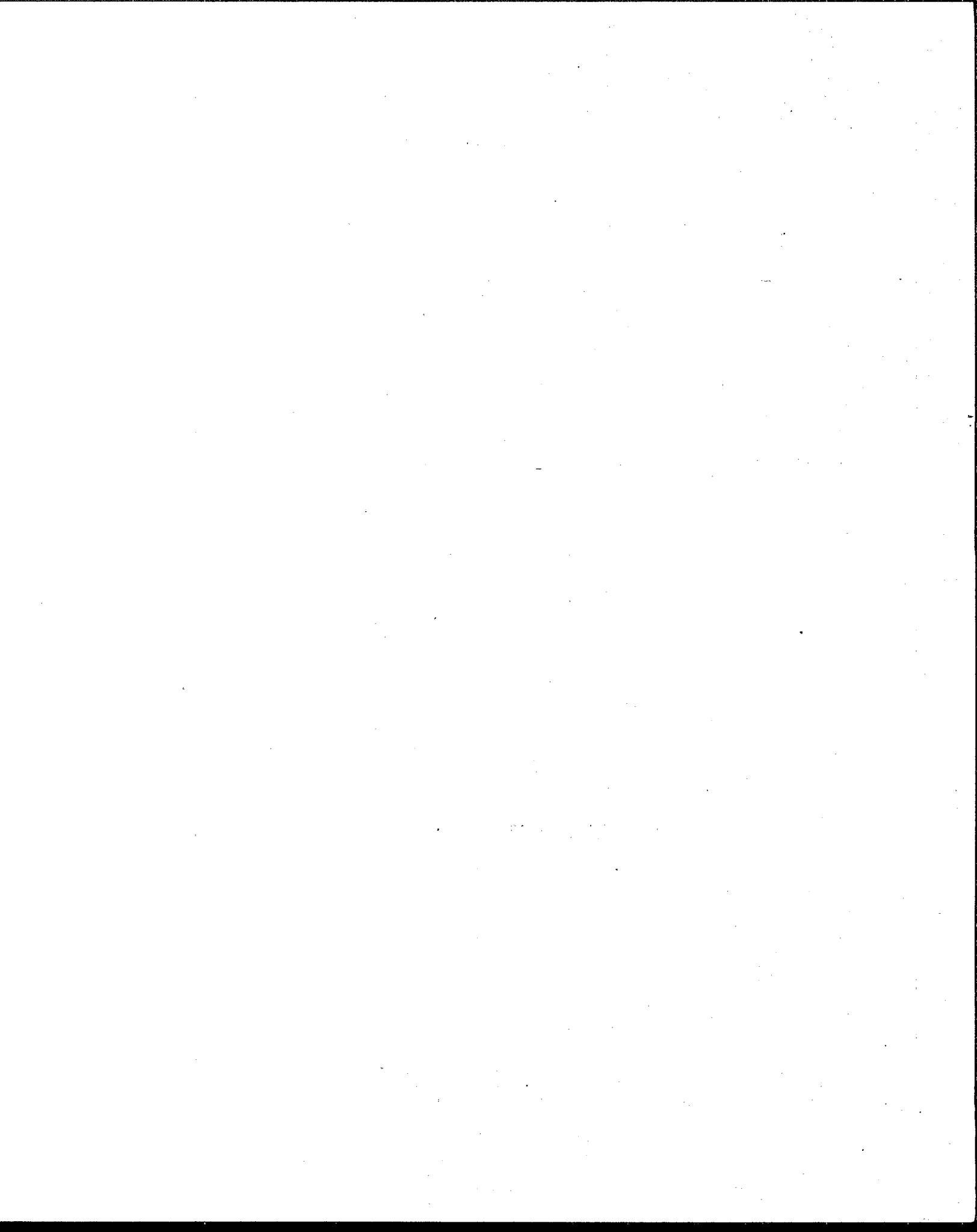
USA Lights processes the materials using the USA Lights Model 2000 system, which is a self-contained, continuous flow process. The glass, metals and mercury all are recovered for reuse. The lamps are processed within 24 hours of receipt and the company issues a certificate of recycling to document that lamp processing has been completed.

The company has \$6 million Pollution Liability Insurance coverage, which protects the customer from financial responsibility should an accident occur either during transport or at the facility.

USA Lights' prices for recycling services, excluding transportation, are: 44 cents per 4 foot lamp; 62 cents per 8 foot lamp; and \$2.29 per HID lamp. USA Lights does not accept ballasts.

APPENDIX D.

USPS INSTRUCTIONS FOR "CLOSED LOOPS"



INSTRUCTIONS FOR COMPLETING AND IMPLEMENTING "CLOSED LOOPS"**STEP ONE:**

Review Inter-Division Dock Sheets, P.S. Form 5398 Inbound/Outbound for a pre-determined amount of time to analyze container utilization. Suggested amount of time, minimum 14 days.

EXAMPLE:

Between November 1-4, the GMF Indianapolis Inbound/Outbound movement of GPMCs/ERMCS were reviewed to further analyze GPMC/ERMC utilization.

The review covered a fourteen day period between October 15-28, 19XX. Based on the finding the routes listed below showed that Indianapolis consistently shipped out more containers than were received.

INTER-DIVISION

Note the amount of containers received/dispatched by HCR/trip. (See example that follows):

1. HCR 60814 Chicago - (Lafayette) - (Gary) - Indianapolis

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
801 - Chicago - Indianapolis	69		
802 - Indianapolis - Lafayette - Chicago		180	= -111
803 - Chicago - Indianapolis	0		
804 - Indianapolis - Chicago		202	= -202
101 - Chicago - Lafayette - Indianapolis	266		
102 - Indianapolis - Chicago		144	= +122
103 - Chicago - Lafayette - Indianapolis	22		
104 - Indianapolis - Lafayette - Chicago		13	= + 9
115 - Chicago - Indianapolis	321		
806 - Indianapolis - Lafayette - Gary - Chicago		252	= + 69

NET DIFFERENCE = -113 OR -9 PER DAY

2. HCR 46090 - Indianapolis - BMC Cincinnati
TOTAL IN - 251 TOTAL OUT - 555 NET DIFFERENCE = -304 OR -29 PER DAY

LOGISTICS PERSONNEL WERE CONTACTED AT THE BMC CINCINNATI REGARDING THE SHIPPING IMBALANCE OF GPMCS/ERMCS. THE FACILITIES ARE WORKING ON RESOLVING THE IMBALANCES.

3. HCR 46011 - Indianapolis - (Columbus, IN) - Louisville, KY

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
1 & 2 - Indianapolis - Columbus - Louisville	190	340	-150
3 & 4 - Indianapolis - Columbus - Louisville	122	225	-103
5 & 6 - Indianapolis - Louisville	50	173	-123

NET DIFFERENCE = -376 OR -29 PER DAY

4. HCR 46021 - Indianapolis, IN - GMF Detroit, MI - BMC Detroit, MI
TOTAL IN - 99 TOTAL OUT - 266 NET DIFFERENCE = -167 OR -13 PER DAY

INSTRUCTIONS FOR COMPLETING AND IMPLEMENTING "CLOSED LOOPS"**STEP TWO:**

Review Intra-Division Dock Sheets, P.S. Form 5398 Inbound/Outbound for a pre-determined amount of time to analyze container utilization. Suggested amount of time, minimum 14 days.

INTRA-DIVISION:

Note Intra-Division the amount of containers received/dispatched by HCR/trip. (See example that follows):

1. HCR 60814 - Indianapolis - (Lafayette) - Gary

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
105 - Gary - Lafayette - Indianapolis	297		
106 - Indianapolis - Gary		315	- 18
107 - Gary - Indianapolis	27		
108 - Indianapolis - Lafayette - Gary		193	-166
109 - Gary - Indianapolis	0		
110 - Indianapolis - Lafayette - Gary		26	- 26
111 - Gary - Lafayette - Indianapolis	2		
112 - Indianapolis - Gary		25	- 25

NET DIFFERENCE = -233 OR -18 PER DAY

2. HCR 46910 - Indianapolis - Kokomo, IN
TOTAL IN - 49 TOTAL OUT - 259 NET DIFFERENCE = -210 OR -16 PER DAY

3. HCR 46016 - Indianapolis - (Muncie) - Ft.Wayne

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
1 - Ft.Wayne - AMF Indianapolis - Indianapolis	179		
2 - Indianapolis - Ft.Wayne		195	- 16
3 - Ft.Wayne - Indianapolis	205		
4 - Indianapolis - Ft.Wayne		290	- 85
5 - Ft.Wayne - Muncie - AMF Indianapolis - Indianapolis	140		
6 - Indianapolis - Muncie - Ft.Wayne		214	- 74
7 - Ft.Wayne - AMF Indianapolis	4		
8 - Indianapolis - AMF Indianapolis - Ft.Wayne		90	- 86

NET DIFFERENCE = -261 OR -20 PER DAY

4. HCR 46012 - Indianapolis - (AMF Indianapolis) - (Kokomo) - So.Bend

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
1 - So.Bend - Indianapolis	144		
2 - Indianapolis - Kokomo - So.Bend		183	- 39
3 - So.Bend - Kokomo - AMF Indianapolis	122		
4 - Indianapolis - So.Bend		374	-252
5 - Kokomo - Indianapolis	264		
6 - Indianapolis - Kokomo		131	+133
7 - So.Bend - AMF Indianapolis - Indianapolis	203		
8 - Indianapolis - So.Bend		77	+126

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INSTRUCTIONS FOR COMPLETING AND IMPLEMENTING "CLOSED LOOPS"STEP TWO: (cont'd)

4. HCR 46012 (cont'd)

TRIP	NUMBER OF CONTAINERS		
	IN	OUT	DIFFERENCE
9 - So.Send - AMF Indianapolis - Indianapolis	43		
10 - Indianapolis - AMF Indianapolis - So.Send		180	-137

NET DIFFERENCE = -169 OR -13 PER DAY

The Intra-Division analysis was included in this report because of the possibility that the offices which are receiving a surplus may be dispatching the containers outside the Division. For example, our study indicates that a deficit condition (-21 per day) exists on HCR 60892, Gary to Chicago. Other possible routes in which a similar situation may exist are:

46510 - So.Send - Kalamazoo
 46711 - Ft.Wayne - Toledo, OH
 46712 - Ft.Wayne - Jackson, MI
 46714 - Ft.Wayne - Chicago
 46990 - Kokomo - BMC Cincinnati
 47311 - Muncie - Dayton, OH
 47490 - Muncie - BMC Cincinnati
 47991 - Lafayette - BMC St.Louis

For these routes an analysis will be performed to determine whether or not there is a closed loop for GPMCs/ERMCS.

The main objective is to develop a permanent solution to the existing shortfall of 250 GPMCS/ERMCS per week or -36 per day. The total deficit for the Inter-Division routes detailed in this exhibit is -74 per day. If the data on the inbound/outbound sheets is correct, the shortfall quantity appears to be obtainable by modifying current mail processing operations that affect the deficit routes and monitoring the dispatch to ensure balance. Correction of the Inter-Division losses would leave an ample supply of containers available for Intra-Division operations.

STEP THREE:

In view of the expansion of containerization it is imperative that "CLOSED LOOPS" be established and adhered to on an ongoing basis. The Division must analyze all their routes and develop the "CLOSED LOOPS" necessary to insure availability of rolling stock both Intra and Inter-Division.

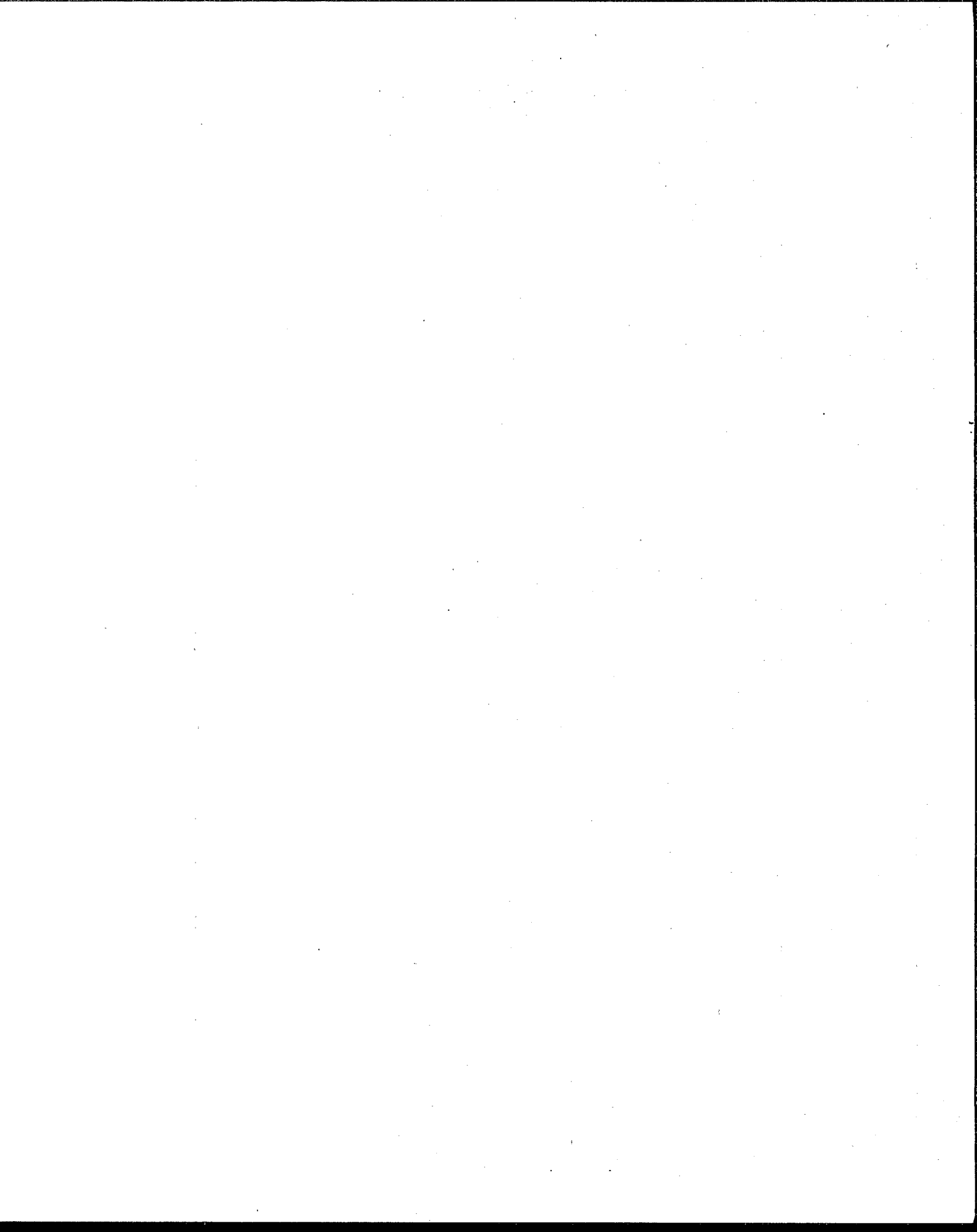
Loops will be closed as follows with assistance from the next level necessary:

<u>TYPES OF TRANSPORTATION</u>	<u>SERVICE AREA</u>	<u>FACILITY/NEXT LEVEL</u>
INTRA-TRANSPORTATION	MSC	MSC
INTER-TRANSPORTATION	MSC	MSC/DIVISION
INTRA-TRANSPORTATION	DIVISION	DIVISION
INTER-TRANSPORTATION	DIVISION	DIVISION/T&E SPEC.
INTRA-TRANSPORTATION	TMSC	T&E SPEC./AMTES
INTER-TRANSPORTATION	TMSC	T&E SPEC./AMTES

When cooperation from other facilities cannot be obtained to close loop containers then the shipping facility must consider changing their way of dispatching their mail. The supply of GPMCS/ERMCS are in short supply due to the increasing demands to containerize wherever possible. When you ship containers and lose them replacement of those containers may not be readily available, thus, forcing facilities to bed load and increase their man hours. Forecasts and procurement of containers will continue to be a priority to keep up with the supply of rolling stock, however, everyone must realize that an unlimited budget does not exist to allow unlimited buys to replace uncontrolled dispatches due to lack of replacement procedures within the facility.

