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Overview of Pollution Prevention Accomplishments at Hanford

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Prepared for the U.S. Department of Energy
Office of Environmental Restoration and
Waste Management

Westinghouse Hanford Company Richland, Washington

Hanford Operations and Engineering Contractor for the
U.S. Department of Energy under Contract DE-AC06-87RL10930

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Overview of Pollution Prevention Accomplishments at Hanford

C. J. Chase
E. A. Raney
J. A. Engel

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Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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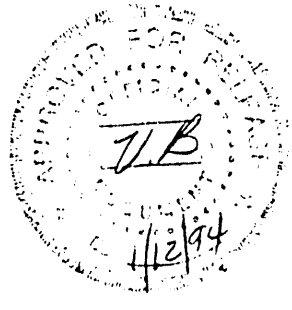

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Additional Information

Overview of Pollution Prevention Accomplishments at Hanford

Colette J. Chase
Westinghouse Hanford Company
P.O. Box 1970 MSIN H4-21
Richland, WA 99352

Elizabeth A. Raney
Westinghouse Hanford Company
P.O. Box 1970 MSIN H4-21
Richland, WA 99352

Jill A. Engel
Westinghouse Hanford Company
P.O. Box 1970 MSIN H4-21
Richland, WA 99352

INTRODUCTION

Westinghouse Hanford Company is the current operations and engineering contractor for the U. S. Department of Energy at the Hanford Nuclear Site, located in south-central Washington State. The Site was established by the federal government in 1943 for the production of plutonium for use in manufacturing nuclear weapons. The Hanford Site is now devoted to environmental restoration and remediation. Approximately 17,000 persons are employed at the Site, which encompasses 560 square miles of desert land.

The Pollution Prevention Program was established in 1989 at Westinghouse Hanford Company to change policy, practices, and operations to reduce the use of hazardous substances and the generation of waste, pollutants or contaminants, including radioactive, mixed, and hazardous materials. To make this change the group set out to encourage employees to use their ingenuity to prevent pollution in their work places.

The Pollution Prevention Program at Westinghouse Hanford Company created a book to promote individual and Site accomplishments that prevent pollution. The *Pollution Prevention Accomplishments Book* used short bullets of information and photos to highlight 34 of the many ideas implemented on site that minimize waste.

The motivation behind creating this book was to encourage ingenuity in individuals and groups on site, increase communication within the Site, and make employees aware that the Pollution Prevention Program can assist them in their endeavors to prevent pollution. Additional benefits reaped from the book included showing employees ways to prevent pollution, recognizing individuals who prevent pollution, training, and education.

Each entry in the book identified the challenge, initiative, and success of the idea. Nine of those entries have been chosen to be featured in this paper: aerosol puncture; excess chemical sales; diapers save landfill; paper recycling; demolition recycling; reuse of steel drums; co-disposal; effluent reduction to process trenches; and engine steam cleaning.

POLLUTION PREVENTION ACCOMPLISHMENTS

Aerosol Puncture

Aerosol cans are costly to dispose of for many businesses and municipalities. The Hanford Site is no different. General Area Services North (GAS-N) is the maintenance support group for the northern portion of the Site, serving craft, administrative, engineering, and management personnel. GAS-N accumulates approximately 2,000 aerosol cans each year. These fill between 20 to 30 drums and are shipped as compressed gas cylinders at a cost of $21,600 to $32,300 each year. To address this problem of cost, as well as the environmental and shipping hazards of compressed gas cylinders, an aerosol can puncture kit was purchased. The kit was purchased for $500 which included the puncturing apparatus, two filters, and goggles.

The apparatus is screwed into one of the bung openings on a 55-gallon drum. A carbon filter is screwed into the other bung, creating a closed system. An aerosol can is turned upside down and clamped into the apparatus. The handle is pushed down to puncture it. The liquid drains into the drum and all volatiles are collected in the filter. The chemicals are logged and segregated into different drums and then disposed.

This initiative was a success at GAS-N. The aerosol can waste at GAS-N was reduced to one drum of flammable liquid waste. The empty cans were crushed and recycled as non-regulated scrap metal and the filters were crushed and disposed.

