Pollution Prevention Opportunities for the Oil Field Service Industry

Alaska Department of Environmental Conservation
Pollution Prevention Office
Anchorage, Alaska

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The Alaska Department of Environmental Conservation Pollution Prevention Office provides non-regulatory technical assistance on waste reduction and recycling to businesses and communities throughout Alaska.

The Alaska Support Industry Alliance is a nonprofit Alaskan business organization which promotes the responsible development of Alaska’s oil, gas and mineral resources. Members include oil field service companies and other organizations that have relationships with the petroleum and mining industries.
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INTRODUCTION

Why Prevent Pollution?

The costs of waste management are very high in the oil industry, particularly in Prudhoe Bay, because of extreme arctic conditions which limit disposal and cleanup options, and the high costs of transportation to the lower 48. These costs include:

- purchase, treatment, and disposal of hazardous chemicals
- regulatory compliance
- employee training
- cleanup of spills and contaminated pads

Cleanups of contaminated pads and chemical spills in the Prudhoe Bay area have proven very costly. The cost to ship out one 55 gallon drum of hazardous waste ranges from $500 to $1000. Since 1987, the oil industry and the State of Alaska have conducted several major cleanups in Prudhoe Bay, including Service City, Child's Pad and Forward Pad. Combined cleanup costs are estimated to be over $2.5 million. Expenditures on waste cleanup activities take away from investments in other oil field activities.

Preventing these problems can save your company money on waste management costs and protect the environment. This resource guide is designed to introduce the concept of pollution prevention and provide examples of these activities in the oil field service industry.

The guide has been written for oil industry workers, government agency staff, and interested citizens. After reading this guide, you will have a better understanding of common pollution prevention techniques used in the oil industry. Additional resources are provided for further study.
BACKGROUND

Government and Industry Efforts

In the fall of 1991, the Alaska Department of Environmental Conservation (ADEC) Pollution Prevention Office and the Alaska Support Industry Alliance (The Alliance) agreed to work cooperatively to identify and implement pollution prevention practices within the oil field service industry. A working committee of representatives from ADEC, The Alliance, BP Exploration (Alaska) Inc., ARCO Alaska, Inc., the North Slope Borough, Alyeska Pipeline Service Company, and the United States Environmental Protection Agency (EPA) meets monthly to design and implement pollution prevention projects on the North Slope. The Prudhoe Bay Environmental Alliance provides active support for these efforts by offering a monthly forum for information exchange and training among contractors in Deadhorse.

The committee identified the following wastes as priority concerns of the Deadhorse community:
- lead-acid batteries
- oily waste water
- used oil
- ethylene glycol antifreeze

Cooperative efforts to reduce these waste problems are ongoing. Additional projects of this committee include the development of a product substitution guide and the Alaska Materials Exchange (see p.13).

This resource guide is a product of this committee. Success stories describing innovative pollution prevention practices are included in Section 4. These examples have been provided by workers in the North Slope oil fields. Contact names are included for further information.
SECTION ONE

What is Pollution Prevention?

Pollution prevention means eliminating or reducing at the source the use, generation, or release of toxic chemicals, hazardous materials or solid waste. It requires a review of business activities from start to finish, in order to make changes that avoid the creation of waste, rather than managing waste after it has been generated.

Examples of pollution prevention techniques include:
- Elimination of chlorinated solvents through product substitution
- Use of water-based muds as an alternative to oil-based muds
- Directional drilling to reduce environmental impacts
- Spill prevention programs

This concept can be applied to all aspects of oil field operations, such as drilling, acid mixing, facility design, fluid transfer, and vehicle maintenance (see Table 1).

Pollution Prevention Versus Pollution Control
Pollution prevention is not the same as pollution control. Pollution control means reducing waste after it has been created, rather than avoiding its creation in the first place.

Examples of pollution control techniques include:
- Cleaning of contaminated gravel
- Mitigation of damage caused by a chemical spill

In some cases pollution control is the only feasible option. Whenever possible, pollution prevention is emphasized as a new approach to apply in the design and implementation of a variety of projects. The EPA, ADEC, many oil companies and other major U.S. corporations endorse the use of a waste management hierarchy to guide decision-making as follows: source reduction is the strategy of first choice, followed by recycling, treatment, and as a last resort, environmentally sound disposal.

Waste Management Hierarchy: Preferred Choices

Recycling can be a very effective form of waste reduction when source reduction is not possible. This guide highlights some of the extensive recycling efforts that have been undertaken in the Prudhoe Bay area. Recycling of paper, aluminum, batteries, cardboard, and a variety of other materials has been very successful.
**Table 1: Pollution Prevention Options for the Oil field Service Industry**