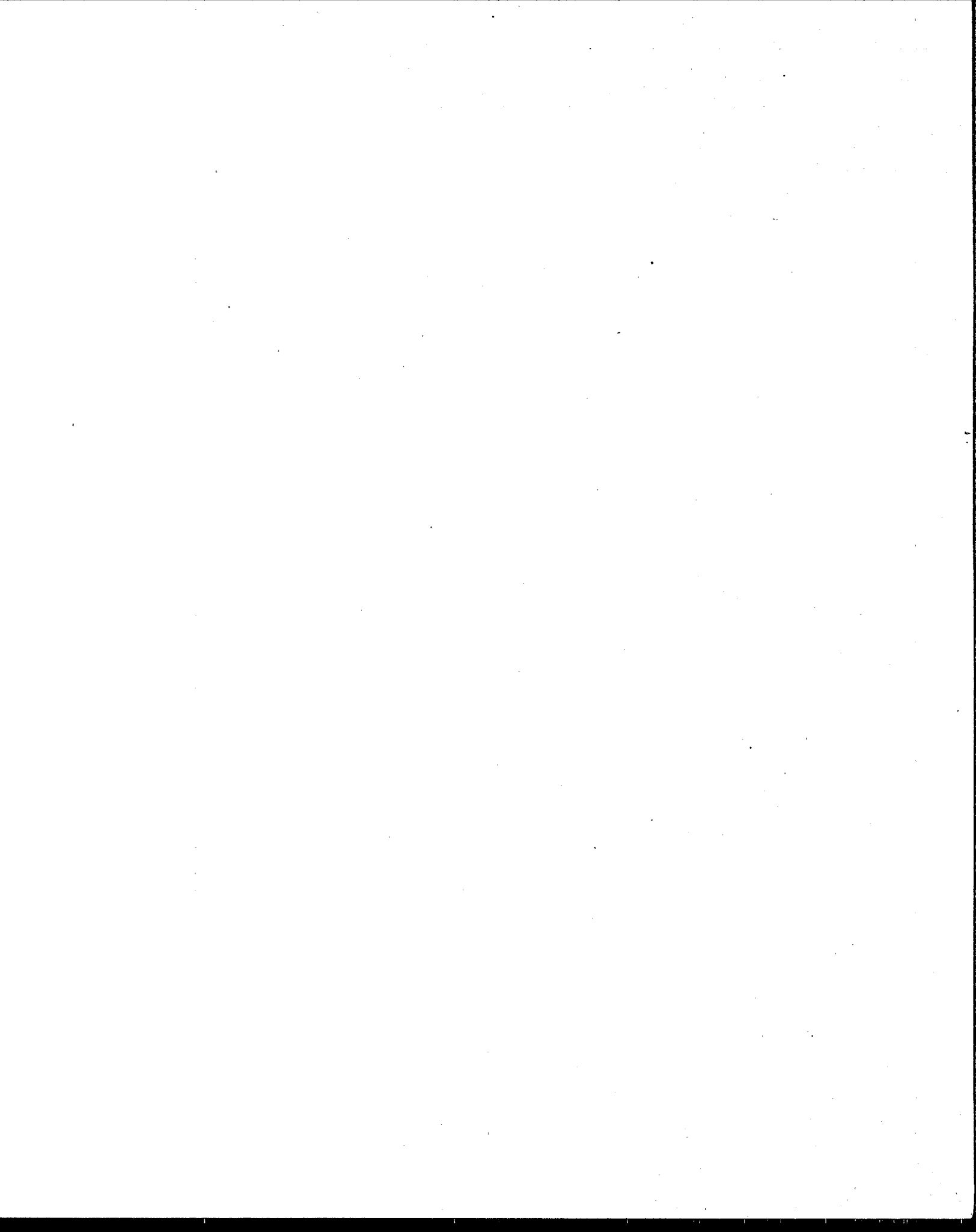
-Page 3-

EXHIBIT 322.42 (p.3 of 3) — Instructions for "Closed Loops"



APPENDIX E.

**GREEN LIGHTS INFORMATION AND SAMPLE MEMORANDUM OF
UNDERSTANDING (MOU) FOR GREEN LIGHTS PARTNERS**



Green Lights for Federal Participants



When EPA launched Green Lights -- its flagship voluntary pollution prevention program -- it engaged the free market by promoting profitable investment in energy-efficient lighting. Since 1991, more than 1,500 organizations across the country have joined Green Lights to conserve energy, cut their electricity bills, and reduce the amount of air pollutants released into the atmosphere. This dynamic program continues to grow and meet the energy needs of the country. Currently, Green Lights is helping Federal agencies comply with mandated energy conservation goals.

The Federal government is a major consumer of energy, using over 2 percent of all energy consumed in the US. Two mandates — The Energy Policy Act of 1992 (EPAct) and Executive Order 12902 (EO 12902) — require Federal agencies to cut energy use. Green Lights provides mechanisms for Federal agencies to meet these mandates by offering extensive technical expertise and planning support.

FEDERAL ENERGY CONSERVATION MANDATES

The Energy Policy Act of 1992 (EPAct)

EPAct requires Federal agencies to reduce energy consumption per gross square foot 20 percent by the year 2000 (compared to 1985). It also requires that agencies install energy conservation measures with less than 10-year payback periods. Certain buildings are excluded from this mandate (see box). EPAct encourages Green Lights participation in Section 543 (paragraph b.4).

"An agency may participate in the EPA's Green Lights program for purposes of receiving technical assistance in complying with the requirements of this section."

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FEDERAL GREEN LIGHTS.....	3
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Executive Order 12902

EO 12902 requires Federal agencies to reduce energy consumption 30 percent per gross square foot by the year 2005 (as compared to 1985). It also requires a 20 percent reduction in energy consumption in industrial facilities by 2005 (compared to 1990). The order compels agencies to conduct comprehensive facility audits and install cost-effective energy conservation measures. Agencies should audit about 10 percent of their facilities each year. However, if a facility has had a comprehensive audit within the last three years, it counts as current. Agencies must use "no-cost" audits wherever practicable. The actions required of Federal agencies by EO 12902 are summarized below.

Buildings exempt from EPAct

- Federal agency facilities that generate or transmit electric energy
- Uranium enrichment facilities operated by DOE
- Buildings in which compliance with the requirements would be impractical

Goals for Energy Use/SqFt Reduction in Existing Federal Buildings

EPACT, 1992.....20% by 2000 relative to 1985

EO 12902, 1994.....30% by 2005 relative to 1985

Activities Required by EO 12902

September 1994

- ✓ Begin implementing cost-effective recommendations from comprehensive facility audits performed within the last three years to install energy efficiency, water conservation, and renewable energy technologies.
- ✓ Designate one major building to showcase energy or water efficiency (and other renewable energy technologies if possible)
- ✓ Develop showcase implementation plan

March 1995

- ✓ Identify high priority facilities to audit
- ✓ Complete first 10 percent of comprehensive facility audits

Within six months of each audit

- ✓ Begin installing cost-effective recommendations (i.e., those with less than 10 year payback) for energy efficiency, water conservation, and renewable energy technologies

September 1995

- ✓ Complete prioritization surveys for all facilities

December 1995

- ✓ Reclassify "exempt" or "industrial" facilities based on prioritization surveys, and report to the Federal Energy Management Program and the Office of Management and Budget

Interaction Between EPAct and EO 12902

Both EPAct and EO 12902 require Federal agencies to reduce energy consumption per gross square foot and to implement energy conservation measures.

EO 12902 effectively extends the EPAct timeline for Federal energy conservation measures to 2005 and requires additional energy savings by that time. It also requires energy conservation in industrial facilities. Finally, while EPAct allowed exemptions of entire facilities due to specialized, energy-intensive activities, EO 12902 requires agencies to designate specific buildings as exempt and implement cost-effective conservation measures wherever possible in other parts of those facilities.

EPAct

- ✓ reduce energy consumption per gross ft² 10 percent by 1995 (compared to 1985)
- ✓ reduce energy consumption per gross ft² 20 percent by 2000 (compared to 1985)
- ✓ install all energy and water conservation measures with payback periods of less than 10 years in Federally owned buildings
- ✓ exempt buildings in which energy intensive activities are carried out

EO 12902

- ✓ reduce energy consumption per gross ft² 30 percent by 2005 (compared to 1985)
- ✓ reduce energy consumption per gross ft² 20 percent in industrial facilities in aggregate by 2005 (compared to 1990)
- ✓ conduct surveys and comprehensive audits and implement recommendations with payback periods of less than 10 years
- ✓ reclassify "exempt" facilities

To assist in overcoming many of the obstacles that may have stalled lighting upgrades in the past, participants will receive extensive support materials and services from EPA. We currently provide participants with the following products, information, and services.

- ★ Information Hotlines
- ★ Green Lights Electronic Bulletin Board
- ★ Energy Star Fax-Line System
- ★ "Specifier Reports"
- ★ "Lighting Answers"
- ★ "Light Briefs"
- ★ Lighting Upgrade Manual
- ★ Lighting Upgrade Workshops
- ★ Green Lights Financing Directory
- ★ Lighting Waste Disposal Information
- ★ Decision Support System
- ★ ProjectKalc
- ★ ReportKalc
- ★ Directories of Green Lights Allies
- ★ Implementation Planning Assistance
- ★ Communications Assistance

FEDERAL GREEN LIGHTS

In Federal buildings, approximately 25 percent of the energy consumed is for lighting. Retrofitting such systems could result in substantial energy savings, providing cost-effective options for meeting Federal energy mandates.

EPA encourages participation in Green Lights because it provides Federal agencies with many of the tools they need to get moving on lighting retrofits. It offers comprehensive, up-to-date lighting information and responsive support services. The program also has analytic tools to help participants rapidly analyze lighting systems and select appropriate upgrade solutions. Additionally, Green Lights helps participants effectively plan upgrades and publicize their successes once upgrades are complete.

Who Can Be a Federal Partner?

Green Lights is open to any Federal organization (including sub-agencies) that has control over its own

facilities and budget, and has its own management structure. In other words, legislative branch agencies, executive branch departments, and administrations, bureaus, and services within departments can join. A diverse mix of Federal Partners has already joined the program, including the Bureau of Reclamation, Kelly Air Force Base, the National Security Agency, and several Department of Energy and Department of Defense facilities.

What Do You Agree to Do by Joining?

Federal Partners agree to reduce lighting energy use by 50 percent, provided lighting quality is not compromised. In the Memorandum of Understanding (MOU), Federal Partners agree to conduct a variety of energy saving activities in owned facilities:

- ◆ Survey all agency facilities and identify lighting upgrades that will reduce energy use 50 percent without compromising lighting quality.
- ◆ Upgrade 90 percent of the square footage of agency facilities no later than January 1, 2005.
- ◆ Implement all lighting projects with payback periods of less than 10 years by January 1, 2005.
- ◆ Re-survey and, if necessary, upgrade each facility within five years of the initial surveys and upgrades.
- ◆ Appoint an implementation director who oversees participation in the program.
- ◆ Document annual energy efficiency improvements.
- ◆ Encourage regulatory reform and public awareness efforts.

Design new facilities in compliance with applicable codes and regulations (e.g., 10 CFR Part 435 Subpart A).

EPA encourages organizations to look at lighting as an investment opportunity, not as an overhead cost. Green Lights asks federal participants to cut lighting energy use 50 percent, contributing to the overall 30 percent energy reduction required by EPA. This goal is achievable, because Green Lights participants are accomplishing average returns of over 40 percent

and reducing their lighting electricity use by an average of 46 percent.

Upgrading Leased Space

Federal Partners also agree to upgrade leased facilities. However, several factors can limit their ability to upgrade these facilities: the length of the lease, the cooperation of the landlord and tenants, and whether the building is federally owned. The following MOU agreements take these limits into account.

- ♦ Survey leased facilities where the agency pays directly for electricity or where the General Services Administration (GSA) delegates management authority
- ♦ Identify lighting upgrades in applicable facilities that will reduce energy use 50 percent without compromising lighting quality
- ♦ Upgrade 90 percent of the square footage of qualifying leased facilities no later than January 1, 2005.

Non-delegated GSA buildings are the responsibility of the GSA, not the Federal Partner. However, Partners agree to work with the GSA to expedite surveys and upgrades of these buildings. If landlords or tenants refuse to cooperate, EPA will conduct meetings to identify the benefits of Green Lights and to seek GSA cooperation.

Three circumstances generally preclude upgrades in leased spaces:

- ♦ payback period exceeds the remaining duration of the lease term
- ♦ lease expires less than five years from the date the MOU is signed
- ♦ Federal Partner does not pay utilities directly

Definitions of Financial Terms*

$LCC = (\text{investment costs} - \text{salvage values}) + (\text{non-fuel O\&M costs}) + (\text{replacement costs} - \text{salvage costs}) + (\text{energy costs})$

$NPV = LCC_{\text{without project}} - LCC_{\text{with project}}$

Savings to Investment Ratio

$$= \frac{\text{PV Savings in energy and non-fuel O\&M costs}}{\text{PV Costs in investment and replacement costs} - \text{salvage values}}$$

$IRR = [(\text{terminal value of savings/present value of costs})^{1/n} - 1]$, where n = the number of years in the study period

Simple Payback

$$= \text{Number of years required for investment costs to equal} \\ (\text{cumulative energy cost savings} - \text{non-fuel costs}), \text{ not} \\ \text{considering future price changes or discount rates}$$

* as defined in 10 CFR Part 436

EVALUATING UPGRADE OPTIONS

Green Lights encourages Partners to choose profitable lighting alternatives that are the most energy-efficient, thereby maximizing energy savings.