Excess Chemical Sales

As weapons production at Hanford ceased, chemicals procured for those production activities were no longer needed. The Materials Management department has established and streamlined the process for

excessing these bulk surplus chemicals. Materials Management personnel make the available excess chemicals visible at the local and national levels. The screening cycle used gives preference to certain buyers. Hanford contractors get first choice up through the sale. The rest of the preferred buyers are, in descending order, other DOE sites, then federal agencies, and state programs. Finally, the remaining materials are made available through public sale. This requires a complete cycle time of 42 to 156 days. This program has been active since April 1992; and so far three public auctions and two sealed bid sales have been conducted.

This program has met with great success. Over 200,000 gallons and 100,000 pounds of chemicals have been sold, saving over $1 million in waste disposal costs and generating over $100,000 in revenue.

Diapers Save Landfill

The most creative and simple idea for pollution prevention highlighted in the book was from Custodial Services. Each year $84,000 are spent on disposable reinforced paper cleaning towels that produce 24,500 kg of waste for the landfill. Shirley Cook of Custodial Services took the initiative to purchase cloth diapers to use as cleaning rags instead of the paper towels. The janitors rotate the duty of washing the diapers in washing machines that were already in place.

This wonderfully simple idea saved $81,000 in products purchased each year, eliminated approximately 24,500 kg of waste or 90 yd^3, of landfill space. The entire Site is changing over to cloth diapers with minimal cost and frustration.

Paper Recycling

The paper recycling program is continuing with much success at Hanford. Receptacles for paper to be recycled have been furnished to all buildings that are eligible to participate. Most individual offices have smaller receptacles, often copier paper box lids, located near the printer or in another easily accessible location. The centralized receptacles are large bags provided by an independent recycling company. The recycling company purchases the recyclable paper from Westinghouse Hanford and provides all of the labor and transportation required.

Recycling office paper is voluntary, but with increased awareness and ease of recycling, the response has been outstanding. In 1992 the Hanford Site saved $38,000 in disposal costs and 993 m^3 of landfill space. In 1993 an estimated 500 tons of paper were recycled. In addition, a phone book recycling service was also successful in diverting 8,000 phone books from the landfill.

Demolition Recycling

One of the current activities of the Environmental Restoration Organization (ERO) at Westinghouse Hanford is the decommissioning and demolition of buildings. Old facilities and reactor support structures are being removed to alleviate industrial safety concerns and restore the Site. The Accomplishments Book highlighted the demolition of the 190-B Pump House Complex, a support structure for B Reactor. The B Reactor was the first reactor to go into operation at Hanford during World War II. During the demolition project two principles were implemented: reuse as much material as possible and decrease the volume of material disposed of as waste.

The first action taken to implement these principles was the rental and future purchase of a universal processor, which consists of a hydraulic shear, concrete breaker, and concrete pulverizer. The processor is used both during building demolition and afterward to expedite site cleanup. The hydraulic shears cut I-beams of up to 18 inches and can clamp onto objects to maneuver the steel into piles. Removed steel, previously sectioned by employees climbing onto possibly unstable piles of steel beams, can now be remotely sliced and stacked with the shears. The shears can also remotely handle regulated waste materials during demolition.

Large sections of concrete are broken into smaller sections by the concrete breaker and pulverizer and can be sent through a recycling plant (soon to be purchased by ERO) that reduces the concrete to the size of

gravel. Metal up to a certain size, such as rebar, is mechanically separated from the concrete. The reduced pulverized concrete is then piled and used on site for such purposes as construction backfill, road beds, cover material, and potentially in the Co-disposal project (discussed later in the paper).

Approximately 900 tons of recyclable steel were recovered from 190-B Pump House Complex. The steel can be sold off site as salvage scrap iron. An estimated 13,000 tons of concrete and block from the 190-B demolition will be crushed and reused.

Reuse Steel Drums

During well installation and other maintenance activities on site, Environmental Field Services generates waste steel drums. They generated 4,000 55-gallon steel drums, which once contained non-hazardous, non-radioactive waste. Kaiser Engineers Hanford, the Site architecture and engineering company, was contracted to steam clean the drums and select drums in good condition for use on site to bury low-level waste.

The Environmental Division took on this project with the goal of putting all of the material back to some use. After the drums were cleaned and sorted, customers on site procured the used drums through Materials Control. Drums that were "out of round"and no longer sealable were marked "BAD" with paint and excessed to Government facilities for possible use as simple trash cans. Unusable and unsalable drums were excessed as scrap metal.