<table>
<thead>
<tr>
<th>Business Activity</th>
<th>Type of Waste Generated</th>
<th>Pollution Prevention Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Maintenance</td>
<td>Lead-acid batteries</td>
<td>Recharge/Recondition batteries or recycle.</td>
</tr>
<tr>
<td></td>
<td>Oil filters</td>
<td>Extend oil change out intervals through oil analysis.</td>
</tr>
<tr>
<td></td>
<td>Antifreeze</td>
<td>Purchase reusable oil filters.</td>
</tr>
<tr>
<td></td>
<td>Solvents</td>
<td>Recycle antifreeze.</td>
</tr>
<tr>
<td></td>
<td>Used Oil</td>
<td>Keep lid on parts washer to avoid solvent evaporation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Purchase citrus-based solvents.</td>
</tr>
<tr>
<td>Fluid Transfer</td>
<td>Oil, fuel, and chemical spills</td>
<td>Use portable surface liner as specified in North Slope Unified Operating Procedure.</td>
</tr>
<tr>
<td>Purchasing and Materials Management</td>
<td>Obsolete inventory stock</td>
<td>Institute inventory control program through centralized purchasing.</td>
</tr>
<tr>
<td></td>
<td>Unused materials</td>
<td>Order materials in containers sized to use.</td>
</tr>
<tr>
<td></td>
<td>Delivery and receiving spills</td>
<td>Ensure secondary containment for hazardous materials.</td>
</tr>
<tr>
<td></td>
<td>Spills from improper storage</td>
<td>Utilize recyclable containers that can be returned to vendor.</td>
</tr>
<tr>
<td>Painting and Stripping</td>
<td>Sludge</td>
<td>Use water-based paints.</td>
</tr>
<tr>
<td></td>
<td>Paint thinner</td>
<td>Train employees to apply efficiently.</td>
</tr>
<tr>
<td></td>
<td>Solvent</td>
<td>Reduce overspray by proper use of spray gun.</td>
</tr>
<tr>
<td></td>
<td>Paint waste</td>
<td>Mix only what is needed.</td>
</tr>
<tr>
<td></td>
<td>Evaporative losses</td>
<td>Use up paint completely.</td>
</tr>
<tr>
<td></td>
<td>Bad batch</td>
<td></td>
</tr>
<tr>
<td>Vehicle Washing</td>
<td>Oily water</td>
<td>Install oily water recycling systems which includes oil water skimmer.</td>
</tr>
<tr>
<td></td>
<td>Sludge</td>
<td>Wash only when necessary.</td>
</tr>
<tr>
<td>Facility Design and Construction</td>
<td>Poor design may result in:</td>
<td>Install concrete floor.</td>
</tr>
<tr>
<td></td>
<td>Spills</td>
<td>Install secondary containment for hazardous materials.</td>
</tr>
<tr>
<td></td>
<td>Poor separation of hazardous chemicals</td>
<td>Design building to segregate wastes.</td>
</tr>
<tr>
<td>Facility Operation and Maintenance</td>
<td>Spills resulting from poor operation and maintenance</td>
<td>Develop quality assurance and preventive maintenance program.</td>
</tr>
<tr>
<td>Drilling</td>
<td>Lead, other materials in pipe dope</td>
<td>Use non-metallic dope.</td>
</tr>
<tr>
<td>Mixing of Acids, Muds, Brines</td>
<td>Spills of acids and other materials</td>
<td>Design system so mixing is done automatically through computer system.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Design system so mixing takes place indoors where there is secondary containment.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filter, recycle and reuse materials prior to disposal.</td>
</tr>
</tbody>
</table>
SECTION TWO

Benefits of Pollution Prevention for the Oil Field Service Industry

Economic benefits
Pollution prevention can result in decreased costs for transportation, treatment, cleanup and disposal of chemicals. It may reduce insurance liability by providing a safer work environment, and may also save money on materials and equipment.

Competitive benefits
Pollution prevention can increase operational efficiency. An emphasis on pollution prevention shows your customers that you run an efficient business. It may help you to secure contracts as important customers recognize that you run a high quality operation. It also provides an opportunity to gain ground floor access to new methods and materials through pollution prevention technology and grants.

Regulatory benefits
Pollution prevention may help to streamline the permitting process as well as reduce the need for future regulation. It can also reduce long-term liabilities associated with improper waste management.

Community relations benefits
These activities draw positive attention to your company and may reduce the chance of litigation. The Annual North Slope Environmental Achievement Awards provide public recognition of companies which have shown innovation in environmental management and pollution prevention.

Worker safety benefits
Pollution prevention techniques can reduce worker exposure to toxic substances by substituting non-toxic products in place of toxic chemicals.

Environmental benefits
These techniques reduce the potential of chemical releases that can have harmful effects on the environment and public health.

Personal benefits
Pollution prevention can provide personal benefits to you as an employee in the oil field service industry. By working pro-actively on pollution prevention in your company, you can save money, create a cleaner work place, and protect the environment. These activities can bring a great sense of pride and personal satisfaction.
SECTION THREE
What are the Techniques of Pollution Prevention?

Pollution prevention can be accomplished through a variety of different techniques which involve changes in human behavior, materials, equipment, technology, or some combination of these factors. These techniques include:

- Improved operating practices
- Technology changes through process and equipment
- Product reformulation/materials substitution
- In-process recycling/reuse and materials exchange

A key to successfully achieving pollution prevention is making the commitment to carefully review all business operations with an eye toward waste reduction so that promising techniques can be identified and implemented. Section Five provides an overview of the steps in conducting a comprehensive waste reduction assessment.

Pollution prevention techniques can be incorporated into design, construction, and operations and maintenance. This section proves an introduction to these techniques. Section Four follows with examples of pollution prevention success stories from the North Slope oil fields.

Improved Operating Practices
Improved operating practices are often the simplest and least expensive means of achieving pollution prevention. This category includes improved housekeeping, purchasing and inventory control, materials management, leak and spill prevention, and training. It may also include changes in management philosophy that allow for more employee contributions to pollution prevention, such as implementing quality improvement programs.

Improved Housekeeping
Examples of improved housekeeping procedures include the following actions:

- Inspect and maintain equipment routinely
- Replace seals and gaskets regularly
- Repair leaks as they occur
- Use tight fitting rings and bungs on containers to minimize evaporation and spillage
- Use spigot or pumps to prevent spills
- Perform preventive maintenance routinely
Preventive maintenance schedules should be reviewed periodically to ensure that equipment is not being “over maintained.”

**Purchasing and Inventory Control**

*The company representative in charge of purchasing is a key player in waste reduction.* Therefore, purchasing staff should be involved in waste reduction planning to help reduce the use and waste of toxic materials. Examples of purchasing and inventory control practices include:

- Purchase and use toxic substances only as needed
- Purchase non-toxic products, if available
- Set up an inventory tracking system to avoid over purchase of materials in different parts of a facility
- Avoid overstock of raw materials, especially those with a short shelf life
- Purchase materials in containers sized to the amounts you plan to use
- Maintain records of toxic substance purchases for reporting purposes and to understand trends in usage
- Maintain current Material Safety Data Sheets (MSDS)
- Review MSDS sheets prior to purchase to ensure that the product is compatible with your process and safe for workers
- For materials used in large quantities, purchase in bulk storage containers and/or reusable totes to avoid the need for drum disposal
- Don’t accept free samples of materials unless you know you will use them, to avoid future disposal costs

**Materials Management**

Improved materials management provides an easy and low cost way to reduce waste. Good materials management practices include:

- Space rows of drums appropriately to allow for easy transfer and inspection for damage or leaks
- Stack containers according to manufacturer’s instructions to reduce tipping, puncturing, or other damage
- Segregate each toxic substance, hazardous waste and non-hazardous waste to avoid cross-contamination, mixing of incompatible materials, and unwanted reactions and to facilitate materials exchange, recycling, or reclamation
- Store containers on pallets to prevent corrosion which can result from containers contacting concrete floors. Add containment berms to capture and contain leaks or spills
- Keep aisles free of obstructions
- Clearly label containers with information on contents, handling, storage, expiration dates, and health and safety hazards
Spill and Leak Prevention
A comprehensive spill prevention program saves money in both product and cleanup costs. To reduce the potential for leaks and spills:

- Use storage tanks and vessels only for their intended purposes
- Install leak detection equipment and train employees to use it
- Install spill containment equipment and train employees to use it
- Wipe up spills whenever possible rather than hosing down an area
- Maintain the integrity of tanks and containers
- Control the loading, unloading, and transfer of all hazardous substances
- Ensure that all hoses and gaskets are properly fitted prior to receiving and dispensing fuels and other liquids
- Install secondary containment around tanks or storage areas to limit spills

Training
A comprehensive training program is a cornerstone to effective implementation of pollution prevention practices in your company. This can include informal training sessions at staff meetings, as well as formal classroom and field training sessions.

Alaskan Success Stories of these techniques are found in Section Four, pages 15-21.

Technology Changes
Process and/or equipment changes can be effective pollution prevention measures. Old or inefficient processes often result in excess use of toxic substances and excess generation of hazardous wastes. The installation of new processes and/or equipment can result in improved efficiency, safety, and lowered costs. Examples of process changes include:

- automate to reduce accidental releases and control quality
- conserve water and energy to reduce waste generation
- improve scheduling of processes or dedication of equipment to certain processes to minimize the amount of cleaning needed, especially in painting operations
- test solvent baths to determine whether they need changing rather than changing them according to a schedule
Equipment changes may include **redesign** to reduce the likelihood of spills, and installation of equipment to recycle materials such as solvents and antifreeze.

Alaskan Success Stories of these techniques are found in Section Four, pages 22 and 23.

**Product Reformulation/Materials Substitution**

Hazardous wastes may be reduced by changing a product’s formula so that a toxic or hazardous ingredient is replaced with a less toxic or hazardous material. This technique is called product reformulation. Water-based paints are an example of a product that has been reformulated to eliminate the solvents found in oil-based paints.

Materials or product substitution can reduce or eliminate the amount of toxic materials being used and disposed of in the exploration and production process. Substitution of citrus-based solvents and water-based cleaning systems for chlorinated solvents used in parts cleaning is one of the common materials changes occurring in the oil field service industry.

Carefully evaluate substitute products. *These substitutes may be less hazardous than the original product, but they are not risk free, and should be handled by trained personnel. Wastes generated from the use of these substitutes may be regulated by federal or state laws.*

Alaskan Success Stories of these techniques are found in Section Four, pages 24 and 25.

**In-process Recycling/Reuse**

In-process recycling and reuse can improve efficiency and reduce the cost of waste disposal. Rather than disposing of a material after a one-time use, the material is **reprocessed** so it can be used again. This technique has been used in the oil field to reuse well fluids as well as to conserve water.

North Slope workers have implemented successful programs to recycle lead-acid batteries, aluminum, paper, cardboard and scrap metal. These materials are collected and shipped to the lower 48 for recycling.

Alaskan Success Stories of these techniques are found in Section Four, pages 26-31.
Materials Exchange

A materials exchange program can help to conserve resources, energy and land fill space by assisting businesses in finding alternatives to the disposal of useful materials or wastes. The materials exchange provides an information clearinghouse for businesses to list materials wanted and available. Type of materials listed include:

- Out of date/overstock chemicals
- Pallets and wood
- Containers/packaging materials
- Used office/electronic equipment
- Construction materials
- Paints and coatings
- Metals
- Plastic
- Oils
- Paper products

One company can often use another company’s wastes. Materials exchanges are mutually beneficial: the buyer saves on raw material costs and the seller saves on disposal costs. These exchanges do not absolve companies of liability for materials. Therefore, it is important to make sure that exchanges are made with responsible businesses.

An Alaska Materials Exchange program has recently been established as a cooperative effort of the Alaska Support Industry Alliance, the DEC Pollution Prevention Office, ARC0 Alaska, BP Exploration, the U.S. Environmental Protection Agency and the Anchorage Chamber of Commerce. To participate in this program, contact:

Alaska Materials Exchange Program
Anchorage Chamber of Commerce
441 West 5th Ave., Suite 300
Anchorage, AK 99501
(907) 272-2401.
This section includes success stories of innovative pollution prevention practices. These examples have been provided by workers in the North Slope oil fields. Contact names are included for further information.

This is just a sampling of the many pollution prevention success stories that can be found in the oil and gas industry on the North Slope. We would like to know your success story for future publications like this one.

To submit your story, fill out the form on the inside back cover of this publication.
Dowell/Schlumberger-Facility Reconstruction Allows Design for Prevention

In 1990, a fire destroyed the operations building of the Dowell/ Schlumberger facility in Deadhorse. In reconstructing the building, efforts were made to design a building with spill prevention in mind. For example, acid storage tanks were located inside the building to reduce the risk of acid spills. A coded concrete containment structure was installed, with a double liner and a design to allow for visual leak detection on a periodic basis.

Dowell Schlumberger has replaced drums with reusable 300 gallon tote containers wherever volume has been adequate to justify this change. Also, 6,300 gallon “iso” tanks are used for large volume chemicals.

Dowell/ Schlumberger has also begun to recycle lubricating oils on their triplex pumps. In the past, 150 gallons of oil were used per job. Now this oil is recycled through a strainer reservoir that was fabricated on-site. Benefits of this system include: reduced spill potential, reduced labor requirements to keep pumps full of oil, and fewer burned out pumps. This system cost approximately $1000 and has a payback of less than one year.

In addition, the new building contains a waste water recycling system (including filtration, oil skimming and chlorination) which allows truck wash water to be reused. This system has significantly reduced the volume of water used and disposed.