As they begin their upgrades, participants use the *Decision Support System (DSS)* to select the mix of technologies that maximize energy savings. Next they use internal rate of return (IRR) and net present value (NPV) to measure profits from lighting investments. A Green Lights upgrade is considered profitable if the IRR is equal to or greater than 20%. Green Lights chooses this hurdle rate because of the low risk involved in lighting upgrades and the added benefit of pollution prevention. NPV calculations help participants select the most profitable project among several that meet the IRR test. ProjectKalc (another Green Lights analytical tool) can analyze NPV on a system- or building-wide basis. For more information, see *Financial Considerations*, a section of the *Lighting Upgrade Manual*.

Life-Cycle Costs

EPAct refers to 10 CFR Part 436 to specify life-cycle cost calculations. According to these regulations, life-cycle costs (LCC) refer to the total costs of owning, operating, and maintaining a building over its useful life, and are determined by evaluating and comparing

alternative building systems. For leased buildings, the LCC are calculated over the effective remaining term of the lease. The method of calculating LCC, specified in 10 CFR 436, is a systematic analysis of

relevant costs -- excluding costs incurred before the analysis -- producing a discounted cash flow and calculating the net present value. Future versions of the DSS and ProjectCalc will calculate LCC.

Internal rate of return (IRR) is an acceptable LCC method provided that the IRR (as described in 10 CFR 436.22) is greater than the discount rate as set by DOE.

Cost-Effectiveness

Building energy conservation measures are deemed cost-effective if one of the following criteria is met.

- ✓ LCC are estimated to be lower than other alternatives.
- ✓ NPV is estimated to be positive.
- ✓ Savings-to-investment ratio is estimated to be greater than one.
- ✓ Adjusted IRR is estimated to be greater than the discount rate as set by DOE.
- ✓ Simple payback is significantly less than the life of the system and the federal building in which it is installed.

Investments are not deemed cost-effective for buildings that are...

- * occupied under a lease, with less than one year remaining and without a renewal option or with a renewal option that is not likely to be exercised.

- * occupied under a lease that includes utilities in the rent and does not provide a pass-through of energy savings to the government.
- * scheduled to be demolished or retired from service within one year or less.

FINANCING OPTIONS

Besides third-party financing and traditional procurement routes, Federal agencies have several options for financing lighting upgrades. They are:

- ♦ utility financing
- ♦ energy savings performance contracts
- ♦ Federal Energy Efficiency Fund

The Federal MOU includes a financial disclaimer stating that "both parties agree that the commitment to survey buildings and complete lighting upgrades is contingent upon the availability of appropriated funds or third-party financing resources."

Utility Financing

EPAct authorizes agencies to participate in utility programs that increase energy efficiency, conserve water, or manage electricity demand. According to EPAct, agencies may accept rebates or other incentives to increase energy efficiency and may not be denied them if they satisfy the criteria other customers must meet. Agencies may also enter into negotiations to address any unique needs of their facilities.

Energy Savings Performance Contracts

Energy savings performance contracts (ESPCs) are also authorized by EPAct. ESPCs are contracts with energy service companies that guarantee energy savings to an agency and require annual energy audits. The contractor incurs the costs of implementing energy savings measures -- including the costs of audits, equipment installation, and training -- in exchange for a share of the energy savings. The head of a federal agency may enter into these contracts to achieve energy savings and benefits.

The term -- which may not exceed 25 years -- and conditions of any government payments and

performance guarantees are specified in the contract. Aggregate annual payments to utilities and contractors cannot exceed the amount an agency would have paid for utilities without an ESPC. Additionally, Federal agencies may incur debt to finance energy conservation measures using ESPCs, provided guaranteed savings exceed payments.

To facilitate the selection of contractors, DOE has developed an annually-updated list of qualified energy service firms. Federal agencies are required to use contractors from this list.

Federal Energy Efficiency Fund

The Federal Energy Efficiency Fund was established by EAct to provide grants to assist agencies in meeting its requirements. Guidelines for submitting proposals were issued on June 30, 1993.

Funds have been appropriated through 1995. Up to \$6 million was available for fiscal year 1994, and up to \$50 million is available in fiscal year 1995. These funds will be distributed to agencies based on a combination of several factors:

- ◆ cost-effectiveness of project
- ◆ amount of energy and cost savings anticipated
- ◆ amount of funding committed to the project by the agency
- ◆ the extent to which proposals leverage financing from non-Federal sources

FEDERAL AGENCY ACCOUNTING REQUIREMENTS

To encourage energy efficiency, EAct mandates that some of the energy and water cost savings remain available to Federal agencies. An amount equal to 50 percent of the cost savings (from utility rebates or ESPCs) remains available for additional energy efficiency programs, particularly at those facilities where energy savings are achieved. To maintain these savings, agencies must establish a fund and maintain strict financial controls, documenting savings realized and expenditures made. These records must be made available for public inspection upon request.

Federal organizations that make the commitment to Green Lights are profiting by reducing their energy consumption and electricity bills, improving lighting quality, and increasing worker productivity. By using energy-efficient lighting, they are also reducing the air pollution caused by power generation (particularly carbon dioxide, sulfur dioxide, nitrogen oxide, and heavy metal emissions). As one of the first market-driven, non-regulatory programs sponsored by EPA, Green Lights is revolutionizing the way America cleans up the environment.

GREEN LIGHTS

A Bright Investment in the Environment

Green Lights is an exciting and innovative programs sponsored by the US Environmental Protection Agency (EPA) that encourages major US corporations and other organizations to install energy-efficient lighting technologies.

Organizations that make the commitment to Green Lights will profit by lowering their electricity bills, improving lighting quality, and increasing worker productivity. They will also reduce the air pollution caused by electricity generation.

For more information contact:

Green Lights Program
US Environmental Protection Agency
401 M Street, SW (6202J)
Washington, DC 20460

Green Lights Information Hotline
(for program, technical, and software support)

☎ (202) 775-6650
Fax (202) 775-6680

Green Lights Ally Information

☎ (202) 293-4527
Fax (202) 223-9534

Energy Star Fax-Line System

☎ (202) 233-9659

Green Lights for Federal Participants is an appendix to the *Lighting Upgrade Manual*. Other documents in the *Manual* are listed below.

Lighting Upgrade Manual

PLANNING

- *Green Lights Program*
- *Implementation Planning Guidebook*
- *Financial Considerations*
- *Lighting Waste Disposal*
- *Progress Reporting*
- *Communicating Green Lights Success*

TECHNICAL

- *Lighting Fundamentals*
- *Lighting Upgrade Technologies*
- *Lighting Maintenance*
- *Lighting Evaluations*
- *The Lighting Survey*

To order other documents or appendices in this series, contact the Green Lights Hotline at (202) 775-6650. Look in the monthly Green Lights *Update* newsletter for announcements of new and relevant publications.



NOTES:

In order to maintain consistency and fairness among program participants, this Memorandum of Understanding may not be changed.

**Memorandum of Understanding Between
The United States Environmental Protection Agency
and
Federal Agency**

I. Common Agreements and Principles

A. This is a voluntary agreement between Federal Agency ("Federal Partner") and the United States Environmental Protection Agency (EPA), by which Federal Partner joins EPA's Green Lights Program. This agreement can be terminated by either party without penalties or liability to either party.

B. Federal Partner and EPA agree that the primary purpose of the Green Lights Program is to encourage U.S. organizations to install energy-efficient lighting, in order to prevent the creation of air pollution (including greenhouse gases, acid rain emissions, air toxics, and tropospheric ozone), solid waste, and other environmental impacts of electricity generation. Green Lights is part of a larger program, and Partners are encouraged to explore additional opportunities for pollution prevention by joining EPA's Energy Star Buildings Program and the Energy Star Computers Program. Either or both of those programs may be entered by signing addenda to this Memorandum of Understanding.

C. Federal Partner and EPA agree that installation of energy-efficient lighting can improve profitability and competitiveness, reduce government operating costs, and enhance national energy security.

D. Federal Partner and EPA agree that energy-efficient lighting can maintain or enhance lighting quality and can improve employee productivity.

E. Federal Partner and EPA agree that communicating Partner's commitments (as stated in this MOU) to the public demonstrates:

- the concern of Federal Partner for the environment,
- the vitality of the free enterprise system in reducing costs, and
- the capability of voluntary programs to achieve national goals with minimal regulation.

F. Federal Partner and EPA agree that maintaining public confidence in the credibility of the Green Lights Program and its participants is critical to achieving the shared goals stated above.

G. Federal Partner and EPA agree that joining Green Lights constitutes participation in the U.S. Department of Energy's (DOE) Federal Relighting Initiative. Federal agencies may participate in the Federal Relighting Initiative without joining Green Lights.

H. Federal Partner and EPA agree that provisions of this agreement are in accordance with Executive Order 12902 Energy Efficiency and Water Conservation at Federal Facilities (March 10, 1994).

II. Federal Partner's Responsibilities

A. **Definition of Partner and Eligibility.** A Federal Partner is a Federal organization that joins the Green Lights Program by signing this Memorandum of Understanding. Any authority of the Government of the United States, in the Executive, Legislative, or Judicial branches (including those within or subject to review by a parent organization), that has financial and operational control of any of its own facilities may join Green Lights. Examples may include legislative branch agencies, executive branch departments, and administrations, bureaus, and services within departments.

Federal Partner recognizes that the Energy Policy Act of 1992 (Pub. L. 102-486) authorizes Federal agencies to participate in the Green Lights program. Additionally, Federal Partner recognizes that the Clean Air Act (42 U.S.C. 7412) and the Pollution Prevention Act (42 U.S.C. 13101) provide the authorities for the Green Lights program, and that Executive Order 12902 and Section 543 of the National Energy Conservation and Policy Act (42 U.S.C. 8253), as amended by the Energy Policy Act of 1992, provide authorities for Federal energy management.

Federal Partner agrees that it has financial and operational control of some or all of its facilities, and further agrees that its membership in Green Lights commits all of its component suborganizations (such as subsidiaries, divisions, campuses, etc.) over which it can and/or does exercise financial or operational control. In completing the square footage tally on Appendix A, Federal Partner agrees to include all facilities subsumed by this definition.

B. **Green Lights Implementation Director.** Federal Partner agrees to appoint a senior representative of the organization (designated on Appendix A) as Green Lights Implementation Director. The Green Lights Implementation Director will be the person responsible for ensuring that Federal Partner successfully completes its commitments as stated in this MOU, and Federal Partner agrees to assign the authority to the Implementation Director needed to execute that responsibility. The Green Lights Implementation Director's responsibilities include:

- establishing and overseeing Green Light Partner's implementation plan, which includes the securing of personnel and financial resources, and the scheduling of upgrade projects.
- directing Federal Partner's lighting upgrades.
- coordinating Federal Partner's participation in Green Lights activities.
- facilitating communication with the Green Lights Program Office at EPA, and
- annual reporting to EPA of Federal Partner's lighting surveys and upgrades.

Federal Partner agrees to notify EPA in writing within two weeks of any change in the designation of the Green Lights Implementation Director.

C. Communications Director. Federal Partner agrees to appoint a representative of the organization (designated on Appendix A) as Green Lights Communications Director. The Communications Director will direct Federal Partner's communications effort to ensure (as deemed appropriate by Federal Partner) that the organization is properly recognized for its environmental protection achievements through Green Lights, and, in addition, to educate all employees and the general public about the Program. Federal Partner agrees to notify EPA in writing within two weeks of any change in the designation of the Green Lights Communications Director.

D. Staff Commitment. Based on the experience of Partners who have already joined the Green Lights Program, Federal Partner should anticipate devoting a combination of internal (staff) and external (consultant/contractor) personnel resources at the approximate level of 1 person-year for every 5 million square feet of facility space, for the purpose of surveying buildings, specifying upgrades, supervising upgrade installations, and managing other aspects of Federal Partner's participation in Green Lights. Federal Partner agrees to provide adequate staff to fulfill the commitments it undertakes in the MOU.

E. Financial Commitment. Federal Partner recognizes that, although energy-efficient lighting upgrades are highly profitable (typically earning 20-40% post-tax rates of return), an initial investment of \$0.50-2.00 per square foot (depending upon existing equipment, purchasing strategy, and scope of the lighting upgrades) will be required on average to implement its participation in Green Lights. Federal Partner agrees to allocate each year sufficient funds (or secure third-party financing) to allow for the investment in energy-efficient lighting to meet its commitments under this agreement.

F. Energy-Efficient Lighting Upgrades (terms in bold defined at Appendix B).

Federal Partner agrees to:

- survey the lighting in all of the square footage of its eligible facilities.
- consider the full range of lighting technology, design, and maintenance options that can reduce energy use, and
- upgrade the lighting with the set of options that, taken as a whole on a facility- aggregate basis, maximizes energy savings and that also (1) reduces lighting energy use by 50% and (2) meets Federal Partner's lighting quality objectives.
- maximize energy savings while meeting lighting quality objectives; where lighting quality concerns prevent energy reductions of 50% or more, Partner agrees to maximize energy savings while meeting quality objectives.

Federal Partner agrees to complete no later than January 1, 2005:

- lighting surveys of 100% of the square footage of its eligible facilities, and
- upgrades of 90% of the square footage of its eligible facilities other than those that are no-upgrade facilities.
- projects with payback of less than 10 years, using methodologies for estimating payback consistent with Section 544 of the National Energy Conservation Policy Act (42 U.S.C. 8254) and implementing regulations at 10 CFR Part 436 Subpart A ("A Methodology for Life Cycle Cost Analyses).

The following is a recommended implementation schedule:

Cumulative Percentage of Square Footage		
End of Year	Completed Surveys	Completed Upgrades
1	5%	1%
3	90%	40%
5	100%	90%

G. Leased Space. Federal Partner shall survey and upgrade leased space meeting the following criteria according to the provisions of paragraph II.F: (1) Federal Partner directly leases from a non Federal landlord under an agreement expiring more than five years after the date this MOU enters into force, and (2) Federal Partner pays for electricity costs directly to an electric utility.

1. **Predominantly Short-Term Leased Space.** Notwithstanding paragraph II.F, if Federal Partner's facilities are comprised of more than 75 percent short-term (less than 5 years remaining) leased space, Federal Partner agrees to:
 - survey at least 50% of its short-term leased space,
 - consider the full range of lighting technology, design, and maintenance options that can reduce energy use; and
 - upgrade the lighting with the set of options that, taken as a whole on a facility- aggregate basis, maximizes energy savings and that is also (1) profitable and (2) meets Federal Partner's lighting quality objectives.

For short-term leased space, a project is defined as "profitable" when it provides a payback term shorter than the remaining term of the lease. Federal Partner agrees to upgrade 90% of the square footage of its short-term leased facilities other than those that are "no-upgrade facilities" within the recommended 5-year period.

2. **Delegated Buildings.** Where Federal Partner occupies space leased by the General Services Administration (GSA) and in which management authority has been delegated by GSA to Federal Partner, Federal Partner agrees to treat such buildings as in paragraph II.F.

3. **Non-Delegated Buildings.** Federal Partner and EPA agree that space managed by GSA without delegation to Federal Partner shall be considered the responsibility of GSA, not of Federal Partner. Federal Partner agrees to work with GSA in good faith to expedite surveys and upgrades of such buildings.