The goal was successfully accomplished. Approximately 2,000 drums will be reused on site for low-level waste disposal, which saves $32,000 by not purchasing new drums. An additional 1,500 drums were excessed off site for reuse or scrap metal. An estimated 700 cubic yards of compacted steel was saved from disposal in the landfill, avoiding $21,000 in burial cost.

Co-Disposal

Large industrial burial boxes housed in landfills and trenches on site contain a variety of materials including large bulky machinery, drums, and rags. These boxes also contain void space that will eventually cause the boxes to collapse from the weight of the soil above them. This creates a considerable safety concern when employees or vehicles work in the area and compact the soil, instigating collapse. To remediate this problem the Environmental Performance and Risk Assessment group will demonstrate and apply Co-disposal at the Hanford Site.

The Co-disposal concept is in-situ stabilization of industrial burial boxes and void-fill in other waste burial packages. Existing solid and liquid wastes combined with binding agents, such as cement and polymers, will form the fill material. This material is referred to as waste rock. The waste rock is injected into the boxes in radioactive and mixed waste landfills and trenches, filling void space around the contents of the box. Formulations of waste rock are tailored to the waste constituents going into the mix and are fully tested to meet all of the regulations and requirements.

Co-disposal, if implemented at a mixed-waste landfill, could increase the current designed volume efficiency from 28 percent to greater than 95 percent by using waste rock rather than clean dirt as fill material. It would take an estimated six equivalent landfills, at their current design, to equal one landfill using Co-disposal. This project has the potential for saving an estimated $50 million dollars per landfill.

Effluent Reduction to Process Trenches

Water conservation is an important consideration at the Hanford Site. The 300 Area Steam and Water Utilities group sought to minimize clean water discharges to 300 Area process trenches. The trenches contain heavy metals and uranium; therefore, minimizing water discharge minimizes its effect on the hydraulic head driving the heavy metals toward the Columbia River.

Projects and modifications were identified to reduce the amount of water required. The primary waste water sources included sanitary, processes, backwash, fire protection, washdown, laboratories, and steam plant. The modifications identified and instituted included installing closed-loop cooling systems, plugging

drains, reducing the temperature in steam-heated buildings, using water in water-cooled equipment only when required, and executing administrative controls where possible.

The success of these modifications reduced the average monthly 300 Area water discharge from approximately 50 million gallons in 1991 to 28 million gallons at the end of 1992. Thus, 260 million gallons of water are saved each year. Because of these actions, the Hanford Site was awarded the Federal Energy Efficiency, Renewable and Water Conservation Award for fiscal year 1992.

Engine Steam Cleaning

Fleet Operations at Hanford services approximately 4,500 government and emergency vehicles for use on the 560 square-mile site. Fleet Operations has taken many initiatives to prevent pollution. One of these initiatives is the reuse of water required to steam clean vehicle engines.

Steam cleaning generates 80,000 gallons of waste water each year at Fleet Operations. The waste water was shipped off site to a pretreatment facility in 10,000 gallon tanker trucks. To save the cost of shipping and more efficiently use the water, Fleet Operations purchased the Land Delta 1000 Water Maze. The water used to steam clean engines goes down the sump and into the Water Maze's series of filters that remove various contaminants. The water is then put into a large holding tank, which is the source of water for Fleet Operations' car wash.

Because of the new system, water is reused in the car wash then treated to the satisfaction of the City of Richland for discharge into the city's waste water system. This innovation saved $117,000 in disposal costs.

BENEFITS OF BOOK

The goal of this project was to create a notebook for use as a tool to promote individual and Site accomplishments in preventing pollution. The *Pollution Prevention Accomplishments Book* has far exceeded the expectations of its use. Its functions include communication, awareness, recognition, training, and education. Most importantly it encourages the ingenuity of individual employees.

Collecting the information for the book was the basis for opening communication. The information for each entry was obtained by interviewing the employee who took the initiative to prevent pollution. The employee explained the work done and gave a tour of the subject work site, emphasizing the changes made to prevent pollution. This approach obtained information for the book and established personal contact, which opened the flood gates of communication between the Pollution Prevention Group and individual Site employees. The group obtained greater understanding and respect for the employees and their everyday activities. The employees gained recognition for their ideas and awareness of the function of the Pollution Prevention Program. With this increased awareness on both parts, additional ideas and suggestions were shared.

