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Subject Area: **Pollution Prevention and Waste Minimization**

Contents: Pollution Prevention and Waste Minimization

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

| Section | Overview of Content (see section for full process) |
|---|---|
| Introduction 1. Planning and Designing Work Activities to Minimize Waste | <ul style="list-style-type: none"> Identify wastes that will be generated during work activities. Investigate opportunities for pollution prevention, waste minimization, and resource conservation. Incorporate identified techniques into work activities. |
| 2. Purchasing Products with Recycled Content | <ul style="list-style-type: none"> Use recycled paper products. Purchase items on the Products Requiring Recycled Content list. |
| 3. Reducing Waste in Work Activities | <ul style="list-style-type: none"> Identify all wastes, effluents, and emissions in work plans. Implement practices that eliminate or reduce waste generation. Segregate wastes and recycle in designated containers. Reuse, recycle, or dispose of wastes according to work plans. |
| Definitions | |
| Exhibits Pollution Prevention Techniques | |
| Products Requiring Recycled Content | |
| Forms None | |

Training Requirements and Reporting Obligations

This subject area does not contain training requirements.

This subject area may or may not contain reporting obligations. See the subject area until obligations are listed here.

References

REFERENCES

BNL Radiation Control Manual

[Chemical Management System](#)

[ES&H Standard 1.3.5, Planning and Control of Experiments](#)

[ES&H Standard 1.3.6, Work Planning and Control for Operations](#)

[General Procurement Information](#)

[Pollution Prevention](#) Web page

Standards of Performance

All staff and guests shall comply with applicable Laboratory policies, standards, and procedures, unless a formal variance is obtained.

Managers shall ensure that work is planned to prevent pollution, minimize waste, and conserve resources, and that work is conducted in a cost-effective manner that eliminates or minimizes environmental impact.

All staff and users shall identify, evaluate, and control hazards in order to ensure that work is conducted safely and in a manner that protects the environment and the public.

All staff and users shall ensure that environmental effluents, emissions, and wastes associated with their work are as low as reasonably achievable (also referred to as "E-ALARA").

Management System

This subject area belongs to the management system.

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Introduction: Pollution Prevention and Waste Minimization

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

This subject area describes how staff plan, conduct, and closeout their work activities to eliminate or minimize the impact of their activities on the environment. The following topics are discussed in this subject area:

- Reducing or eliminating wastes, effluents, and emissions
- Conserving natural resources
- Procuring recycled products
- Reusing or recycling materials

Brookhaven National Laboratory (BNL) is committed to integrating environmental stewardship into all facets of our mission. This stewardship includes integrating pollution prevention, waste minimization, resource conservation, and environmental compliance into all of our planning and decision-making. Cost-effective practices are used to eliminate, minimize, or mitigate environmental impacts.

This subject area implements, in part, the Laboratory's Policies and Standards of Performance related to environment, safety, and health commitments.

Although this subject area discusses the waste-minimization aspects of the following topics, it does not address their full scope; that information is detailed elsewhere:

- The management, permitting, or disposal of wastes, effluents, and emissions (see also BNL environmental compliance subject areas)
- The general procurement process (see [General Procurement Information](#))
- The management of all the aspects of projects, experiments, and other work activities.

The Laboratory's goal for pollution prevention/waste minimization is to decrease facility wastes, effluents, and emissions over time, including the following items:

- The quantities (by weight) of solid waste (trash) sent to the landfill.
- The quantities of hazardous, radioactive, and mixed waste that are generated at BNL.
- The total airborne and waterborne radiological and non-radiological contamination.

In addition, Department-level goals are being developed that support these Laboratory goals.

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1. Planning and Designing Work Activities to Minimize Waste

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to all staff, visitors, vendors, and contractors. It applies to the planning and design of projects, experimental work, and all other types of work activities.

Required Procedure

All BNL staff take the following actions.

| | |
|---------------|---|
| Step 1 | Identify any wastes, effluents, and emissions that will be generated during the project, experiment, or other work activity so that they can be minimized to the extent practicable. |
| Step 2 | Determine the costs for managing and disposing of the wastes, effluents, and emissions. Ensure that adequate funding is available for waste disposal. |
| Step 3 | Investigate opportunities for pollution prevention, waste minimization, and resource conservation. See Pollution Prevention Techniques for types of activities to consider. Note: Contact your Environmental Compliance Representative (ECR) or the Pollution Prevention Coordinator for assistance in identification of pollution prevention opportunities. Funding is often available to support cost-effective ways to minimize waste and prevent pollution. See the Pollution Prevention Web page for more information. |
| Step 4 | Incorporate technically and economically feasible techniques for pollution prevention, waste minimization, or resource conservation into your work. <ul style="list-style-type: none"> • For experiments, document the techniques in the ES&H review of the experiment (see ES&H Standard 1.3.5, "ES&H Review of Experiments"). • For projects, document the techniques in the project plan. • For new facility designs or facility modifications, incorporate pollution prevention techniques into design specifications. • For other work, document the techniques in any written plans or other documents (see ES&H Standard 1.3.6, "Work Control"). |