4. **Lessor.** Where Federal Partner leases (as controlling or majority owner) to other parties and Federal Partner pays for electricity costs directly to an electric utility, Federal Partner agrees to treat such buildings as in paragraph II.F.

H. Quick Start. Within 180 days of signing this MOU, Federal Partner agrees to:

1. Specify and install a 5,000-15,000 square foot demonstration lighting upgrade with technical cooperation from EPA, if needed. If Federal Partner's total square footage is less than 5,000 square feet, participant will do a demonstration upgrade of at least 50% of their square footage.
2. Create a list of all facilities to be surveyed and/or upgraded under this agreement, their location, square footage, projected survey date, and pre-survey estimated upgrade budget. EPA agrees to provide assistance with budget estimation, upon Federal Partner's request.
3. Conduct, in cooperation with EPA, a kick-off meeting. EPA agrees that it will provide materials, orientation information, planning assistance, technical training, and networking ideas at or to this kickoff meeting. Federal Partner agrees that all parts of its organization with a stake in Green Lights (such as facilities management, environmental compliance, human resources, corporate communications, strategic planning, financial resources, etc.) will be represented by a senior manager at the kick-off meeting. EPA's participation may take the form of supplying materials, participating via telephone or videoconference, or sending Green Lights staff or consultants to the meeting at the request of Federal Partner.

I. Upgrades Completed Prior to Joining Green Lights. EPA and Federal Partner agree that Federal Partner may count toward its upgrade commitment lighting upgrades that were completed fewer than 18 months prior to joining Green Lights, provided that the upgrades meet the Green Lights Program standards and proper documentation is provided (see "Reporting," below). EPA and Federal Partner agree that facilities in which upgrades were completed earlier than 18 months prior to Federal Partner's joining Green Lights shall be surveyed, and, according to the criteria of this MOU, upgraded. Based on the experience of Federal Partners already in the Green Lights Program, it is common that a new lighting survey would determine that no additional measures are warranted in a previously upgraded facility, provided that the earlier upgrade was done in a thorough manner.

J. Reporting. Federal Partner agrees to submit Green Lights Implementation Reports (blank copy attached as Appendix D) or the equivalent Electronic Progress Report (diskette available upon request) to EPA for each lighting survey and upgrade project that it undertakes. Federal Partner agrees to submit reports at least annually, to

- establish the credibility of Federal Partner's pollution-prevention achievements,
- demonstrate the benefits of energy-efficient lighting to Partner's management, customers, and other stakeholders, and to
- increase participation by other organizations in Green Lights.

More frequent reporting is encouraged in order to avoid the need for large "batch" processing by either Federal Partner or EPA. EPA agrees to assist Federal Partner with completing Partner's first implementation report, if Partner requests.

If Federal Partner has not undertaken any new surveys or upgrades since its previous membership anniversary, Federal Partner agrees to send a letter to EPA in lieu of the Green Lights Implementation Report.

Federal Partner is encouraged to submit this information to DOE's Annual Report on Federal Energy Management.

K. New Construction. Federal Partner agrees to design all new facilities in compliance with applicable codes and regulations, with particular attention to 10 CFR Part 435 Subpart A, as required by law. When designing new lighting systems in areas that are not intended for manufacturing or commercial or industrial processing, Federal Partner further agrees to at least meet (and attempt to exceed) the most current lighting energy standards, defined as follows:

1. Until December 31, 1994, the building energy guidelines of the U.S. Department of Energy, or any new Illuminating Engineering Society (IES) lighting energy standard (if one has been issued), or ASHRAE/IES 90.1-1989 if no new IES standard has been issued.
2. Following January 1, 1995, any post-1989 IES lighting energy standard (if one has been issued), or the building energy guidelines of the U.S. Department of Energy, or another post-1989 building energy standard more stringent than ASHRAE/IES 90.1-1989 that has been created via an industry/professional/public consensus process.

Federal Partner agrees that all new leases that it signs (whether as a lessor or lessee) lasting 5 years or longer will be treated as "New Construction."

L. Re-Surveys. Because of the continuing improvement in and falling prices of energy-efficient lighting equipment, Federal Partner agrees to re-survey facilities and reanalyze options at all eligible facilities no later than five years after completing an upgrade at that facility or determining that the facility was a "no-upgrade facility." Federal Partner agrees to implement options that meet the Green Lights upgrade criteria that then exist within five years of the re-survey.

M. Employee Education. Federal Partner agrees to educate its employees about the economic and environmental advantages of energy-efficient lighting and, to the extent that is possible and consistent with the organization's policies, to encourage employees to purchase such products for their homes.

N. Communication. Federal Partner agrees to cooperate with EPA efforts to help raise public awareness of the Green Lights Program and of the benefits of energy-efficient lighting in general. This could include Federal Partner's preparation of case studies, advertisements, and press releases and their distribution to the media, employees, other Green Lights participants, potential participants, and the general public. Federal Partner agrees to provide at least one case study to EPA by the end of its second year of membership.

O. Non-Endorsement. Federal Partner agrees that participation in the Green Lights Program, use of the Green Lights Program logo, or any publicity relating to its participation in the Green Lights Program does not constitute EPA's endorsement of Federal Partner for anything other than its commitment to install energy-efficient lighting. Federal Partner agrees that it will not imply otherwise.

P. Regulatory Reform. Federal partner agrees to work with EPA to remove any unjustified regulatory, administrative, and other barriers to the widespread adoption of energy-efficient lighting. Federal Partner will also promote additional mechanisms and incentives that will encourage the widespread adoption of energy-efficient lighting in the Federal Government, consistent with overall Federal policy and Federal Partner's authority.

Q. National Historic Preservation Act. Federal Partner shall not be required to undertake any actions that would violate the National Historic Preservation Act, as amended.

III. Associated Considerations

A. The EPA strongly encourages and recommends that Partners initially address lighting upgrade projects prior to other energy systems such as heating or air conditioning. EPA experience has shown that energy reductions accomplished from lighting improvement projects can significantly impact and reduce HVAC requirements and their associated costs.

IV. EPA's Responsibilities

A. Liaison. EPA agrees to designate a single liaison point for the Green Lights Program, and will attempt to notify Federal Partner within 2 weeks of any change in the designated liaison. The liaison is: Chief, Green Lights Branch: U.S. EPA (6202J); 401 M Street, SW; Washington, DC 20460; PH# 202-233-9120; FAX # 202-233-9569; HOTLINE 202-775-6650.

B. Technical Support. EPA agrees to assist Federal Partner in adopting new cost-effective lighting technologies in the following ways:

1. EPA agrees to provide to Federal Partner a comprehensive summary of the best available information about energy-efficient lighting and implementation methods.
2. EPA agrees to offer workshops and training courses that Federal Partners may attend. These workshops and training courses will teach Federal Partners about energy-efficient lighting technologies, analytical techniques, and the use of technical tools developed by the Green Lights Program.

3. EPA agrees to provide lighting analysis software designed to help Federal Partner conduct their lighting surveys, complete their options analyses, and choose the most energy-efficient and profitable lighting upgrade package.
4. EPA agrees to manage Green Lights Allies Programs in which lighting manufacturers, installation companies, electric utilities, lighting equipment distributors, and lighting surveyors agree to follow specific criteria.
5. EPA agrees to support an independent lighting product information program that will test lighting products on a name-brand basis. EPA further agrees to provide Federal Partner with a copy of each report produced by this program.
6. EPA agrees to provide Federal Partner with a comprehensive directory (updated semi-annually) of utility rebate programs in the U.S. In addition, EPA agrees to provide a similarly updated directory of non-utility financing organizations (such as leasing companies and energy service companies) that provide financing for energy-efficient lighting upgrades.
7. EPA agrees to operate informational hotlines for Federal Partner to provide Federal Partner with the most up-to-date information available on energy-efficient lighting, implementation techniques, and the Green Lights Program.
8. EPA agrees to provide model Requests for Proposals (RFPs) for Federal Partners wishing to procure lighting products and services on a positive cash flow basis (e.g., using shared energy savings, guaranteed savings, operating leases, energy-savings performance contracting).
9. EPA agrees to encourage electric utilities to provide financing for lighting upgrades, as permitted by law and where consistent with other policies, in areas where Federal partners, as a group, have significant facility square footage and to encourage agencies to utilize such financing.
10. EPA agrees to work with various agencies that set Federal policy on budgets, leases, and procurement to develop rules, mechanisms, and financing that facilitates adoption of energy-efficient lighting.

Recognition. EPA agrees to provide Federal Partner with recognition for its public service in protecting the environment by:

- publishing articles and performing analyses about the pollution prevented by participants.
- organizing at least one major media event each year.
- publishing articles describing the Green Lights Program and organizations that have completed outstanding lighting upgrades, and
- creating public service advertisements that raise awareness of the program as a whole.

Advertising. EPA agrees to work with Federal Partners independently and/or in conjunction with other Partners to develop advertisements publicizing Federal Partners' involvement in the Green Lights Program. Due to limited advertising space and varying audiences, EPA may, on

occasion, work with selected Federal Partners to develop advertisements. Federal Partners may be invited to participate in an advertisement on the basis of such criteria as organization size (e.g., square feet or number of employees), date of entry into the Program, type of commercial/industrial sector, scope of organization (e.g., national, regional, local), organization headquarters location, or other practical limitations.

E. Direct Support. At Federal Partner's request, EPA agrees to undertake surveys and analyses for part or all of Federal Partner's facilities, contingent upon the completion of separate interagency agreements that contain sufficient funds to support such activities by EPA's expert teams.

V. Use of EPA-Developed Materials

A. EPA Materials. Both parties to this agreement agree that EPA-developed publications are a valuable tool in educating the public about the pollution-prevention benefits of energy-efficient lighting and the Green Lights Program.

B. Green Lights Logo. EPA agrees to permit Federal Partner to use the Green Lights Partner logo for use on non product-specific materials that will publicize Federal Partner's participation in the Green Lights Program. Federal Partner agrees that appropriate use of the EPA Green Lights Program logo is encouraged by EPA, but that such use does not constitute EPA's endorsement of Federal Partner's products or services.

C. **EPA Materials.** EPA agrees to provide to Federal Partner, at Partner's request, available camera-ready negatives, mechanicals, and other directly reproducible material, from which Federal Partner can create:

1. Green Lights brochures, Light Briefs, and video(s)
2. Green Lights Program logo
3. Other Green Lights materials

Federal Partner agrees to return to EPA the directly-reproducible material identified above within 30 days of receipt.

D. **No Charge.** EPA agrees not to charge Federal Partner for such materials.

E. **Reproduction of EPA Materials.** Federal Partner agrees to reproduce such EPA-developed materials faithfully, without altering their form, content, or appearance in any way, except, at Federal Partner's option, to add the phrase "Distributed at no cost by [Federal Partner], with permission of EPA's Green Lights Program," as well as Federal Partner's own logo, address, and phone number.

F. **Recycled Paper.** Federal Partner agrees to use recycled paper for all of its reproductions of EPA-developed informational materials.

G. **Distribution.** Federal Partner agrees to distribute EPA-developed informational materials to Federal Partner's employees and potential Federal Partners to promote and expand the use of energy-efficient lighting and membership in the Green Lights Program.

VI. Criteria and Standards:

A. Each party to this agreement agrees to assume the good faith of the other party as a general principle for the Green Lights Program.

B. Both parties agree to notify each other if any problems arise and to work together to foster maximum public confidence in the Program. Either party can terminate this agreement, without penalty, via 10 days' written notice to the other, and both will then cease to publicize Federal Partner's participation in the Green Lights Program. Reasons that could cause EPA to terminate this agreement with Federal Partner include (but are not limited to):

- Partner's failure to provide annual report(s).
- Partner's failure to make adequate progress on lighting upgrades, to the point where it is evident that Partner will not be able to fulfill its upgrade commitments as stated in this MOU, and
- Partner's use of the Green Lights logo in an inappropriate manner.

Because public confidence in the credibility of Federal Partners' achievements is so important, EPA will make a best-faith effort to assist Federal Partner in meeting all of the goals of this MOU.

C. Each party's commitments will be subject to any legal restrictions that may apply.

D. EPA agrees that information provided by Federal Partner to EPA will be treated pursuant to EPA's public information regulations under 40 Code of Federal Regulations, Part Two.

E. Both parties agree that the commitment to survey buildings and complete lighting upgrades is contingent upon the availability of appropriated funds or third-party financing resources.

The undersigned hereby execute this Memorandum of Understanding on behalf of their parties. This Memorandum takes effect when signed by both parties.

For the U.S. Environmental Protection Agency (EPA):

Paul Stolpman, Director
Office of Atmospheric Programs

On: _____

For Federal Agency:

On: _____

Name (Please Print) _____

Title _____

Please return:

(1) the signed MOU in its entirety, including Appendices A & B, and (2) a camera-ready version of your organization's logo (EPA uses collages of company logos in Green Lights brochures, newsletters and advertisements. Where a single organization is being focussed on, that organization is given the opportunity to review and approve the logo use.) to: Chief, Green Lights Branch: US Environmental Protection Agency (6202J); 401 M Street, SW: Washington, DC 20460.
Thank you. Welcome aboard.