Site-wide awareness is being addressed as well. The book's entries are sources for articles in the Westinghouse Hanford Site newspaper, *The Hanford Reach*, which is distributed to all employees. Each written entry and photograph was also designed for a bulletin board that is circulated to various locations on site for perusal by employees. Each entry has a point of contact so anyone reading the book or an article or perusing a bulletin board can communicate directly with those responsible for the initiative. This encourages communication between individuals and groups on site.

Training has been assisted by the book. The Pollution Prevention Program has incorporated the book's information and photos into pollution prevention training for all employees. The book is also used in the more extensive training programs for individuals who work as Design Engineers and Waste Shippers.

The book has also become a tool to promote the Pollution Prevention Program to sponsors for funding. Sponsors, such as the U.S. Department of Energy and senior management, have hard evidence of work

done, dollars saved, and volume of waste avoided in a package that pleases the eye and is easily read and understood. Those same attributes have made the *Pollution Prevention Accomplishments Book* a way to show compliance to regulators.

The book also serves as a resource within the group. It is a working document where additional pollution prevention ideas can be collected in a centralized location for use by all members of the group. These ideas may be identified from conversations, award nominations, reports, and articles. This collection then becomes a source to the group for ideas and points of contact.

CONCLUSIONS

Pollution Prevention is important at the Hanford Site. Individuals and groups have made significant contributions to the effort of preventing pollution. Nine of those efforts have been highlighted in this paper. The *Pollution Prevention Accomplishment Book* was compiled using 34 of the many activities at Hanford that prevent pollution. Those innovations resulted in over 21.3 million kilograms and 989 million liters of waste reduced or recycled and saved over $2.9 million.

The *Pollution Prevention Accomplishment Book* itself has been a great asset to the program. It increased communication and awareness of the program. It also gave well-deserved recognition to employees who took the initiative to prevent pollution at their work place. I, along with all the other people in the Pollution Prevention Program at Westinghouse Hanford Company, sincerely recommend this project to other companies. We believe pollution prevention is an attitude. This book promotes and reaffirms to employees the pollution prevention attitude. It is that attitude that makes change happen.