Guidelines

Before purchasing new equipment or materials, look for existing equipment or material that is available for reuse from the following sources:

- Within your own group
- Outside your immediate group (e.g., the Laboratory's [Chemical Management System](#) or Supply and Materiel)
- Outside the Laboratory (e.g., the EPA EnviroSense webpage)

In all situations, consider purchasing and using environmentally preferable products (see Section 2: [Purchasing Products with Recycled Content](#)) and products that are designed to minimize the use of natural resources and waste generation.

A Pollution Prevention Opportunity Assessment (PPOA) can be conducted to identify ways to minimize waste and prevent pollution. Funding often is available to conduct the assessment. For additional information, contact the [Pollution Prevention Coordinator](#) or see the [Pollution Prevention](#) Web page.

References

[Chemical Management System](#)

ES&H Standard 1.3.5i, "ES&H Review of Experiments"

ES&H Standard 1.3.6, "Work Control"

[Pollution Prevention](#) Web page

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2. Purchasing Products with Recycled Content

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to staff, visitors, vendors, and contractors.

Required Procedure

All BNL staff take the following actions.

| | |
|---------------|--|
| Step 1 | When purchasing paper (including all forms of office paper, cover stock, envelopes, and manila folders), use products that contain no less than 30% post-consumer or 50% recycled content. |
| Step 2 | When purchasing new equipment or materials, review the Products Requiring Recycled Content list. You are required to purchase these items unless you can provide written justification for taking exception (e.g., price, performance, and availability). For assistance, contact the Pollution Prevention Coordinator . |

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3. Reducing Waste in Work Activities

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

Applicability

This information applies to all staff, visitors, vendors, and contractors as they conduct their normal work activities.

Required Procedure

All BNL staff take the following actions.

| | |
|---------------|--|
| Step 1 | Ensure that your work plans have adequately identified all wastes, effluents, and emissions. |
| Step 2 | Implement work practices that eliminate or reduce the generation wastes, effluents, and emissions. See Pollution Prevention Techniques for types of activities to consider. |
| Step 3 | Appropriately segregate wastes that are generated (e.g., nonhazardous materials from hazardous materials and nonradioactive materials from radioactive materials). See the BNL Radiation Control Manual. |
| Step 4 | Recycle office waste in designated containers. For information on recycling office wastes, see the Pollution Prevention web page. |
| Step 5 | As experiments or projects end, ensure that all hazardous materials are properly labeled and identified. Reuse, recycle, or dispose of all wastes appropriately in accordance with your project, experiment, or work plan. |

Guidelines

Before purchasing new equipment or materials, look for existing equipment or material that is available for reuse from the following sources:

- Within your own group
- Outside your immediate group (e.g., the Laboratory's [Chemical Management System](#) or Supply and Materiel)
- Outside the Laboratory

In all situations, consider purchasing and using environmentally preferable products and products that are designed to minimize the use of natural resources and waste generation.

If you have made significant strides in minimizing waste, preventing pollution, or conserving natural resources,

you can report those successes through the Pollution Prevention Web page. Information that is submitted will be used to document the Laboratory's success in meeting its waste minimization goals.

A Pollution Prevention Opportunity Assessment (PPOA) can be conducted to identify ways to minimize waste and prevent pollution. Funding often is available to conduct the assessment. For additional information, contact the [Pollution Prevention Coordinator](#) or see the [Pollution Prevention](#) Web page.

References

BNL ESH Standards 6.1.1, 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.2.0, 6.2.1, and 6.2.2

BNL Radiation Control Manual

[Chemical Management System](#)

[Pollution Prevention](#) Web page

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Pollution Prevention Techniques

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

Preventing pollution, minimizing waste, and conserving resources can save money, time, effort, and while creating a safer workplace. Some of the techniques that should be considered are listed below.