Federal Agency _____

Appendix A: Please enclose the following information with the signed MOU:

Secretary/Administrator's Name: _____

Title: _____

Address: _____

Telephone Number: _____

Fax Number: _____

**Please identify your Green Lights Implementation Director:
Communications Director:**

Mr./Ms./Rank _____

Title _____

Address _____

Phone _____

Fax _____

Please identify your Green Lights

Mr./Ms./Rank _____

Title _____

Address _____

Phone _____

Fax _____

What is the Nature of Organization's Business _____

SIC Code _____

Approximate number of employees _____

Approximate number of facilities _____

Headquarters location _____

Approximate square footage:

Office _____

Warehouse _____

Health Care _____

Industrial/Manufacturing _____

Lodging (hotels, dormitories) _____

Education (classrooms) _____

Assembly (auditoriums) _____

Food Sales & Services _____

Other () _____

please specify _____

Parking Garage _____

Is the organization signing this MOU a component of another organization? If so, please provide the name of the parent organization:

What is the first day of your organization's next fiscal year? _____

Who referred you to Green Lights? _____

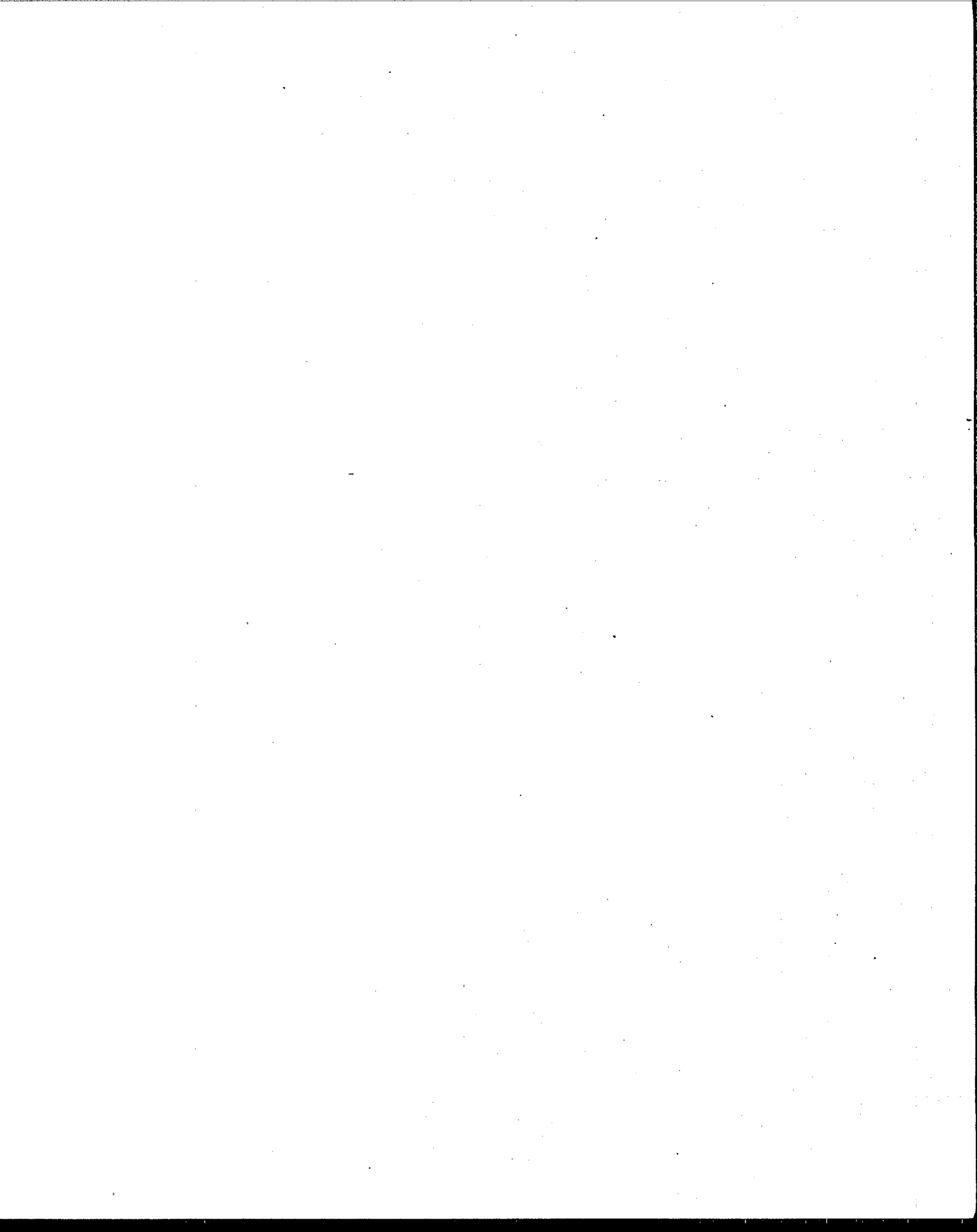
Appendix B: Definitions

1. **Lighting** includes all electrical and natural (daylight) lighting installations, including those found indoors and outdoors (facades, roadways, parking lots and garages, security/safety lighting, signage, etc.).
2. **Eligible Facilities** includes: (1) all domestic facilities that Federal Partner owns; (2) all domestic facilities it currently leases from other parties under agreements that expire more than five years after the date this agreement enters into force. Space that Federal Partner leases under agreements terminating sooner than five years after the date this agreement enters into force are excluded from "eligible facilities;" and (3) all facilities where Federal Partner is the majority or controlling owner and that it currently leases to other parties (including facilities managed by property management firms). Facilities that the Federal Partner reasonably anticipates selling sooner than five years from the date this agreement enters into force are excluded from "eligible facilities." EPA encourages Federal Partner to include facilities outside the U.S. New leases, as lessor and lessee, are discussed under "New Construction."
3. **Profitable.** Due to the relatively low risk involved in installing energy-efficient products and the tangible, but difficult to measure, benefits of enhanced quality, a project is defined as "profitable" when it provides an annualized internal rate of return that is equal to or greater than twenty percentage points, with an analysis term of at least 10 years. Projects that maximize energy savings while providing internal rates of return higher than twenty percentage points (the typical Green Lights upgrade yields an IRR of 20-40% post-tax) meet this criterion. EPA does not expect Green Lights partners to include measures within an upgrade project that are non cost-effective. EPA defines a non cost-effective measure as any individual measure within an upgrade project that has an internal rate of return of less than twelve percentage points. (Organizations in financial distress may qualify for a different criterion.)
4. **Lighting Quality.** Federal Partner and EPA agree that Federal Partner shall make all determinations affecting lighting quality and quantity, although Federal Partner may seek EPA's advice.
5. **No-Upgrade Facility.** After completing lighting surveys on all eligible facilities, Federal Partner need not upgrade those facilities that are identified as "no-upgrade facilities" according to one of the following three criteria:
 - a. If a facility's circumstances are such that, after a survey, no upgrade can be identified that would save energy while being profitable and meeting Federal Partner's lighting quality objectives, such a facility need not be upgraded. It has been the experience of Federal Partners that such circumstances are rare.
 - b. In a facility that Federal Partner leases from another party, the landlord must cooperate in the proposed installation program and in the division of financial benefits (e.g., by adjusting rents and/or other lease provisions) so that the upgrade project is profitable for Federal Partner. If, following good-faith efforts on the part of the Federal Partner, the landlord declines to cooperate, Federal Partner agrees to provide EPA with an opportunity to seek the landlord's cooperation through an EPA presentation on the benefits of the Green Lights Program. If the landlord still declines to cooperate, then such a facility need not be upgraded.
 - c. In a facility that Federal Partner leases to other parties, the tenant(s) must cooperate in the proposed installation program and in the division of financial benefits (e.g., by adjusting rents and/or other lease provisions) so that the upgrade project is profitable for Federal Partner. If, following good-faith efforts on the part of the Federal Partner, the tenant(s) refuse(s) to cooperate, Federal Partner agrees to provide EPA with an opportunity to seek the tenant(s)'s cooperation through an EPA presentation on the benefits of the Green Lights Program. If the tenant(s) still decline(s) to cooperate, then such a facility need not be upgraded.

Federal Agency

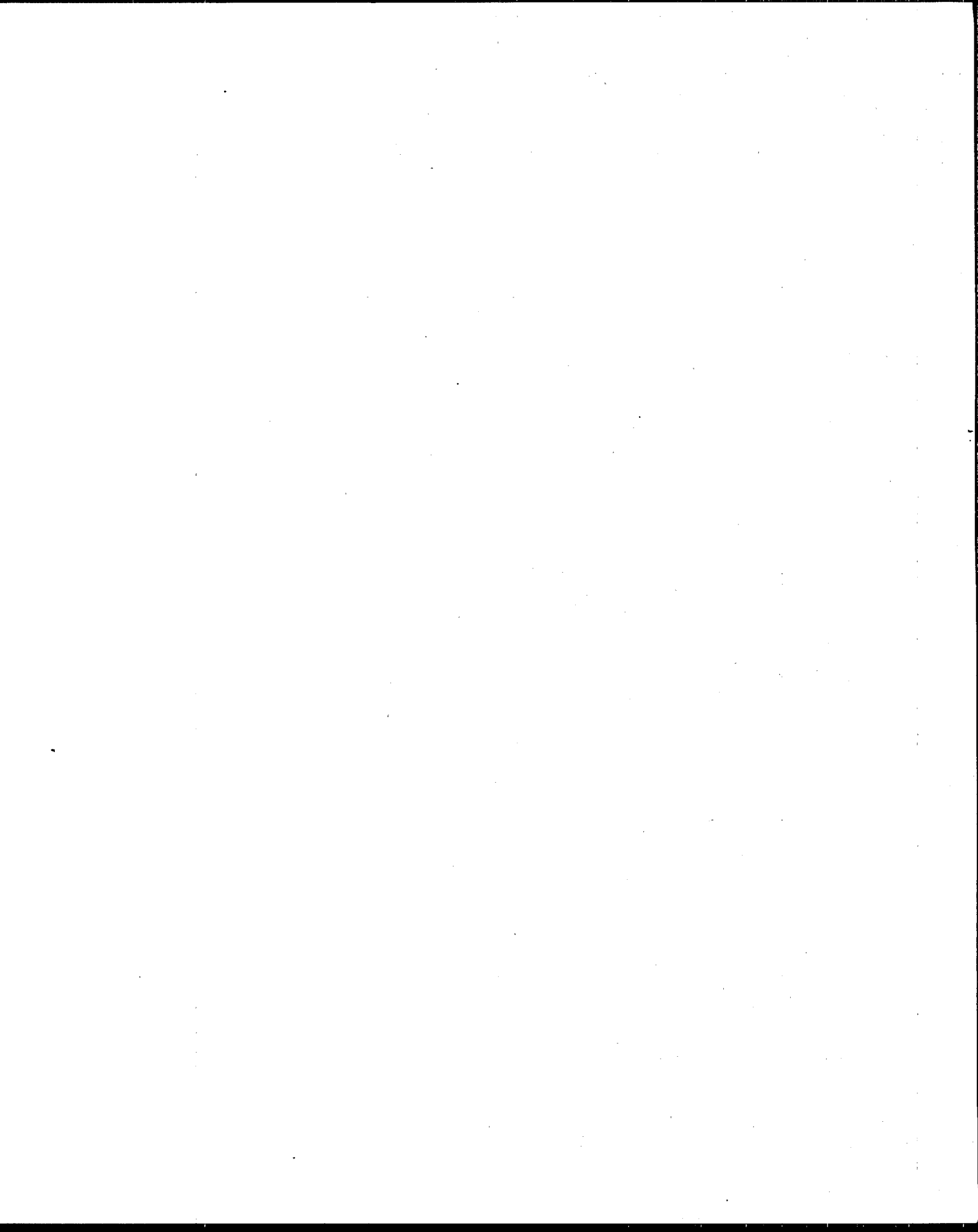
Appendix C: Green Lights publishes a monthly newsletter that gives news about events, new participants, media coverage, training opportunities, etc. We would be happy to send copies to 20 people in your organization, in addition to the Green Lights Implementation and Communications Directors. Our current participants usually designate as their 20 subscribers, managers and executives in: public affairs department, environment department, energy department, facilities management (regional managers or managers of major facilities), real estate department, strategic planning department and corporate finance department. Please provide names and addresses below. Thank you.

1. _____ _____ _____	6. _____ _____ _____	11. _____ _____ _____	16. _____ _____ _____
2. _____ _____ _____	7. _____ _____ _____	12. _____ _____ _____	17. _____ _____ _____
3. _____ _____ _____	8. _____ _____ _____	13. _____ _____ _____	18. _____ _____ _____
4. _____ _____ _____	9. _____ _____ _____	14. _____ _____ _____	19. _____ _____ _____
5. _____ _____ _____	10. _____ _____ _____	15. _____ _____ _____	20. _____ _____ _____



APPENDIX F.

ENERGY STAR EQUIPMENT INFORMATION



Requiring Agencies to Purchase Energy Efficient Computer Equipment

Whereas, the Federal Government should set an example in the energy-efficient operation of its facilities and the procurement of pollution preventing technologies;

Whereas, the Federal Government should minimize its operating costs, make more use of taxpayer provided dollars and reduce the Federal deficit; and

Whereas, the Federal Government is the largest purchaser of computer equipment in the world, and therefore has the capacity to greatly accelerate the movement toward energy efficient computer equipment;

Now, therefore, by the authority vested in me as President by the Constitution and the laws of the United States of America, including section 381 of the Energy Policy and Conversation Act, as amended (42 U.S.C. 6361), section 205 of the Federal Property and Administrative Services Act, as amended (40 U.S.C. 486), section 152 of the Energy Policy Act of 1992 (Public Law 102-486), and section 301 of title 3, United States Code, and to ensure the energy-efficient operation of the Federal Government's facilities and to encourage the procurement of pollution-preventing technologies that will save taxpayer money, reduce the Federal deficit and accelerate the movement to energy-efficient designs in standard computer equipment, it is hereby ordered as follows:

Section 1. Procurement of Computer Equipment That Meets EPA Energy Star Requirements for Energy Efficiency.

(a) The heads of Federal agencies shall ensure that, within 180 days from the date of this order, all acquisitions of microcomputers, including personal computers, monitors and printers, meet "EPA Energy Star" requirements for energy efficiency. The heads of Federal agencies may grant, on a case-by-case basis, exemptions to this directive for acquisitions, based upon the commercial availability of qualifying equipment, significant cost differential of the equipment, the agency's performance requirements and the agency's mission.

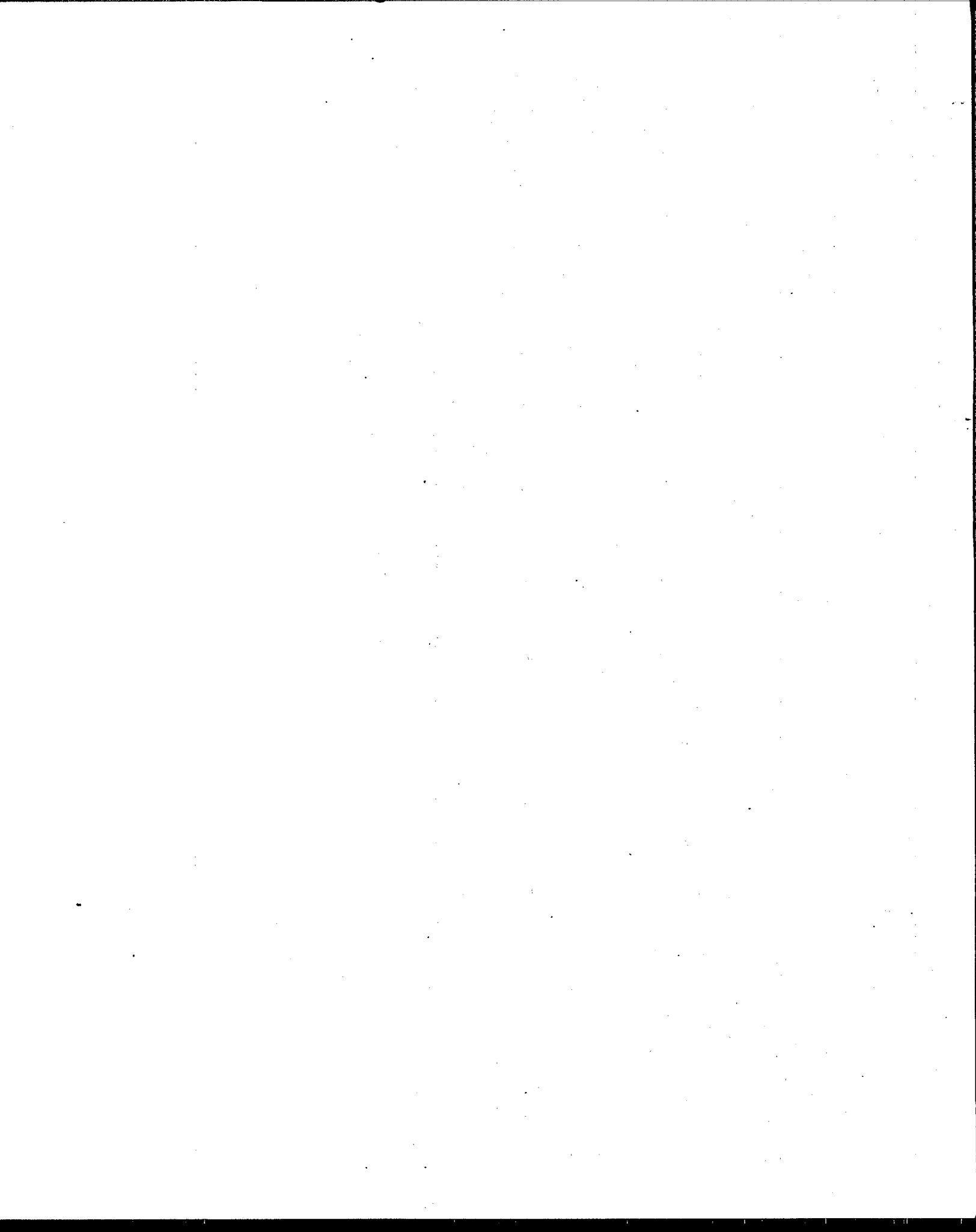
(b) Within 180 days from the date of this order, agencies shall specify that microcomputers, including personal computers, monitors and printers, acquired by the agency shall be equipped with the energy-efficient low-power standby feature as defined by the EPA Energy Star computers program. This feature shall be activated when the equipment is shipped and shall be capable of entering and recovering from the low-power state unless the equipment meets Energy Star efficiency levels at all times. To the extent permitted by law, agencies shall include this specification in all existing and future contracts, if both the Government and the contractor agree, and if any additional costs would be offset by the potential energy savings.