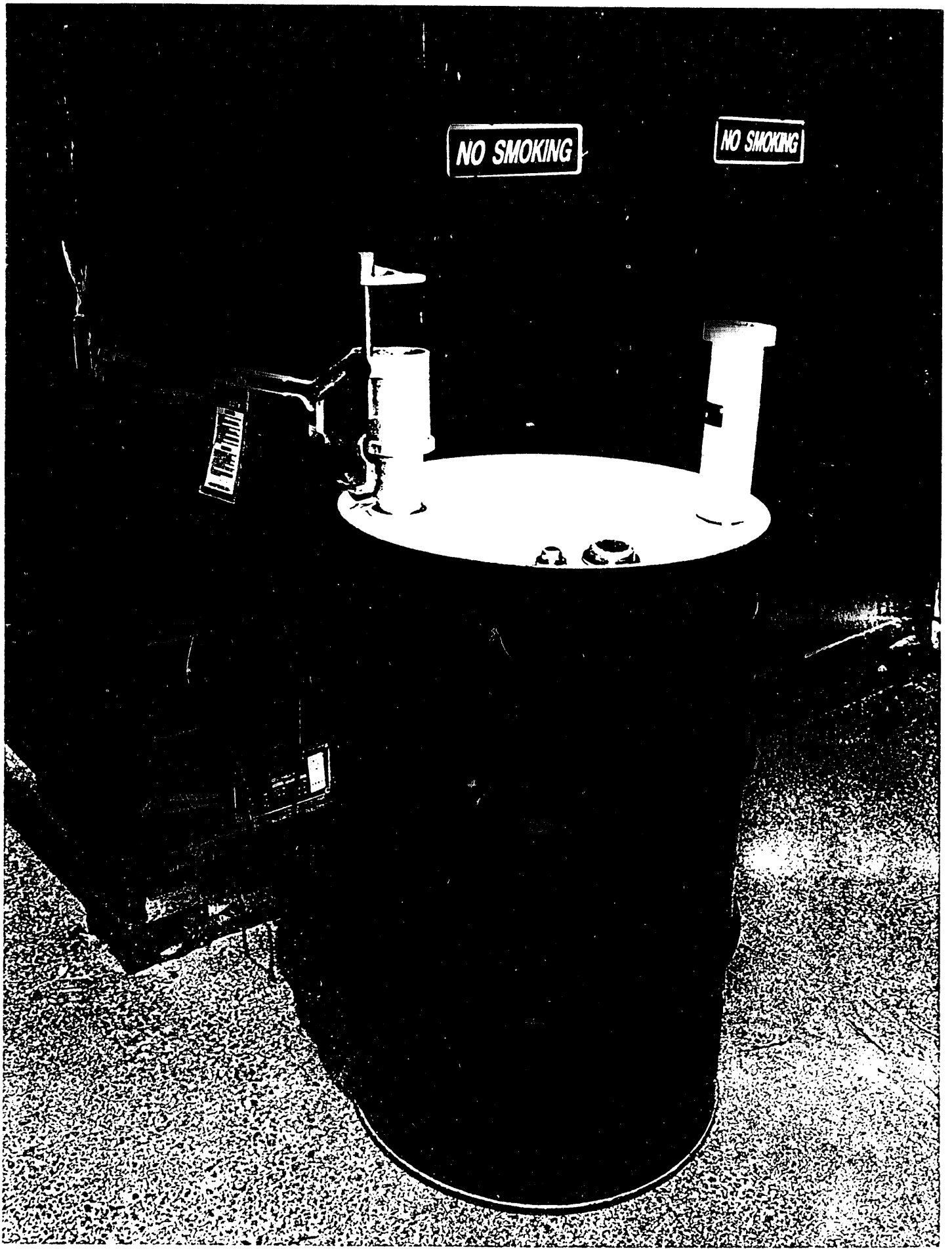


Fig. 1: Aerosol Puncture

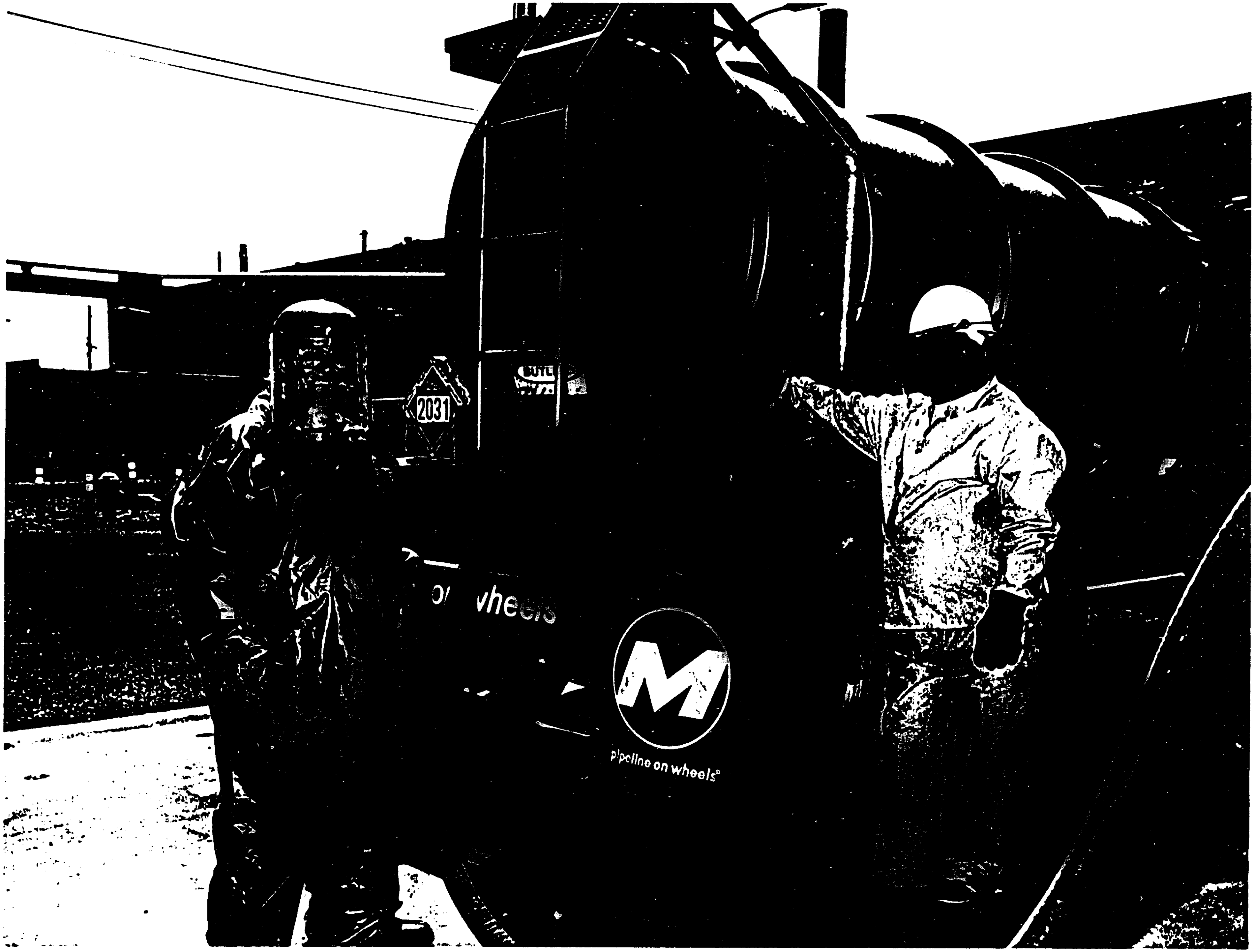