- Conduct a Pollution Prevention Opportunity Assessment (PPOA) of the process to identify any techniques that could reduce or eliminate wastes. A PPOA is a systematic evaluation that uses a number of structured problem-solving and decision making tools that will identify pollution prevention opportunities and determine cost effectiveness (contact the Pollution Prevention Coordinator or ECR for assistance).
- Use materials that are less hazardous by substituting more environmentally friendly products for hazardous ones. Material substitution techniques are particularly useful in part washing operations.
- Purchase only the amounts needed. Investigate availability of excess materials before procuring new hazardous materials.
- Label hazardous materials and segregate hazardous materials from non-hazardous materials.
- Investigate ways to modify processes or procedures to generate less waste.
- Consider microscale chemical techniques that use only very small samples and small amounts of chemicals. Microscale glassware and instrumentation has been developed for many common analytical procedures.
- Investigate ways to reuse or recycle materials within your workgroup, or in coordination with other groups.
- When several products meet your needs, select the one with the least environmental impact.

For radiological operations:

- Segregate and label radioactive materials by using conspicuous color-coding.
- When possible, select radionuclides with short half-lives.
- Don't simply assume all materials in radiological areas are contaminated. Survey the area and segregate clean materials.
- Decontaminate wastes that are radioactive due to removable surface contamination by wiping, washing, or other means (if the resulting decontamination wastes are less volume than the original contaminated item).
- When items are partially contaminated, consider cutting out only the contaminated portion for radioactive disposal.
- Use reusable protective clothing (e.g., lab coats or rubber booties) that can be cleaned and reused.
- Convert laboratory processes that generate mixed or low-level radioactive waste to microscale.
- Consider non-radiological procedures (e.g., chemoluminescent procedures) to replace radiological procedures
- Neutralize radioactive acids or bases to a pH between 6 and 8; if the pH was the only characteristic making the waste a mixed waste they then can be disposed of as low-level radioactive waste.
- For liquid scintillation counting, use 7-ml mini-vials instead of 20-ml vials to achieve a three-fold reduction in LSC waste generation.
- Consider using 'biodegradable' liquid scintillation fluid in lieu of pseudocumene based cocktails. New biodegradable cocktails are less toxic, non-flammable and not regulated as mixed waste (wastes still must be collected for disposal).
- Use lead-free solder and low mercury fluorescent bulbs in activation areas.

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| Product | Required Content |
|---|-----------------------------------|
| Office Products | |
| Paper (all forms of office paper, cover stock, envelopes, manila folders) | 30% post-consumer or 50% recycled |

Recommended Purchases:

| Product | Recommended Content |
|-----------------------------------|---|
| Office Products | |
| Binders - Paperboard | 80% post-consumer |
| Binders - Plastic | 25% recycled |
| Desktop Accessories - Plastic | 25% post-consumer polystyrene |
| Diskettes | electronically cleaned diskettes - not required but available |
| Facial Tissue | 5% post-consumer |
| Ink Jet Cartridges | refilled ink jet cartridges - not required but available |
| Plastic Envelopes | 25% post-consumer with total of 35% recycled plastic |
| Printer Ribbons | reinked/reloaded printer ribbons |
| Toner Cartridges | recharged/remanufactured (need DiaNippon drums to provide good quality) |
| Janitorial Products | |
| Paper Napkins | 30% post-consumer |
| Paper Towels | 40% post-consumer |
| Recycling Containers - Office | 20% post-consumer plastic or 25% post-consumer steel |
| Toilet Tissue | 20% post-consumer |
| Trash Bags - Plastic | 10% post-consumer |
| Trash Receptacles - Office | 20% post-consumer plastic or 25% post-consumer steel |
| Building Insulation | |
| Cellulose Loose Fill and Spray On | 75% post-consumer paper |
| Fiberglass | 20% glass cullet |
| Foam-in-Place | 5% recycled |