Contact: Roger Keese
Field Engineer
659-2434
Prudhoe Bay Seawater Treatment Plant Sets Goal of “Drum-Free in ’93”

The Seawater Treatment Plant in Prudhoe Bay has set an ambitious goal to be “drum free in ’93.” After years of purchasing chemicals and oils in 55 gallon drums, the employees at this facility are taking the steps to save money and reduce waste by eliminating this type of container. 55 gallon drums are costly and difficult to manage, as they are not reusable and must be cleaned and disposed of properly.

In order to eliminate drums, employees have completed an inventory of all chemicals and oils at the facility. Reusable liquid totes and bulk storage containers have been purchased. Chemicals no longer in use have been returned to the warehouse for disposal or use at other facilities. Chemicals used in small quantities will be purchased in five gallon containers to avoid overstocking.

This measure will eventually save the facility money through improved inventory control and materials management, but is designed primarily as a waste reduction and accident prevention program.

Contact: Brad Gerken
ARC0 Alaska, Inc.
2651463
Field-wide Spill Prevention Encouraged by Unified Operating Procedure

In 1991, the Alaska Support Industry Alliance worked with BP and Arco to form a committee to evaluate consistency in health, safety and environmental procedures across the Prudhoe Bay operating area. BP originated the Spill Reduction Task Force to focus specifically on how to reduce spills through emphasizing prevention techniques and standardizing procedures throughout the operating areas.

BP worked with a contractor to design surface liners that meet the needs of field workers. Two types of portable surface liners have been designed and built, sized 18" x 18" and 4' x 5'. These liners are to be used whenever fuels are transferred. They are easy to handle and can be stored on vacuum trucks, fuel trucks, tankers, power generators, and pick up trucks. BP and ARGO jointly developed a field-wide North Slope Unified Operating Procedure on surface liner and drip pan use to ensure proper use of this equipment to provide secondary containment, maintain contaminant-free work sites and to instill proper spill prevention techniques. The Alaska Support Industry Alliance encourages use of these surface liners by Deadhorse contractors.

This focused effort on spill prevention has resulted in some success in spill reduction. From 1991 to 1992, the number of spills was reduced by 52% and volumes by 84% in the Western Operating Area. Spills were up again in 1993. This points out the need to continually provide training and make people responsible for the spills they cause.

Contact: Ron Hocking/Chris Backlund
BP Environmental Superintendent
659-4452
BP Exploration Commits to Training for Environmental Excellence

BP Exploration has made a strong corporate commitment to achieving excellence in the areas of health, safety and environmental protection. To heighten employee awareness and understanding of this commitment, BP has developed an intensive training program, entitled “Achieving Environmental Excellence.” This program emphasizes adoption of best management practices, compliance with all laws and regulations, development and maintenance of well-planned strategies for spill prevention and response, and development of innovative solutions to waste minimization and pollution prevention.

The program is presented in two phases. Phase I includes an introductory presentation on the arctic environment and provides examples of BP’s initiatives to date in the areas of spill prevention and response, site cleanups, arctic research, and pollution prevention. Phase II provides more in-depth training to employees on the following topics: spill prevention, field operations, compliance, managing solid waste, pollution prevention at home and work, and key issues for managers. The program utilizes videos, manuals, overhead transparencies, and exercises as teaching techniques.

All employees and contractors are required to attend Phase I of the training. Phase II is required for employees whose jobs require in-depth knowledge of environmental issues. This includes all BP employees and contractors who work at Prudhoe Bay or Endicott. This program has been a major investment of time and money. BP Exploration believes that this effort is well worth it. By teaching employees to understand the value of effective environmental management, the likelihood of accidents and spills is reduced, and the costs to the company of the results of environmentally unsound practices are decreased.

Contact: Janet Platt
BP Exploration
564-5501
Halliburton Energy Services (formerly Otis Engineering)-
Company Commitment to Quality Results in Design for Spill Prevention

Otis Engineering has made a company-wide commitment to excellence in the areas of environment, safety, and service. Since 1990, Otis has reduced its North Slope spills more than 75% through a number of worker developed initiatives. In 1993, Otis received the Arctic Footprint and the Corporate Achievement awards in the North Slope Environmental Achievement Awards program for their creative efforts.

How did this all come about? In 1990, Otis implemented a corporate-wide quality improvement program. In 1991 and 1992, Otis set up Quality Improvement Teams to evaluate environmental, safety, and service issues. Employees are encouraged to come up with new ideas to improve performance in each area. The mission of the Otis Environmental Quality Improvement Team is to: evaluate and
prevent spills related to service equipment and personal performance, improve awareness and make recommendations that will result in environmentally sound operating procedures. This team includes a district superintendent, completion specialists, field operators, a division manager, and a field assistant. The team solicited ideas from all employees for environmental improvement, and met on a regular basis to discuss how to develop these ideas further.

This process resulted in several inventions, including the “scotty boot” and the stuffing box shroud, going beyond the design stage and being developed for use in service operations. Both of these inventions prevent oil from spraying out over the tundra. The oil is collected within these pieces of equipment and can be easily managed, rather than requiring clean-up of the area when the job is finished.

These inventions are now becoming part of standard operating procedures and other oil field service companies are implementing these techniques as well.

Cost savings are a result of these inventions and the quality approach. Otis employees believe that they are saving the oil companies money as a result of utilizing these simple device. The dollars previously spent on labor for clean-up of spills can now be used for other company needs.

Contact: Robert McDaniel
Manager, Health, Safety, and Environment
344-2929
Prudhoe Bay Drilling Begins
"Pallet-Free Sack-Free" Initiative

The "Pallet-Free Sack-Free Initiative" begun by Prudhoe Bay Drilling will eventually eliminate 60-70% of the pallets and sacks used at a typical well. This waste reduction will be achieved by converting to the use of bulk barite and gel at the rig sites. This program will also help to reduce occupational injuries and increase efficiency of receiving barite and gel by using "just in time" delivery. Prudhoe Bay Drilling is an alliance between BP, ARCO, and several well service and drilling contractors. MI Drilling, Baroid, and Halliburton are implementing the first phase of this venture.