Fig 2: Excess Chemicals Sale

Diapers Save Landfill

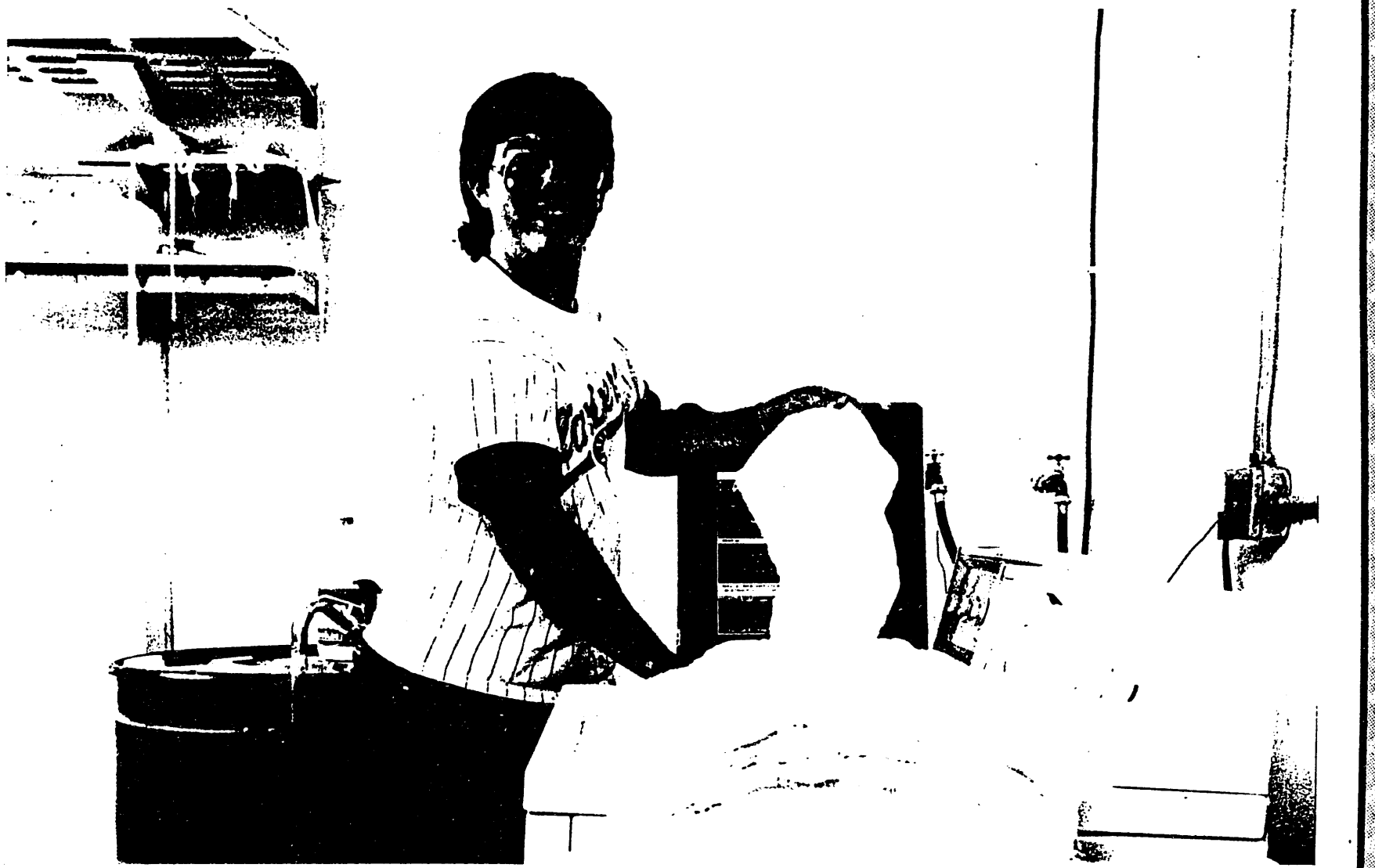


Fig 3. Diapers Save Landfill