(c) Agencies shall ensure that Federal users are made aware of the significant economic and environmental benefits of the energy-efficient low-power standby feature and its aggressive use by including this information in routine computer training classes.

(d) Each agency shall report annually to the General Services Administration on acquisitions exempted from the requirements of this Executive order, and the General Services Administration shall prepare a consolidated annual report for the President.

Sec. 2. Definition. For purposes of this order, the term "agency" has the same meaning given it in section 151 of the Energy Policy Act of 1992.

Sec. 3. Judicial Review. This order does not create any right or benefit, substantive or procedural, enforceable by a nonfederal party against the United States, its officers or employees, or any other person.





Energy Star Computers

Introducing... The Energy Star Computers Program



The U.S. Environmental Protection Agency (EPA) promotes energy efficiency because electricity generation contributes to air pollution, including 35 percent of all U.S. emissions of carbon dioxide. It also accounts for 75 percent and 38 percent of all U.S. emissions of sulfur dioxide and nitrogen oxides, respectively. By using more energy-efficient equipment in our homes, offices, and factories, we can reduce this pollution—while saving money!

Why Energy-Efficient Computers?

Computers are the fastest-growing electricity load in the business world. They account for 5 percent of commercial electricity consumption—and if action

is not taken, this could rise to 10 percent by the year 2000. Ironically, much of this electricity is wasted: research shows that most of the time personal computers

are on, they are not actively in use—and 30–40 percent are left running at night and on weekends.

What Is EPA Doing About It?

EPA has signed partnership agreements with industry-leading manufacturers, who sell 70 percent or all desktop computers and 90 percent of all laser printers sold in the United States. These companies are introducing desktop computers, monitors, or printers that can automatically power-down to save energy when they are not being used. This "sleep" feature could cut a product's annual electricity use by about one-half.

Consumers will easily recognize the new, more efficient systems because they will be identified by the EPA Energy Star™ logo shown here.



Energy Star™-bearing office equipment could save enough electricity each year to power Vermont, New Hampshire, and Maine, cut electricity bills by \$2 billion, and reduce CO₂ pollution equal to the emissions from 5 million autos.

An EPA Energy Star

computer can save users a

great deal of money by going to

sleep. And according to manufacturers,

a majority of their products will have

this feature within just a couple of

years. This added functionality will be

invisible to the user, both in terms of

performance and in terms of price

tag—making it noticeable only by the

EPA Energy Star™ logo—and, of

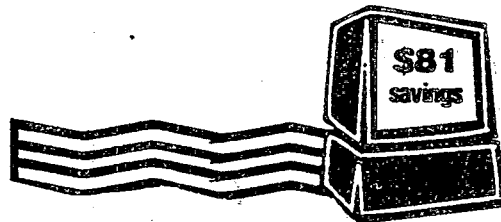
course, the lower electricity bill.

How Much Can My Energy Star Save?*



Conventional System
On all the time
Annual Cost \$165

*As compared to a typical computer, monitor, and laser printer on all day and night, assuming 235 W, 8c/kWh. Does not include heat gain from computer equipment.



Energy Star System
On all the time
Annual Cost \$84



Energy Star Syst
Turned off at nig
Annual Cost \$28

Who Buys Energy Star Computers?

EVERYONE! Everyone who values high performance at a lower cost—and the extra satisfaction of owning an environmentally superior product.

The **U.S. Government**—the largest buyer of computer equipment in the world—will take the lead in purchasing Energy Star equipment.

President Clinton, in an Earth Day address emphasizing the link between the environment and a growing economy, released an Executive Order directing U.S. agencies to purchase only desktop computers, monitors, and printers that

meet EPA Energy Star requirements for energy efficiency—provided that they are commercially available and meet the agencies' performance needs. The Executive Order took effect in October 1993 and will save taxpayers \$40 million annually. In fact, EPA itself will save enough money using the new, energy-efficient products to pay for the Energy Star Computers program several times over—making it one of the most cost-effective government initiatives in history.

EPA is also encouraging **public- and private-sector consumers** to buy products

bearing the Energy Star™ logo. Many of these organizations are already part of EPA's Green Lights program, and are asking EPA for advice on other smart energy-efficiency investments.

In addition, **electric utilities** will purchase Energy Star™-bearing computers for their own use and will encourage companies in their service territories to do the same.

If your organization is interested in learning more about maximizing its purchasing power to help the environment, contact EPA about available Energy Star products.



For more information about Energy Star Computers, please contact:

Manager
Energy Star Computers
U.S. EPA (6202J)
Washington, DC 20460
fax: 202 775-6680

Or call: 202 775-6650

For more information by fax (available 24 hours a day), call: 202 233-9659.



Purchasing An Energy StarSM Computer



The EPA Energy Star Computers program is a partnership effort with the computer industry to promote the introduction of energy-efficient personal computers, monitors, and printers. Reducing energy consumption can help to combat smog, acid rain, and global warming by reducing emissions from electricity generation. By using more energy-efficient equipment in our homes, offices, and factories, we can both improve the environment and save money.

What is Energy Star Equipment?

"Energy Stars" are energy-efficient computers, monitors, and printers that save energy by powering down and going to "sleep" when not being used. An Energy Star computer has all the performance features of a regular computer—it simply has the additional ability to "power-down." These energy-efficient machines save money on electricity bills and reduce pollution, improving your bottom line and the earth's environment.

EPA has signed partnership agreements with industry-leading manufacturers who sell more than 75 percent of all desktop computers and 90 percent of all laser printers sold in the United States. These companies have introduced more than 2,000 desktop computers, monitors, and printers that have earned the right to bear the EPA Energy StarSM logo, shown at the top of the page.

Computer equipment is the fastest growing electric load in the business world, and energy use by computers could double by the year 2000. Ironically, much of this energy is wasted: research shows that most of the time personal computers are on they are not

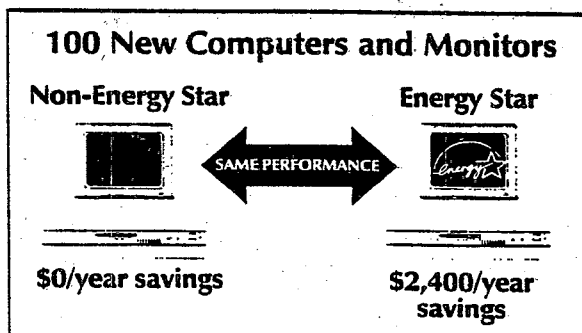
actively in use—and 30 to 40 percent are left running at night and on week-ends. By the year 2000, Energy Star equipment could save enough electricity to power Vermont, New Hampshire, and Maine for a year, cut electricity bills by \$2 billion, and reduce CO₂ pollution equal to the emissions from 5 million automobiles.

Real Savings

Energy Star computers are available at no additional cost, and a single Energy Star computer and monitor can save anywhere from \$7 to \$52 per year in electricity bills. If you notice computers and printers left on when leaving the office at night and on weekends, your savings will be toward the higher end of this range.

If you add an Energy Star printer to your system, you can increase your savings by an additional \$35 per year.

For an office environment where one-third of the computers are left on all the time, purchasing 100 Energy Star PCs and monitors instead of non-efficient equipment could save you \$2,400 per year. In addition, Energy Stars generate less heat, and upgrading your existing equipment to Energy Star as it naturally turns over can lead to cooling reductions of up to 25 percent.



How to Find Energy Star Products

Consumers can easily recognize the new, more efficient systems because they will be identified by the EPA Energy StarSM logo. Since there are now more than 2,000 products available from all major manufacturers, EPA is encouraging companies and organizations to specify Energy Star compliance in all future purchases of computer equipment.

- If you are a business, ask your MIS or procurement official about purchasing Energy Star equipment, and look for the Energy StarSM logo in advertisements and on specification sheets.
- If you work in the Federal Government, the General Services Administration has issued guidelines on the acquisition of Energy Star computers. Call (202) 519-4860 for a copy.
- If you need a computer for home, look for the Energy StarSM logo on display models in local retail stores—if you do not see it, ask for it.

To help, EPA offers a database of available products which is updated monthly. Just call or write EPA to receive a copy.

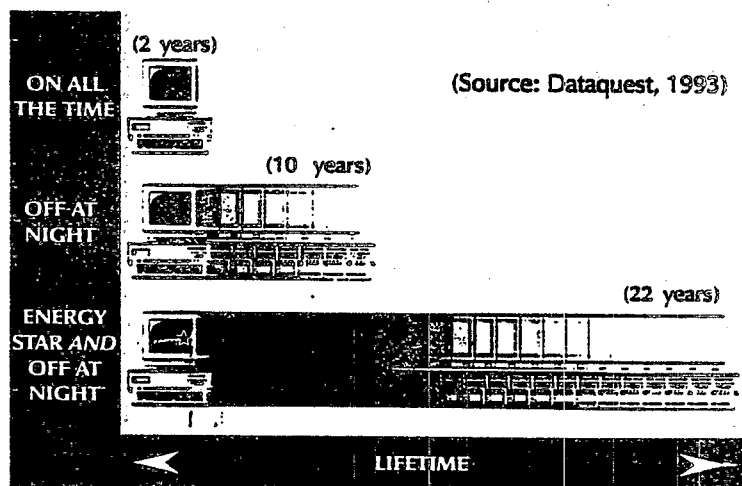
User Advantages

Besides the cost savings, Energy Star equipment offers users several key advantages.

- Energy Star PCs can be **quieter** since some have no fans.
- Sleeping Energy Star monitors **emit fewer electromagnetic fields (EMF)** since they are not displaying any visual image when "asleep."
- Energy Star monitors can also **increase file security** since the "sleeping" screen is dark.
- All Energy Star equipment produces less heat, and thus contributes to a cooler and **more comfortable workspace**.
- Energy Star PCs tend to be a **less intrusive desktop** item since they are usually smaller than traditional PCs.

Increased Reliability

In addition, Energy Star equipment may actually last longer than conventional products because it will most likely spend a large portion of time in a low-power sleep mode. Non-Energy Star computer equipment left on at night and over weekends may last only 2 to 3 years, but Energy Star computers "sleeping" during the day and turned off at night could last almost 10 times as long (see graph).



By spending time "sleeping," Energy Star equipment can reduce wear and tear, leading to extended life and increased reliability.

Which Energy Star Is Right for Me?

Committing to an "Energy Star purchasing strategy" for your organization is the first crucial step. The second step is figuring out *which* Energy Star products to buy. It is important to realize that not all Energy Star computers are the same, and your choice will depend on your needs and preferences.

If you operate on a Local Area Network (LAN), make sure that your Energy Star computer is compatible with that network system. Most Energy Stars are now being network tested, but specify your particular environment—whether its Novell Netware, Banyan Vines, Windows NT, Lan Manager, or others, to ensure that it is compatible (see sample procurement language on page 4).

You also may want to specify certain "user-friendly" features, such as an Energy Star or power management "icon", which is easily accessible and gives the user a quick and simple way to change the "sleep" settings. Some users may want to set their computer to go to sleep after 15 minutes of inactivity, while others may choose 30 minutes. Having a user friendly power management feature to customize an Energy Star computer to your own schedule contributes to productivity and increases energy savings.

What If No Energy Star Is Available?

If you need an expert computer system or an extremely high speed printer, there might not yet be an Energy Star model available. Because high-end equipment was designed to give you maximum performance, it also tends to use more power. Until the designers of this higher end equipment develop Energy Star models, you will have to buy non-Energy Star. The goal of the Energy Star program is to save energy with no sacrifice in performance or cost. If you need a high-end system to do your job, and there is not an Energy Star available, then buy what you need.

However, if you are considering the purchase of a computer with certain specifications and have the choice between an Energy Star and a non-Energy Star machine, buy the Energy Star. If both machines have the exact same performance and are similar in cost, purchasing the Energy Star system will give you the additional benefits of saving on your electric bill and helping to prevent pollution.

Should I Still Turn My Energy Star Off at Night?

Yes. Power-managed Energy Stars will go to sleep by themselves, but remember that the sleep mode does not mean "off." Sleeping Energy Stars use less power than when fully activated, but they still draw some power when in the sleep mode. To save additional energy and increase the lifetime of the equipment, be sure to turn your system completely off at the end of each day. It is a common myth that turning computer equipment off and on is bad for it; in fact, the exact opposite is true. **Turning off your computer at night may actually increase its life** because it will reduce susceptibility to heat and mechanical stress, the two leading causes of personal computer failure. The recommended approach: set your Energy Star to sleep when you are away during the day, and turn off the system when you leave at night.

President Clinton's Executive Order

In April 1993, President Clinton signed Executive Order 12845 requiring all federal agencies to purchase Energy Star computers, monitors, and printers where commercially available. This order, which took effect on October 18, 1993, reads in part:

Agencies shall specify that microcomputers, including personal computers, monitors, and printers, acquired by the agency, shall meet the EPA Energy Star specifications. This feature shall be activated when the equipment is delivered to the customer and shall be capable of entering and recovering from the low-power state unless the equipment meets Energy Star efficiency levels at all times.

What Can I Do for My Existing Equipment?

Again, turning off your existing equipment at night is the easiest and most cost-effective strategy for reducing the energy consumption of non-Energy Star equipment. However, if you are unable to turn off existing equipment or wish to make additional savings, consider retrofitting your equipment with an Energy Star-compliant controlling device. These devices are fairly easy to install and can completely shut off the power to your PC, monitor, or printer after a period of inactivity or at a specified time of the day.