| | |
|--|---|
| Glass Fiber Reinforced | 6% recycled |
| Perlite Composite Board | 23% post-consumer paper |
| Phenolic Rigid Foam | 5% recycled |
| Plastic Rigid Foam, Polyisocyanurate/Polyurethane: Rigid Foam | 9% recycled |
| Rock Wool | 75% slag |
| Construction Products | |
| Carpet - Polyester | 25% PET |
| Cement and Concrete | possible 0-40% coal fly ash ; 25%-50% ground granulated blast furnace slag |
| Dividers - Restroom and Shower | 20% post-consumer plastic or 10% post-consumer with total of 27% recycled steel |
| Fiberboard - Structural | 80% recycled |
| Floor Tiles and Patio Blocks | 90% post-consumer rubber or 90% recycled plastic |
| Paint - Latex | 50% post-consumer |
| Paperboard - Laminated | 100% post-consumer |
| Patio Blocks | 90% recycled rubber or plastic |
| Landscaping Products | |
| Edging - Lawn and Garden | 30% post-consumer plastic/rubber |
| Hoses - Garden and Soaker | 60% post-consumer plastic/rubber |
| Hydraulic Mulch | 100% post-consumer paper-based or 100% recovered wood/paper wood-based |
| Yard Trimmings Compost | composting and use of compost instead of fertilizers and soil amendments recommended |
| Miscellaneous | |
| Pallets | 95% post-consumer wood or 100% post-consumer plastic or 50% post-consumer paperboard |
| Park and Recreation Products | |
| Playground Surfaces and Running Tracks | 90% rubber or plastic |
| Fencing - Snow | 60% post-consumer plastic with total of 90% recycled plastic |
| Transportation Products | |
| Channelizers | 25% post-consumer plastic; 100% post-consumer rubber base |
| Delineators - Flexible | 25% post-consumer plastic; 100% post-consumer rubber base; 25% post-consumer steel base |
| Stops - Parking | 100% post-consumer concrete, plastic, or rubber |
| Traffic Barricades | 80% post-consumer content: <ul style="list-style-type: none"> • PETE (symbol: ) • HDPE (symbol: ) • LDPE (symbol: ) • Steel 100% fiberglass |

| | |
|---------------------------|--|
| Traffic Cones | 50% crumbrubber, LDPE (symbol:  LDPE), PVC |
| Vehicular Products | |
| Engine Coolants | reclaimed with only one base chemical |
| Lubricating Oils | 25% re-refined |
| Retread Tires | should meet Federal Specification ZZ-T-381 |

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Definitions: Pollution Prevention and Waste Minimization

Effective Date: **March 1999**

Point of Contact: [Pollution Prevention Coordinator](#)

| Term | Definition |
|--|--|
| Chemical Management System | A database that tracks surplus chemicals stored across the BNL site that are available for use by others in lieu of purchasing new materials. For more information, see the Chemical Management System (CMS) Web site. |
| design for environment | The process by which resource conservation and pollution prevention are considered during the design of an experiment, project, or other work activity, and are designed into the product or service. |
| effluent | Any treated or untreated liquid discharge from an experiment, laboratory, or building. (Note: This may include storm-water run-off.) |
| emission | Any treated or untreated discharge to the atmosphere from an experiment, laboratory, or building. |
| environmentally preferable buying | The process by which products with recycled content are purchased in lieu of other products containing no recycled content. The BNL goal is to purchase 100% of the recycled products designated by the U.S. Environmental Protection Agency if the product meets cost, availability, and performance criteria. |
| hazardous waste | By-product of certain BNL processes and activities that can pose a substantial or potential hazard to human health or the environment when improperly managed. Hazardous waste possesses at least one of four characteristics (ignitability, corrosivity, reactivity, and toxicity), or appears on special EPA lists. |
| life-cycle cost | The cost of a piece of equipment or material from creation through use and disposal. |
| pollution prevention | The reduction or prevention of a hazardous substance, pollutant, or contaminant from entering a waste stream or otherwise from being released to the environment before recycling or treatment. Pollution prevention techniques focus on preventing waste from ever being created (i.e., source reduction) and include measures like material substitution, process changes, inventory control, preventative maintenance, and improved housekeeping. |
| Pollution Prevention Opportunity Assessment (PPOA) | A systematic evaluation and appraisal of a process, activity, or operation to identify potential opportunities to reduce or eliminate wastes, effluents and/or emissions. For more information on the PPOA program, see the Pollution Prevention Web site. |
| Pollution Prevention Program | A program that includes preventing or reducing the generation of pollutants, contaminants, hazardous substances, or wastes at the source, as well as reducing the amount of waste for treatment, storage, and disposal through reuse or recycling. For more information, see the Pollution Prevention Web site. |

| | |
|--------------------|---|
| waste minimization | An approach that focuses on preventing or reducing the generation of pollutants, contaminants, hazardous substances, or wastes. Techniques of waste minimization focus on reuse, volume reduction, and recycling. |
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Revision History: **Pollution Prevention and Waste Minimization**

Point of Contact: [Pollution Prevention Coordinator](#)

Revision History of this Subject Area

| Date | Description | Management System |
|------------|-----------------------------|---------------------------------|
| March 1999 | This is a new subject area. | Environmental Management System |

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