Fig. 4: Paper Recycling

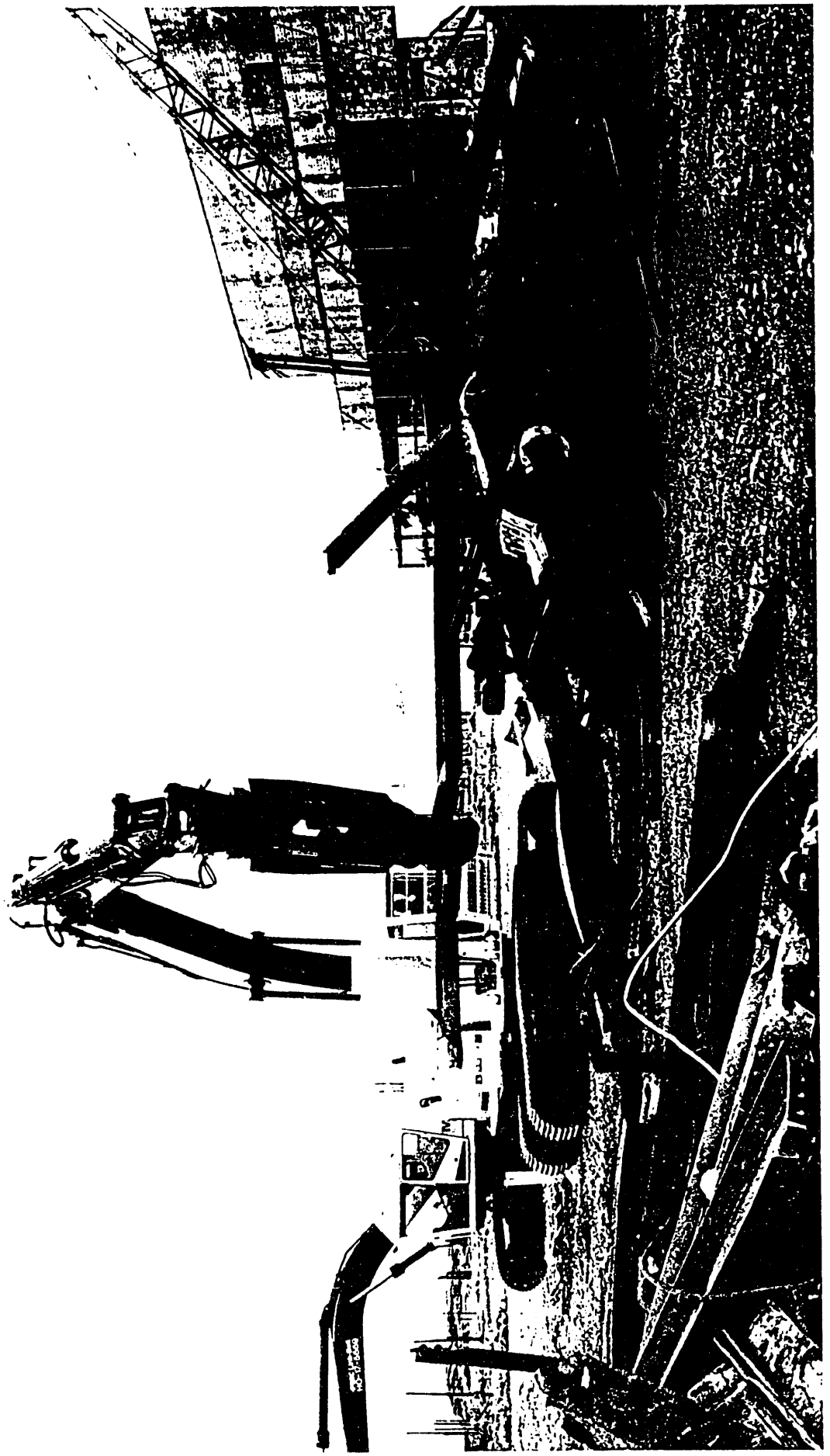


Fig. 5: Demolition Recycling