The pilot program was initiated in 1994 in response to environmental and occupational health concerns. Barite is traditionally shipped to the North Slope in 100 pound sacks. This material is unloaded and reloaded at several locations, including the barite plant, in Seattle where it is packaged, and at rail yards in Seattle, Whittier and Fairbanks. Each time the material is transferred there is the possibility that sacks will be broken and injuries can occur. At the drill site, pallets and sacks make up a large proportion of wastes. In addition, the lifting of 100 pound sacks can cause serious back injuries.

For the pilot program, bulk barite is put into railroad tank cars and shipped to Fairbanks by rail and sea. Barite is then stored at Halliburton’s Fairbanks facility awaiting “just in time” delivery to Prudhoe Bay. The material is then trucked to the North Slope for use at a rig. The material is managed at the rig using a pneumatic system, which helps to prevent back injuries. This system is much more efficient, safer, and more environmentally sound than traditional handling operations for barite.

To implement this system, drilling rigs must be retrofitted at a cost of approximately $50,000 to $100,000 per rig. It is anticipated that the program will provide significant cost savings as a result of fewer occupational injuries and reduction in the generation of solid waste.

This pilot effort came about as a result of the “alliancing” of contractors now being implemented by BP Exploration. Because Halliburton, Baroid, and MI Drilling Fluids are working cooperatively rather than competitively, they were able to design a pilot program than benefitted all of them, but would not have been possible to implement individually.

Contact: Craig Bieber  T. Jay Olive  Lew Balest
MI Drilling Fluids  Baroid  Halliburton
274-5051  248-5390  344-2929
**Reusable Oil Filters increase Efficiency and Save Money**

Kuparuk vehicle maintenance has replaced disposable oil filters with reusable, cleanable filters for its 300 vehicle and heavy equipment fleet. The filters are made by Oberg and System I and some were custom-designed to meet Kuparuk specifications. A light on the dashboard shows when a filter clogs and goes to by-pass, indicating an immediate need for vehicle maintenance.

With the new filters, oil is still changed every 250 hours, but when the oil is replaced, the filters are removed and visually checked for evidence of wear metals. This inspection allows for immediate response to problems where the previous oil screening program required oil samples be sent off-site for analysis. The visual inspection program has been so successful that the oil screening program has been discontinued.

For small equipment the reusable oil filters had an 8 month payback and for heavy equipment the payback was three years. It is estimated that $45,000 of equipment engines has been saved due to immediate response to problems that are detected earlier with reusable filters rather than with the traditional oil testing program.

Contact: Dick Greif/Dick Hunt
ARC0 Kuparuk Vehicle Maintenance
659-7723

Reusable oil filters work and can save money.
B.J. Services-Acid Mixing Facility Protects Workers and Reduces Spills

Prior to the installation of B.J. Services’ acid mixing facility, the preparation of chemicals for an acid job was a time consuming, labor intensive job. Now, one employee using a computerized mixing system can do the job that used to require the efforts of four people. This system is much safer for workers as they are no longer required to directly handle the chemicals. Also, the system is designed to reduce the likelihood of spills. This system was a $400,000 investment for the company. B.J. Services believes that it has paid off in preventing worker accidents and environmental contamination.

B.J. Services-Blending Unit Designed for the Arctic Environment Reduces Spills

B.J. Services received a 1993 North Slope Environmental Achievement award for developing a blending unit which has significantly reduced the likelihood of spills related to well fracturing.

This unit combined three separate pieces of equipment into one, enclosed in a van. This design provides several advantages for arctic operations. The enclosed design reduces the possibility of spills through broken hoses, etc. and also provides spill containment. It is operationally safer for workers and reduces manpower needed from 3 to 2 employees. By reducing the amount of equipment needed, fuel requirements and operating costs are reduced. The operating cost of this new unit is approximately half of what it cost to operate three separate units. B.J. Services believes that this $1.2 million investment will pay off by making their operations more safe, efficient and environmentally sound.

Contact: Perry Willard
District Operations Manager
659-2678
Alaska Petroleum Contractors Switches to Propylene Glycol for Vehicle Antifreeze

Alaska Petroleum Contractors (AK) has successfully made the switch from ethylene glycol to propylene glycol for use as vehicle antifreeze.

In recent years, propylene glycol has come on the market as an alternative to ethylene glycol. Propylene glycol offers an advantage over ethylene glycol as it is less toxic to humans or animals. It offers similar freeze protection and can be recycled in the same manner as ethylene glycol. When either propylene or ethylene glycol is changed out of equipment, it must be tested for hazardous constituents (such as heavy metals) and managed properly.

Although propylene glycol costs more to purchase than ethylene glycol, AK has made the choice to switch to this new product because of the health, safety, and environmental benefits it offers.

Contact: Donovan Jackson
Alaska Petroleum contractors
659-8380
Tuboscope Vetco-Costly Cleanup Encourages Preventive Approach to Building Design and Encourages Alternatives to Lead Pipe Lubricant

In 1991 and 1992, Tuboscope conducted a costly environmental cleanup of gravel contaminated with lead, zinc, and hydrocarbons. Clean-up costs were in the range of $2.5 million.

The building was renovated following a fire and the environmental remediation. A cement floor was added to half the building, with a plan to cement the rest of the floor in the future. This floor is an investment of approximately $500,000, far less than the cost of environmental cleanup.

Tuboscope is now working with the oil companies and other related businesses to encourage the use of non-metallic pipe lubricants. This change will avoid future contamination of pads with heavy metals.

Contact: Ken Hyde
Field Superintendent
659-2812
MI Drilling-Reusing Brine Works Effectively and Save Money

MI Drilling Fluids brine reuse program is saving money for ARCO Alaska and building upon MI Drilling Fluid's reputation as an efficient, quality-oriented service company.

MI Drilling Fluids provides completion and workover fluids for the ARCO Kuparuk River Field. Brines are mixed at their facility in Deadhorse, and then transported to completion or workover activities in Kuparuk. After use, the fluids are recovered, then filtered or reconditioned, either on-site or at a brine storage area where much of the recovery process takes place.

Clear brines are filtered either on site or at the storage area for reuse. This mobile unit can process 4-5 barrels/minute continually or up to 10 barrels/minute for short-term activities. Viscous fluids are reconditioned with a mobile solids separation van. A single Xanvis viscosified fluid has been used effectively in up to 12 workovers, with periodic reconditioning required.