What to Specify When Ordering Energy Star Equipment

☒ **Energy Star Compliant**

"Provide computer products that meet the EPA Energy Star requirements for energy efficiency in the requested configuration." This means that PCs, monitors, and printers shall be able to enter and recover from a low-power standby mode when not in use. For PCs and monitors, the low-power mode is defined as 30 watts or less (30 watts for the PC and 30 watts for the monitor). For printers with speeds of less than 15 pages per minute, the requirement is 30 watts; and for printers with speeds of 15 or more pages per minute, the requirement is 45 watts. All high-end color printers must not exceed 45 watts in low-power mode.

☒ **Shipped Activated**

"Ship all products with the Energy Star low-power feature activated or enabled." This eliminates the need for users to configure the power management feature after delivery and helps to ensure that the energy-saving feature is used.

☒ **Network Compatibility**

"If equipment will be used on a local area network, the PC must be fully compatible with the specified network environment; PCs resting in a low-power state should not be disconnected from the network." Many manufacturers are now testing their Energy Star equipment on networks and can report, for example, that they are compatible on Novell Netware, Banyan Vines, Windows NT, Lan Manager, and other network systems.

☒ **Monitor Control**

"Ensure monitors are capable of entering a low-power mode when connected to the accompanying PC." Most monitors cannot power down by themselves, and must rely on some external input to trigger their low-power state. This is typically accomplished via one of the following: (1) VESA Display Power Management Signalling (DPMS), a signalling protocol that allows a PC equipped with DPMS to control a DPMS compatible monitor (both the computer and monitor must be DPMS compatible), (2) the actual shut off of power to the monitor via a special plug from the PC (this does not require an Energy Star monitor), or (3) the use of a proprietary software utility shipped with the monitor. Organizations may wish to specify one approach or the other. DPMS compatible PCs and monitors will provide seamless power management and immediate recovery from the low-power state, but only when used with each other. PCs that include the power switch approach can shut off power to any monitor, not just an Energy Star monitor.

☒ **Software Compatibility**

System must be able to run commercial off-the-shelf software both before and after recovery from a low-power state, including retention of files opened before the power management feature was activated.

What Products are Available?

More than 2,000 products are now available that meet the Energy Star guidelines.

To receive an abbreviated list of qualified products, call the Energy Star fax-back line. Dial 202 233-9659 and enter #5306 for PCs, #5309 for monitors, and #5307 for printers.

To receive the detailed list of qualified products by mail,

To fax yourself general program information, call the Energy Star fax-back line at 202 233-9659, or call or write us:

Energy Star Computers:

U.S. EPA (6202J)

Washington, DC 20460

Office 202 233-9114

Fax 202 233-9578





EPA ENERGY STAR COMPUTERS

Participant List as of February 1, 1995



COMPUTERS AND MONITORS (number: 387)

3D Microcomputers

- ★ A Plus Info
- ★ Acer/Acros
- Achieva Computer
- ★ ACMA Computers
- ACME
- ★ ACTech
- Action Electronics
- ★ Acula Technology
- Addtech Computer
- ★ ADI
- ★ Adtec
- ★ Advanced Digital Systems
- Advanced Integration Research
- ★ Advanced Intelligence
- Alcan Systems
- ★ Alaris
- Allen Bradley Company
- ★ ALR
- Altima Systems
- AMAX
- ★ Ambra Computer
- American Business Computers (ABC)
- ★ American Megatrends
- ★ Amrel Technology
- ANT Computer
- Antechron Research
- ★ AOC
- Apaq Technology
- APF
- ★ Apple
- ★ Applied Digital Data Systems
- Apricot
- ★ Aquarius System
- ★ Aqualine

- ★ Arche Computer & Technologies
- Area Electronics Systems
- ★ Aspect Computer
- ★ AST Research
- ★ AT&T Global Information Solutions
- Atima Technology
- ATS
- ★ Austin Computer
- ★ Avnet Computer
- Axik Computer
- ★ Bankers Systems
- Barron MicroComputer
- Blue Star Marketing
- ★ Bridge Information
- Brother International Europe
- Byte Technology
- ★ Caliber
- ★ Canon
- ★ Capetronic
- ★ Cemtech
- CFC Technology Services
- Channel Electronics
- ★ Cheer Electronics
- CHEM
- ★ Chien Hou Electronics
- Cognisoft
- Commax Technologies
- Commodore
- ★ Communication Lab International
- ★ Compal Electronics
- ★ Compaq
- ★ CompuAdd
- ★ CompuDyne
- ★ Computer Creations
- Computer Dealers Source

- Computer Extension Systems
- Computer Management
- Computer Sales Professional
- Computer Tec
- CompuTrend Systems/Premio
- Comtech Micro System
- Comtrade
- Conrac Elektron
- Continental Resources
- Corion Industrial
- ★ Cornerstone Imaging
- Corporate Micro Systems
- ★ CP & G Technologies (CSS) Computers, Etc.
- ★ CSS Laboratories
- CTL
- ★ CTX International
- Cube Computer
- ★ CyberStar
- ★ Daesun Industrial
- Daewoo Electronics Canada
- ★ Daewoo Telecom
- ★ Daly Computers
- ★ Data General
- ★ Data Storage Marketing
- ★ DataExpert
- Datavarchuset
- DD & TT Enterprise USA
- ★ DDI Dynex
- ★ Deil
- ★ Delta Products
- ★ Desktop Displays
- Destiny
- ★ DFI
- ★ Diamond Technologies

★ Indicates companies which have announced Energy Star compliant products

- ★ Digital Equipment (DEC)
- Dimension Computer
- Display Technologies
- Dolch Computer Systems
- ★ DTK
- ★ Duracom Computer Systems
- ★ DynaColor
- EFA
- EKM Computer
- Electronic Technology Group
- ★ Elonex
- Elsa GmbH
- EMPaC
- ★ EPS Technologies
- ★ Epson
- ★ Equix
- Ergo Computing
- ★ Essex Monitor Company
- ★ Everex Systems
- Evergreen Systems
- ★ Fair Electronic Company
- Fedcom Microsource
- ★ Fieldworks
- Firepower
- ★ First International Computer
- ★ Flytech Technology
- ★ Foshan Wingbao
- Information Enterprise
- ★ Fountain Technologies
- Fujitsu
- ★ Gateway 2000
- GCH Systems
- Genova
- ★ Giga-Byte Technology
- ★ GoldStar
- Grand Micro
- Great Lakes Electronics
- Distributing
- Green Labs
- Green PC
- GVC
- Hammond and Hammond
- ★ Hectronic
- ★ Hewitt Rand
- ★ Hewlett-Packard
- Highwave Technologies
- HIQ Computer Systems

- ★ Hitachi America
- ★ Hitachi European Centre
- Hitachi, Office Systems Division
- HI-VI Electronics
- HSI
- ★ Hyundai Electronics
- ★ IBM
- ★ ICL
- ★ IDEA
- ★ IDEK/Tiyama N.A.
- ★ Identity Systems Technology
- ★ IDP
- Ikegami Electronics
- Infotel/Midwest Micro
- ★ Inmac
- ★ Insight Distribution
- Integrated Systems Group, Inc.
- Intelicom USA
- Intelligent Computers and Technologies
- Intelligent Decisions
- Intelligent Notebook Systems
- Interactive Computing Devices
- Intergraph
- Intermec
- ★ International Data Systems
- Intra Electronics USA
- ★ IPC
- ★ I.S.L. Automatisering
- J-MARK Computer
- JTA
- Key Power
- Keydata
- Keypoint
- ★ KFC
- ★ Korea Computer
- ★ Korea Data Systems
- ★ Korea Electronics
- LCC Computers
- ★ Leading Edge
- ★ Leo Systems
- LION America
- ★ Lite-On Technology
- ★ Liwski International
- ★ MAG Innovision

- ManTech Systems
- Manufacture Technology Resource
- ★ MASS Research
- ★ Matsushita Electric Industrial
- ★ Max Group
- MaxVision
- ★ Meccer
- ★ Memorex Telex
- Metrovision Microsystems
- Micron Computer
- MicroNiche Information Systems
- ★ Micronics Computers
- MicroPen Computer
- MicroSource
- MicroSource (TX)
- Mind Computer Products
- Mini-Micro Supply
- miro Computer Products
- ★ Mitac
- ★ Mitsubishi
- ★ Mitsubishi
- Modern Instruments
- Modular
- Monitor Technology
- MSSI Consultants
- Multimax
- ★ Mustek
- Mynix Technologies
- NAI Technologies
- Systems Division
- ★ Nanno USA
- National Advantages
- National MicroComputers
- ★ NCD
- ★ NEC
- NETIS
- ★ Nissei Sangyo
- America/Hitachi
- ★ Nokia
- Northern Electronic Technologies
- Northern Micro
- ★ Northgate
- Northwest Micro
- Ocean Information Systems
- Ocean Interface
- Ocean State Computers

★ Indicates companies which have announced Energy Star compliant products

Office Automated
Technology
★ Olivetti
★ Optiquet
★ Orion Electric
Osborne Computer
★ Packard Bell
Pam Pacific Associates
★ Panasonic
Paragon Development
Systems
Patriot Computer
PC Channel
★ PC-Expanders
PC Pros
★ PC&C
PC Ware International
★ Percomp Microsystems
Perpetual Technologies
★ Philips Consumer
Electronics/Magnavox
Pine Technology
Pioneer Technologies
Group
★ Planar Systems
★ Precision America
★ Precision Technology
★ President Technology
★ Primax Data Products
★ Progen
PSI
★ PT Pembina Galindra
Electric
★ QHT Systems
★ QMS
★ QNIX Computer
★ Quantex Microsystems
★ Quest Group
★ Qume
R & S Computers &
Enhancements
★ Radius
Random
RasterOps
★ Regent Technologies
Relialogic
★ Relisys
Repco Data
★ Republic Technology
Royal Electronic

★ Royal Information
Electronics
★ Sampn Technology
★ Samsung Electronics
★ Samtron Displays
Sanyo Information
Business
★ Sceptre Technologies
★ Scion Computers
★ Seanix Technology
Serviceworks Distribution
★ Shamrock Technology
★ Sharp Electronics
★ Sherwood Terminals
Division, Inkel (USA)
★ Shin Ho Tech/Hi-Com
★ Shinlee
★ Shuttle Computer
★ Sidus Systems
★ Siemens Nixdorf
Sigma Designs
Sigma Designs Imaging
Systems (SCIS)
★ Silent Systems
Silicon Graphics
SiO Technology
Sirex USA
★ SKV International/
Computermill
Smith Corona
★ Sony
SsangYong Computer
Systems
★ STD Technology
Summit Micro Design
★ Sun Microsystems
Super Distributor
Supercom
★ Swan
Synnex Technology
International
★ Sysorex
Tae II Media
★ Tagram
★ Taiwan & Hong Kong
Monitor
★ Taiwan Video and
Monitor
★ Tandberg Data Display
★ Tandy
★ Tangent Computer

★ Tatung
★ Taxan
TCP
TeamMax
★ TECO
Tempest Micro
★ Texas Instruments
★ Tobishi Electronic
Company
★ Toshiba
Total Control Products
Total Peripherals
Tri-Cor Industries
Tri-Star Computer
★ TriGem
★ TriGem America
★ TriGem Microsystems
Tripole
TS Micro
TTX Computer Products
★ Tulip Computers
TWC
★ Twinhead
Twinhead International
Twin T Distributors
★ Tyh Pa Electronic
Tystar Electronics
★ Unisys
Unisys Canada
★ United Solutions
★ Unitek Technology
Unitron
★ USA Teknik
USIT
★ USON
U.S. Systems and
Technologies
★ Veridata
Vextrec Technology
Vierci Computers
★ ViewSonic
★ Viglen
★ Vision Computer
Technologies
★ Vita Electronics
Vobis Microcomputer
VTech Computers
Wang Laboratories
★ Wearnes Technology
Wedge Technology
WEN Technology

★ Indicates companies which have announced Energy Star compliant products

Western Imaging
 ★ Win Laboratories
 Winnet
 Wyle Laboratories
 ★ Wyse Technology
 XCV

Xineiron
 Xpro Systems
 Xyst Infotek
 Yanjen Electronic
 Young Microsystems

Z & M Advanced
 Technology
 ★ Zenith Data Systems
 ★ Zenon
 ★ Zeos

PRINTERS (number: 56)

★ Advanced Matrix
 Technology
 ★ Alps Electric
 ★ Apple
 ★ Brother
 ★ Bull Italia
 ★ CalComp
 ★ C-TECH
 ★ Canon
 CIE America
 Citizen Watch
 ★ Data General
 ★ Data Rental & Sales
 Dataproducts
 ★ Digital Equipment
 (DEC)
 ★ Enabling Technologies
 Epson
 ★ Fujitsu
 ★ GCC Technologies
 ★ General Parametrics

★ GENICOM
 Goldstar
 ★ Hewlett-Packard
 IBM
 Intergraph
 ★ Kodak
 ★ Kyocera
 ★ Lexmark
 ★ Mannesmann Tally
 ★ NEC
 ★ Okidata
 ★ Olympus Image
 Systems
 ★ Omnifax
 ★ Output Technology
 ★ Panasonic
 ★ Pentax Technologies
 Printronix
 ★ QMS
 Qnix Computer
 Ricoh

★ Samsung
 Sanyo Information
 Business
 Seiko Instruments USA
 Serviceworks Distribution
 ★ Sharp Electronics
 Sony Electronics
 SaangYong Computer
 Systems
 ★ Star Micronics
 ★ Summagraphics
 ★ SunPics
 ★ Tektronix
 ★ Texas Instruments
 Toshiba America
 Information Systems
 Twin T Distributors
 ★ Unisys
 Westrex
 ★ Xerox

CONTROLLING DEVICES¹ (number: 36)

★ Alpha Micro
 Technologies
 Antechron Research
 ★ Aten International
 Bayview Technology Group
 ★ B & B Electronics
 Communica
 Compu Sci
 ★ Connectix
 (C.C.S.) Computers Etc.
 Curtis Manufacturing
 Cypress Computer
 ★ Defenders Network

Dinexcom
 Energy Interface
 Engram International
 ★ Ergonomics
 Eskel-Porter
 Glitch Master
 GreenInk
 Greenware Technologies
 Hibernation Software
 ★ IBM
 ★ IDC
 ★ Image Plus
 ★ King Jaw Industrial

★ Mecor
 MSSI Consultants
 Newpoint
 Optiquest
 Panamax
 ★ Powercard
 Quantum Composers
 Sequence Electronics
 SIIC
 Sophisticated Circuits
 Tripp Lite

¹ These are external retrofit products that can reduce the energy consumption of non-Energy Star computers, monitors, and printers.