This reuse of a valuable fluid has proven to be a cost-effective pollution prevention strategy. In 1992 each purchased barrel of brine was used 2 ¼ times. A total of 50,000 barrels were used, but only 22,000 barrels were purchased, because of the refiltration program. The cost to refilter the brine is approximately 6% of the purchase price.

Cost Savings: For 1992, Kuparuk's total workover and completion brine and filtration costs were approximately $3.25 million. If only new brine had been used the cost would have been $7 million, plus additional costs for trucking and disposal.

Contact: Dave Wendt
c/o KIC
MI Drilling
659-2900 ext. 6165
Atlas Wireline--Worker Initiative Results in Effective Oily Water Recycling System

Because of the relatively high cost of water in Prudhoe Bay and the limited options for disposal of oily waste water, Atlas Wireline has installed an oily water recycling system to reuse water used in truck and shop washing. This program received the North Slope Environmental Achievement Award in 1993, in the worker initiative category.

The system required several months of troubleshooting by dedicated employees to determine necessary improvements, before it worked properly under arctic conditions. Steps in the process now include: gravity settling in a heated tank, oil-water skimming, ultrafiltration, carbon filtration, and chlorination.

The system is now functioning as a zero discharge system which has eliminated the use of Pad 3 for disposal and reduced water purchases. This program has resulted in cost savings for Atlas Wireline.

Contact: Pete Manchester/ Meyer Herndon
District Operations Manager
659-2642
Brooks Range Supply-Leader in Recycling of Lead-Acid Batteries

Since 1991, Brooks Range has recycled approximately 200,000 pounds of batteries. These batteries are shipped from Prudhoe Bay to a secondary smelter in the lower 48, where the lead is used to manufacture new batteries.

As the only vendor of lead-acid batteries in Prudhoe Bay, Brooks Range Supply sells lead-acid batteries in large quantities. These batteries pose health and environmental risks if not handled properly. Used lead-acid batteries may leak or spill and cause lead and/or acid contamination of soil and ground water. It is unnecessary to throw away lead-acid batteries because this "waste" product provides a valuable raw material.

In the fall of 1991, Brooks Range Supply began a lead acid battery recycling program for their customers. They also accept stockpiles of old batteries which may not have been purchased through Brooks Range Supply, in an effort to encourage environmentally sound recycling of these materials rather than improper disposal. Brooks Range Supply trains its employees to properly package batteries for transport to a recycler in the lower 48.

Contact: Randy Richardson/ Pete Warner
Manager, Brooks Range Supply
659-2550

Batteries are packaged for shipment Outside for recycling.
Group for Environmental Enhancement at Kuparuk (GEEK) Encourages Camp and Field Waste Reduction and Recycling

The Group for Environmental Enhancement at Kuparuk (GEEK) is a volunteer group that was established in 1990 to encourage camp and field waste reduction and recycling. The group identified a long list of items to be evaluated for economic and “logistical” feasibility. The list included items such as reducing camp water demand, reducing mass distributions of memos, eliminating fax cover sheets, recycling of white paper, aluminum cans and Styrofoam, and eliminating styrofoam cups from the bedrooms.

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<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Newspaper, pounds</td>
<td>Not collected</td>
<td>14,000</td>
<td>16,000</td>
<td>7,200</td>
</tr>
<tr>
<td>Cardboard, pounds</td>
<td>Not collected</td>
<td>450</td>
<td>38,800</td>
<td>48,500</td>
</tr>
<tr>
<td>Aluminum, pounds*</td>
<td>Not collected</td>
<td>6</td>
<td>25</td>
<td>135</td>
</tr>
<tr>
<td>Computer/White Paper, pounds</td>
<td>5,121</td>
<td>61,000</td>
<td>51,500</td>
<td>41,800</td>
</tr>
</tbody>
</table>

*1993 figures include some collected in 1992 and recycled in 1993.

Increasing employee awareness was also emphasized. GEEK bulletin boards were established in the main base camp and each of the producing facilities. An environmental section was added to the Kuparuk Library. Formal waste minimization training is provided to all Kuparuk employees.

Projects that were identified have been implemented by incorporating them into existing work activity. For example, the group that is responsible for trash collection in the lobby now is also responsible for collecting the contents of the newspaper recycling bin in the lobby. Integrating recycling activities into standard operating procedures avoids a situation where volunteers “burn out” after several years of participation. Involvement in this group has been personally satisfying as employees have seen that their ideas and efforts do make a difference.

Contact: Barb Byrne/ John Lettow
ARC0 Kuparuk
659-7242
Alaska Clean Seas-Business Philosophy Supports Antifreeze Recycling and Effective Used Oil Management

Alaska Clean Seas (ACS) is a spill response organization located in Deadhorse. With a business philosophy of effective environmental management, ACS evaluated its waste streams and purchased systems for recycling. Antifreeze is filtered and recycled using a “Kleer-flo” machine. Used lubricating oils are burned for energy recovery using a “Clean Burn” heater. This investment of $9300 insures that two of ACS’s common waste streams are properly managed and reused.

Contact: Nick Glover
Alaska Clean Seas
659-3203
Scrap Lifts Recycle 24,000 Tons of Metal

Since 1989, three successful scrap metal back hauls from Prudhoe Bay to the State of Washington have resulted in the recycling of over 24,000 tons of scrap metal. Tonnage per scrap lift is as follows:

<table>
<thead>
<tr>
<th>Year</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1989</td>
<td>7,055 tons</td>
</tr>
<tr>
<td>1990</td>
<td>9,899 tons</td>
</tr>
<tr>
<td>1993</td>
<td>7,350 tons</td>
</tr>
<tr>
<td>TOTAL</td>
<td>24,304 tons</td>
</tr>
</tbody>
</table>

This program was initiated by the Alaska Support Industry Alliance in cooperation with the oil companies. These back hauls are possible because of large construction projects on the North Slope that have required barge shipments. Following delivery, the barges are empty and available to transport materials back to the lower 48. Oil field service contractors, participating in this program on a voluntary basis, have contributed over half of the tonnage.

The program has helped to clean up Deadhorse and Prudhoe Bay by removing metals and equipment that are not-being used and have become scrap. Rather than disposing of these materials in a landfill, they are transported to the State of Washington where the metal is recycled and reused. A final scrap lift scheduled for the summer of 1994 is expected to recycle an additional 10,000 - 18,000 tons of material.

In addition, the scrap lift program spurred the development of the Prudhoe Bay Environmental Alliance (PBEA). The PBEA meets in Deadhorse on a monthly basis, with a goal of bringing industry and government together to work cooperatively on solving environmental problems and promoting pollution prevention efforts.

Contact person: Gordon Krist or Joe Mathis
ARC0 Alaska Nana Corporate Services
659-7489 2654147
How to Identify Pollution Prevention Opportunities

Pollution prevention opportunities can be identified in a variety of ways. The most comprehensive approach is called a waste reduction assessment. This requires convening a team to evaluate all aspects of your company’s operations. Pollution prevention opportunities can also be identified by focusing on a particular waste stream of concern, or a toxic chemical currently in use.

The advantage to conducting a facility-wide waste reduction assessment is that it may suggest overall changes that can benefit your company throughout its operations. A comprehensive assessment will also assist your company in its long-term planning efforts. Some basic steps in conducting a comprehensive waste reduction assessment are as follows:

1. **Lay the groundwork for a comprehensive assessment**

   Prior to beginning an evaluation of a facility, it is important to have clear direction and management support for this type of evaluation. Assembling a diverse team of employees representing all aspects of the operation is key to doing a thorough facility evaluation. This team should include managers, engineers, QA/QC staff, field workers, purchasing agents, maintenance personnel, environmental, health and safety staff and any others critical to the overall operation.

2. **Review your operations**

   Prior to doing a walkthrough of a facility, it may be useful to review data, such as purchasing records, operation and maintenance reports and any information about suspected environmental or safety problems.

   A walkthrough is conducted to identify all of the steps in an operation, including all materials used in the process and an identification of wastes being generated. This evaluation should identify types and quantities of materials used and wastes generated in your facility operations. It may be useful to construct a diagram of the process flow in your business to pinpoint problem areas. Figure 1 provides suggested questions to consider when conducting a walkthrough.

   It is often useful to include someone who is not involved in the day-to-day operations of your facility in this review of operations. This person may provide a fresh eye in evaluating the efficiency of current practices and techniques.
3. **Identify pollution prevention options**
When a walkthrough and review of facility operations has been completed, it is time to generate a list of pollution prevention options. It is productive to work as a team and brainstorm a list of options which can then be evaluated further. **Improved operating practices** are often the easiest to identify, such as improvements in training, inventory control, waste segregation, storage and handling, preventive maintenance, and scheduling.

Other options may include **raw materials changes, technology changes** and **improvements in recycling and reuse of materials** (see Section Three).

4. **Evaluate options**
Options must be evaluated for their technical and economic feasibility as well as the likelihood of their acceptance by workers. Figures 2 and 3 are simple worksheets which provide a format for evaluating technical and cost issues. Financial analysis is discussed further in Section Six.

5. **Implement options**
Once options are selected they can be implemented. Many operating changes can be implemented immediately, whereas more complex exchanges may require equipment and facility redesign. *All changes will require worker training* to ensure long-term effectiveness.

6. **Set goals and evaluate success**
It can be valuable to set annual goals as you begin a comprehensive waste reduction program. These goals may be performance-based or numeric. For example, a goal may be to limit the use of 55 gallon drums or reduce the use of chlorinated solvents by 90%.

The assessment process itself is not a one-time procedure. Ideally, an assessment is conducted on an annual basis. At that time progress can be evaluated and new goals can be set for waste reduction.
12 Questions to Consider During Your Walkthrough

These general questions will help you focus your attention on possible waste sources in your company. Your initial impressions can provide vital clues about how your wastes are generated, and how they might be controlled. Keep this list of questions with you as you do the walkthrough.

- Does your facility show signs of poor housekeeping (cluttered walkways, unswept floors, uncovered material drums, etc.)?
- Are there noticeable spills, leaking containers, or water dripping or ruling?
- Is there discoloration or corrosion on walls, work surfaces, ceilings, equipment or pipes? This may indicate system leaks or poorly maintained equipment.
- Do you see smoke, dirt or fumes to indicate material losses?
- Do you smell strange odors, or experience irritation of eye, nose or throat when you first enter the workplace? These symptoms might indicate system leaks, etc.
- Are there open containers, stacked drums, shelving too small to properly handle inventory, or other indicators of poor storage procedures?
- Are all containers labeled as to their contents and hazards?
- Are there provisions for spill detection and containment?
- Is emergency equipment (fire extinguishers, etc.) available and visible to ensure rapid response to a fire, spill or other incident?
- Do you notice waste being generated from processes in your facility (dripping water or fluids, evaporation, gas/vapor leaks, drag-out, etc.)?
- Check your inventory. Is there any out-dated stock, or materials that you no longer use still in storage?
- Are wastes properly segregated?
- Do employees have any comments about the sources of waste in the facility?
- Is there a history of spills, leaks, accidents or fires in your facility? Which processes were involved?

From: Profiting from Waste Reduction in your Small Business, by David Wigglesworth, Anchorage, AK, Alaska Health Project, 1988
**Technical Evaluation Form**

Company ____________________________________________

Date Completed ________________________________________

Person Completing Form __________________________________

**INSTRUCTIONS:** Check the appropriate response. Skip over questions that do not apply. Copy this form so that you have one form for each option you are evaluating.

**Waste Reduction Option**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Does the option have a proven track record?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Will this option maintain product quality?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Will this option improve productivity?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Can this option be implemented with existing staff?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Are you certain that this option will create less waste?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Are you certain that this option will not simply move waste problems from form to another &lt;e.g. from solid wastes to air emissions)?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Is your plant layout and design capable of incorporating this option?</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>8. Will the vendor guarantee this option?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Have you determined that this option will improve or maintain worker safety and health?</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10. Does this option reduce wastes at their source?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Are materials and parts readily available?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Can this option be easily serviced?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Are other businesses using this option?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14. Does this option promote recycling?</td>
<td></td>
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</tr>
</tbody>
</table>

From: *Profiting from Waste Reduction in your Small Business*, by David Wigglesworth, Anchorage, AK, Alaska Health Project, 1988
# Economic Evaluation Form

Company ____________________________

Date Completed ________________________

Person Completing Form ____________________

**INSTRUCTIONS:** Check the appropriate response. Skip over questions that do not apply. Copy this form so that you have one form for each option you are evaluating.