★ Indicates companies which have announced Energy Star compliant products

ALLIES² (Components and Software: number: 144)

Achieva Computer
 Acronics Systems
 Advanced Micro Devices
 Advanced Integration
 Research
 AFEQT
 Allied Signal, Amorphous
 Metals
 Alpha Technology
 American Proimage
 American Power
 Conversion
 Amkly Systems
 Anigma
 Artek Innovations
 Arvee Systems
 Aslan Computer
 Astec
 ATMEL
 AT&T Microelectronics
 Award Software
 Axelen
 B&B Electronics
 BCM
 Beyond Technology
 CAREO
 Cartaco
 Chips and Technologies
 Chisholm
 Cirrus Logic
 Computer Resources
 Connor Peripherals
 CreSonic
 Cypress Computer
 Cyrix
 Databook
 DELTEC
 DFI
 DIA Semicon Systems
 Diablo Scientific
 Diamond Computer
 Systems
 DynaComp
 EFA
 EFAR Microsystems
 EFI Electronics
 Elitegroup
 Elsa GmbH

Energy Concepts
 Engram International
 Exide Electronics
 First International
 Computer
 Free Computer
 Technology
 Glitch Master
 Golden Power Systems
 Green Labs
 Greenware Technologies
 Hampton Technology
 Harmony
 Harmony Power
 Hibernation Software
 HIPRO Electronics
 Holly Electronic
 Image Plus
 Infomatic Power Systems
 Intel
 Iomega
 J-MARK Computer
 Jabil Circuit
 Lattice Semiconductor
 Lead Year Enterprise
 LION America
 Lite-On
 LLR Technologies
 M Technology
 Macase Industrial
 Market Central
 Maxi Switch
 Maxtor
 Metasoft
 Michada Computers
 Michi Tech System
 Micro Energetics
 Microsoft
 Microtest
 Minta Technologies
 Moretec Electronics
 Industrial
 Morex Information
 Enterprise
 New Bios
 NMB
 North American Power
 Supplies

Nova Distributing
 Ogden Atlantic Design
 OPTI
 Orchid Technology
 Palo Alto Digital Systems
 Panamax
 PAOKU P&C
 Para Systems
 Phoenix Technologies
 PicoPower Technology
 Pine Technology
 Pinnacle Micro
 Power Monitors
 Professional Sound
 PSC
 Pulizzi Engineering
 Quadnovation
 Rumarson Technologies
 SciTech Software
 Seagate Technology
 Sejin America
 Sequence Electronics
 Server Technology
 Silicon Star International
 Silicon Valley Technology
 Smart Industries
 SOLA
 Southeastern-Facts
 Soyo USA
 Speaking Devices
 Sprint Manufacturing
 Standard Microsystems
 SunPics
 Symphony Laboratories
 SystemSoft
 T & T Computer
 Taken
 Tamarack
 Teach Me How Company
 TEKRAM
 Texas Instruments
 Texas ISA
 TMC Research
 Topower Computer
 Tripp Lite
 U.S. Power & Technology
 Unipower
 United Solutions

² The Ally agreement does not contain individual product specifications, so no products are "compliant."

USAR Systems
Vasco Import und
Vertriebs GmbH
Vextec Technology

VLSI Technology
Wave Energy
WCLC
Western Digital

Western Telematic
Zytec

APPENDIX G.

POLLUTION PREVENTION INFORMATION RESOURCES

CLEARINGHOUSES AND ASSOCIATIONS

1. Pollution Prevention Information Clearinghouse (PPIC)

Pollution Prevention Information
Clearinghouse

U.S. EPA

PM 211-A

401 M Street, SW

Washington, DC 20460

Phone: 202-260-1023

Fax: 202-260-0178

The Pollution Prevention Information Clearinghouse (PPIC) is dedicated to reducing or eliminating industrial pollutants through technology transfer, education, and public awareness. It is a free, nonregulatory service of the U.S. EPA and consists of a repository of pollution prevention information, a telephone reference and referral service and a computerized information exchange system.

2. The International Cleaner Production Information Clearinghouse (ICPIC)

Industry and Environment Program Activity
Center

United Nations Environment Programme

39-43 quai Andre Citroen

75739 Paris CEDEX 15

France

Phone: 33-1-30-58-88-50

Fax: 33-1-40-58-88-74

The International Cleaner Production Information Clearinghouse (ICPIC) is a clearinghouse operated by the United Nations Environment Programme (UNEP). The ICPIC provides information to the international community on all aspects of low- and non-waste technologies and methods.

3. OzonAction

Industry and Environment Program Activity
Center

United Nations Environment Programme

OzonAction

39-43 quai Andre Citroen

75739 Paris CEDEX 15

France

Phone: 33-1-30-58-88-50

Fax: 33-1-40-58-88-74

OzonAction relays technical and programmatic information on alternatives to all ozone depleting substances identified by the Interim Multilateral Ozone Fund of the Montreal Protocol Agreements.

4. American Institute for Pollution Prevention (AIPP)

Thomas R. Hauser, Ph.D., Executive
Director

American Institute for Pollution Prevention
Department of Civil and Environmental
Engineering

University of Cincinnati

Cincinnati, OH 45221-0071

Phone: 513-556-3693

The AIPP was founded jointly by U.S. EPA and the University of Cincinnati in 1989 to assist EPA in promoting the adoption of pollution prevention concepts.

5. Center for Environmental Research Information (CERI)

Dorothy Williams

U.S. Environmental Protection Agency

Center for Environmental Research
Information (CERI)

26 West Martin Luther King Drive

Cincinnati, OH 45268

Phone: 513-569-7562

Fax: 513-569-7566

CERI serves as the exchange of scientific and technical environmental information produced by EPA by publishing brochures,

capsule and summary reports, handbooks, newsletters, project reports, and manuals.

6. Center for Waste Reduction Technologies (CWRT)

Center for Waste Reduction Technologies (CWRT)

American Institute of Chemical Engineers
345 East 47th Street
New York, NY 10017

Phone: 212-705-7407

Fax: 212-752-3297

CWRT was established in 1989 by the American Institute of Chemical Engineers to support industry efforts in meeting the challenges of waste reduction through a partnership between industry, academia, and government.

7. Hazardous Waste Research and Information Center (HWRIC)

Alisa Wickliff

Hazardous Waste Research and Information Center

One East Hazlewood Drive
Champaign, IL 61820

Phone: 217-244-8905

Fax: 217-333-8944

HWRIC is a division of the Illinois Department of Energy and Natural Resources. HWRIC combines research, education, and technical assistance in a multidisciplinary approach to manage and reduce hazardous waste in Illinois. HWRIC collects and shares this information through its library/clearinghouse and several computerized waste management tools.

8. The National Roundtable of State Pollution Prevention Programs (Roundtable)

David Thomas

National Roundtable of Pollution Prevention Programs

One East Hazlewood Drive
Champaign, IL 61820

Phone: 217-333-8940

Fax: 217-333-8944

The Roundtable is a group of pollution prevention program at the State and local level in both the public and academic sectors. The member programs are engaged in activities including multi-audience training and primary to post-secondary pollution prevention education.

9. Northeast States Pollution Prevention Roundtable (NE Roundtable)

Terri Goldberg, Program Manager
Northeast States Pollution Prevention Roundtable / Northeast Waste Management Officials' Association
85 Merrimac Street

Boston, MA 02114

Phone: 617-367-8558

Fax: 617-367-2127

The NE Roundtable was initiated in 1989 by the Northeast Waste Management Officials' Association to assist State programs, industry, and the public implement effective source reduction programs.

10. Pacific Northwest Pollution Prevention Research Center

Madeline Grulich, Director

Pacific Northwest Pollution Prevention Research Center

411 University Street, Suite 1252

Seattle, WA 98101

Phone: 206-223-1151

Fax: 206-467-0212

The Pacific Northwest Pollution Prevention Research Center is a non-profit public-private partnership dedicated to the goal of furthering pollution prevention in the Pacific Northwest.

11. Solid Waste Information Clearinghouse (SWICH)

Lori Swain, Manager

Solid Waste Information Clearinghouse

Solid Waste Association of North America

P.O. Box 7219

Silver Spring, MD 20910

Phone: 1-800-677-9424

Fax: 301-585-0297

SWICH is an information clearinghouse covering a wide range of solid waste issues. SWICH components include an electronic bulletin board, a library and a hotline.

12. Waste Reduction Institute for Training and Applications Research, Inc. (WRITAR)

Terry Foecke or Al Innes
Waste Reduction Institute for Training and Applications Research
1313 5th Street, SE
Minneapolis, MN 55414-4502
Phone: 612-379-5995
Fax: 612-379-5996

WRITAR is designed to identify waste reduction problems, help find their solutions, and facilitate the dissemination of this information to a variety of public and private organizations.

13. Waste Reduction Resource Center for the Southeast (WRRC)

Gary Hunt
Waste Reduction Center for the Southeast
3825 Barrett Drive
P.O. Box 27687
Raleigh, NC 27611-6787

WRRC was established to provide multimedia waste reduction support for the eight states of U.S. EPA IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, and Tennessee).

FACILITY PLANNING AND GENERAL POLLUTION PREVENTION MANUALS

1. Audit and Reduction Manual for Industrial Emissions and Wastes

United Nations Environment Programme (UNEP) and United Nations Industrial Development Office (UNIDO), 1991
UNEP
1889 F Street, NW
Washington, DC 20006
Phone: 202-289-8456
Cost: Contact UNEP for cost and availability information

The manual addresses the following topics: introduction to waste auditing, the audit procedure, pre-assessment, material balance, process inputs and outputs, and synthesis, and three technical case studies.

2. Facility Pollution Prevention Guide

U.S. EPA Office of Research and Development
Center for Environmental Research Information
26 West Martin Luther King Drive
Cincinnati, OH 45268
Phone: 513-569-7562
Cost: Free

The manual describes how to conduct a waste assessment, from the planning/organization stage through the assessment and feasibility analysis to final implementation of pollution prevention options.

3. Industrial Waste Minimization Manual

Center for Hazardous Materials Research
University of Pittsburgh Applied Research Center
320 William Pitt Way
Pittsburgh, PA 15238
Phone: 412-826-5320
800-334-CHMR
Cost: \$40

This manual provides information and guidance to all industrial waste generators

on pollution prevention practices and suggested compliance requirements for RCRA and other related Federal acts.

4. Industrial Waste Prevention

Waste Advantage, Inc. 1988
17117 West Nine Mile Road, Suite 902
Southfield, MI 48075
Phone: 313-569-8150
Cost: \$195 (includes access to technical assistance hotline)

This practical guide provides step-by-step instructions for developing an effective waste minimization program.

5. Pollution Prevention Case Studies Compendium

U.S. EPA
Office of Research and Development
Risk Reduction Engineering Laboratory
Cincinnati, OH 45268
Phone: 513-569-7562
Cost: Free from CERL

The studies are a collection of summaries of pollution prevention demonstrations, assessments, and research projects conducted with the Risk Reduction Engineering Laboratory.

6. Pollution Prevention Pays Instruction Manual

Dr. Susan Smith
Center for Improving Mountain Living
Bird Building
Western Carolina University
Cullowhee, NC 28723
Phone: 704-227-7492
Cost: \$28

This manual concentrates on (1) current legal and environmental issues that create the need for an industrial pollution prevention program and (2) an innovative systems approach to industrial-resource management that can reduce pollution.

7. Pollution Prevention Resource Manual

Chemical Manufacturers Association
2501 M Street, NW
Washington, DC 20037
Phone: 202-887-1100
Cost: \$75

This manual was designed for use by personnel of all levels who are involved with planning or implementing a pollution prevention program.

8. Waste Minimization Training Manuals

Department of Toxic Substances Control
Attention: Robert Ludwig
Alternative Technology Division
714/744 P Street
P.O. Box 806
Sacramento, CA 95512-0806
Phone: 916-324-1807
916-322-3670

This includes three pollution prevention modules on waste minimization. Each manual consists of a workbook and video.

9. Waste Reduction Assessment and Technology Transfer (WRATT) Training Manual

George Smelcer
Center for Industrial Services
University of Tennessee
266 Capitol Boulevard Building
Suite 606
Nashville, TN 37219-1804
Phone: 615-242-2456

This manual includes information on waste reduction awareness and incentives, Federal safety standards, State and Federal regulations, how to establish a waste reduction program and conduct a waste assessment and waste reduction approaches for specific industries and waste types.

POLLUTION PREVENTION VIDEOS

1. 1990 Clean Air Act Overview (20 min.)

Sylvia Gordon
WRATT Case Studies
University of Tennessee, 1991
Center for Telecommunications and Video
Suite 61, 1345 Circle Park Drive
Knoxville, TN 37996-0312
Phone: 615-974-1313
Cost: \$25 (available only from the producer)

The new Clean Air Act is reviewed, especially Title 1,3,4, and 6. Pollution prevention implications are discussed.

2. Beyond Business as Usual: Meeting the Challenge of Hazardous Waste (28:30 min.)

U.S. EPA Region VIII
999 18th Street, Suite 500
Denver, CO 80202-2405
Phone: 303-293-1603
Cost: Contact EPA Region VIII for cost and availability information

This video promotes source reduction and recycling as the best hazardous waste management options and includes success stories from industry, Federal agencies, and state and local government programs.

3. The Competitive Edge (17:50 min.)

Ontario Waste Management Corporation,
1989
2 Bloor Street West, 11th Floor
Toronto, Ontario, Canada M4W3E2
Phone: 416-923-2918
Cost: \$24 (available only from the producer)

The video is designed to acquaint employess with the industrial auditing process by explaining the six steps of an audit in clear and simple terms.

4. Pollution Prevention: The Bottom Line (24 min.)

Coastal Video Communications Corporation
3083 Brickhouse Court
Virginia Beach, VA 23452
Phone: 800-767-7703
Cost: \$195

The video includes interviews with official of major international corporations and deals with environmental legislation, cost motivation, and the identification and implementation of pollution prevention techniques.

5. Reducing Waste in the Workplace (24 min.)

Coastal Video Communications Corporation
3083 Brickhouse Court
Virginia Beach, VA 23452
Phone: 800-767-7703
Cost: \$495

This video discusses materials handling and inventory control, equipment operations and scheduling, cleaning and maintenance, and waste collection and management.

6. Waste Not...Want Not (15 min.)

U.S. EPA Region IV, 1989
345 Courtland Street, N.E.
Atlanta, GA 30365
Phone: 404-347-7109
Cost: Contact EPA Region IV for cost and availability information

The video presents EPA's waste management hierarchy, led by source reduction and recycling, to handle the current municipal solid waste crisis.

7. Waste Reduction Assessment Opportunities
(32 min.)

Tennessee Valley Authority, University of
Tennessee-CIS
University of North Carolina Asheville-EQI,
1989

Attention: Carroll Duggan
Waste Technology Program
2F 71B Old City Hall Building
Knoxville, TN 37902
Phone: 615-632-3160
Cost: \$25

This video summarizes the multimedia waste reduction assessment procedure and its application at several businesses.

8. Why Waste? Waste Minimization for Today's Businesses
(28 min.)

California Department of Toxic Substances
Control, 1990

Attention: Kathy Varwick
Alternative Technology Division
Technology Clearinghouse Unit
P.O. Box 806
Sacramento, CA 95812-0806
Phone: 916-324-1807
Cost: \$15

The video defines waste minimization and illustrates waste reduction successes in several different types of businesses.