**Waste Reduction Option ____________________________

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Is this option within your price range (consider both capital and ongoing operations costs)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Does this option have an acceptable payback period (under one year is considered excellent)?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Does this option reduce your raw material costs?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Does this option reduce your utility costs?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Does this option reduce material and waste storage costs?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Does this option reduce regulatory compliance costs?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Will this option reduce the costs associated with worker injury or illness?</td>
<td></td>
<td></td>
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<tr>
<td>8. Will this option reduce your insurance premiums?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Will this option reduce your waste disposal costs?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*From: Profiting from Waste Reduction in your Small Business, by David Wigglesworth, Anchorage, AK, Alaska Health Project, 1988*
SECTION SIX
Evaluating the Costs and Benefits of Pollution Prevention

Traditional accounting methods often are inadequate for evaluating the costs and benefits of pollution prevention options. Total Cost Assessment (TCA) is a method which has been developed in recent years to allow for a comprehensive analysis of long-term costs and savings of pollution prevention projects. TCA includes four elements that differ from traditional financial analyses:

- Expanded Cost Inventory
- Extended Time Horizon
- Use of Long-Term Financial Indicators
- Direct Allocation of Costs to Processes and Products

By using TCA rather than traditional economic analyses, the benefits of pollution prevention options can be more clearly identified.

EXPANDED COST INVENTORY
TCA considers direct, indirect and hidden costs, as well as other qualitative factors.

Direct costs: Direct costs are directly associated with a project’s delivery, installation and operation. These include:

Capital expenditures—costs of buildings, equipment, raw materials, utility connections, site preparation, installation, engineering, and procurement;

Operation and maintenance—costs of labor, transportation, storage, disposal, and maintenance.

Indirect and hidden costs: Indirect costs are those not directly associated with a particular operation, such as costs of administration, housekeeping, and general plant operation. Regulatory costs are a type of indirect cost and may include the costs of permitting and monitoring.

Examples of hidden costs include: spill reporting, monitoring, manifesting, employee training, labeling, inspections, permitting, disposal, laboratory fees, insurance, and protective equipment. Many of these costs are traditionally lumped together in an overhead category, so it is difficult to get an accurate accounting of their significance.

Qualitative Factors: Other important factors to be considered are avoided liability, improvement in community relations, improved corporate image, and improved employee health. These factors may result in increased company revenues. Although these elements are very difficult to quantify,
they should be roughly estimated or qualitatively considered in an economic analysis.

**EXTENDED TIME HORIZON**
TCA is generally conducted over a time horizon of five or more years, whereas conventional analyses evaluate cost and savings for a period of 3 to 5 years. This longer time horizon provides an opportunity to estimate pollution prevention benefits that may not be apparent in the short-term but will materialize after several years.

**LONGTERM FINANCIAL INDICATORS**
When calculating costs and benefits of pollution prevention projects, it is important to select long-term financial indicators that account for the time value of money and all cash flows during the project. Three common financial indicators meet these criteria are:

- Net present value (NPV)
- Internal Rate of Return (IRR)
- Profitability Index (PI)

Payback period is another commonly used indicator. This is the number of months or years over which the investment outlay will be paid back from the cash inflows resulting from the project. Because this simple calculation does not reflect the time value of money, it should only be used as a rough estimate of economic costs and benefits.

Definitions and more detailed descriptions of financial indicators and methods can be found in economics textbooks.

**DIRECT ALLOCATION OF COSTS TO PRODUCTS AND PROCESSES**
By allocating environmental costs to the products and processes that produce these costs, one can avoid lumping these expenses into a single overhead account. This creates an accounting system that can:

- Identify products/processes responsible for environmental costs
- Target prevention efforts to areas with high environmental costs
- Track savings from an investment in pollution prevention

A detailed discussion of these techniques is beyond the scope of this manual. Section Seven provides further resources on Total Cost Assessment.
SECTION SEVEN

Resources

Written information:
The following manuals on pollution prevention were used as resources in preparing this guide. They are available for review at the Pollution Prevention Office, 3601 C St., Suite 1334, Anchorage, AK. The ADEC Pollution Prevention office provides non-regulatory technical assistance on waste reduction and recycling to businesses and communities throughout Alaska. The Office also has information on pollution prevention techniques for specific industries and waste types.


Contacts
ADEC Pollution Prevention Office, 3601 C St., Suite 1334, Anchorage, AK, 99503, 907-563-6529.

The Alaska Support Industry Alliance, 4220 B St., Suite 200, Anchorage, AK, 99503, 907-563-2226.


Alyeska Pipeline Service Company, 1835 S. Bragaw, Anchorage, AK 99512, 907-278-1611.


ARCO Alaska, Inc., Post Office Box 100360, Anchorage, AK, 99510, 907-276-1215.

BP Exploration (Alaska) Inc., P.O. Box 196612, 900 E. Benson Boulevard, Anchorage, AK, 99519, 907-561-5111.

North Slope Borough Industrial Development, 3201 C St., Suite 602, Anchorage, AK 99503, 907-561-8820.

Prudhoe Bay Environment Alliance, 4220 B St., Suite 200, Anchorage, AK 99503, (907) 563-2226.
What is Your Pollution Prevention Success Story?

Company Name _______________________________________
Address ______________________________________________

Phone ___________________________ Fax ________________________
Contact Person ____________________________________________
Approximate # of Employees __________________________________
Type of Business __________________________________________

Describe your pollution prevention project. Please provide as much detail as possible. Use an additional page if needed.

Are there annual net cost savings as a result of this effort?
   yes       no

If yes, how much:
  
  < $500       $10,000 - $50,000
  $500 - $1,000  > $50,000
  $1,000 - $10,000

What other benefits, besides cost savings, are resulting from this initiative?

Copy this form and send or fax to: ADEC Pollution Prevention Office
3601 C St., Suite 1334
Anchorage, AK 99503
Fax: (907) 562-4026