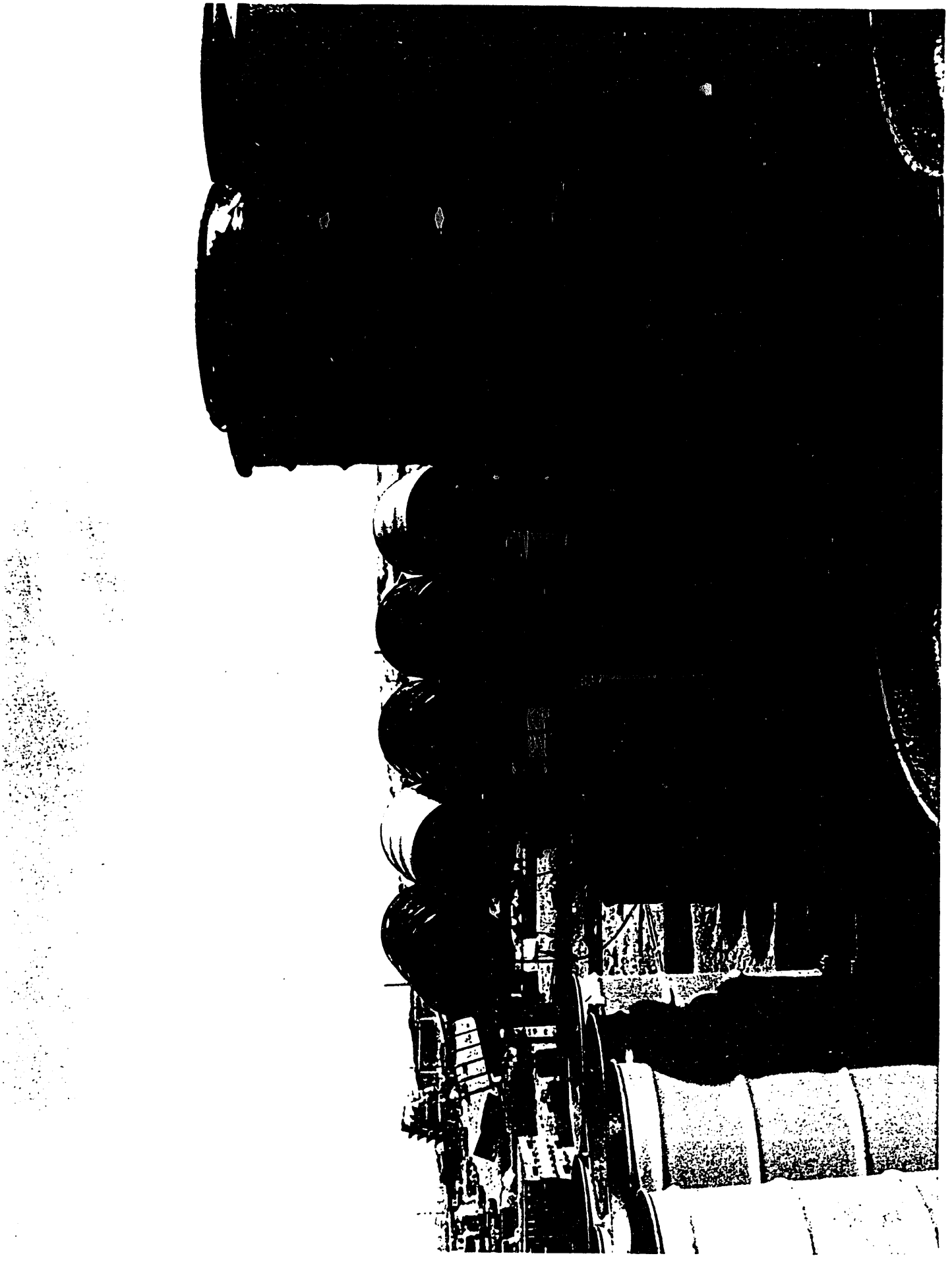


Fig. 6: Reuse Steel Drums

Effluent Reduction to 300 Area Process Trenches

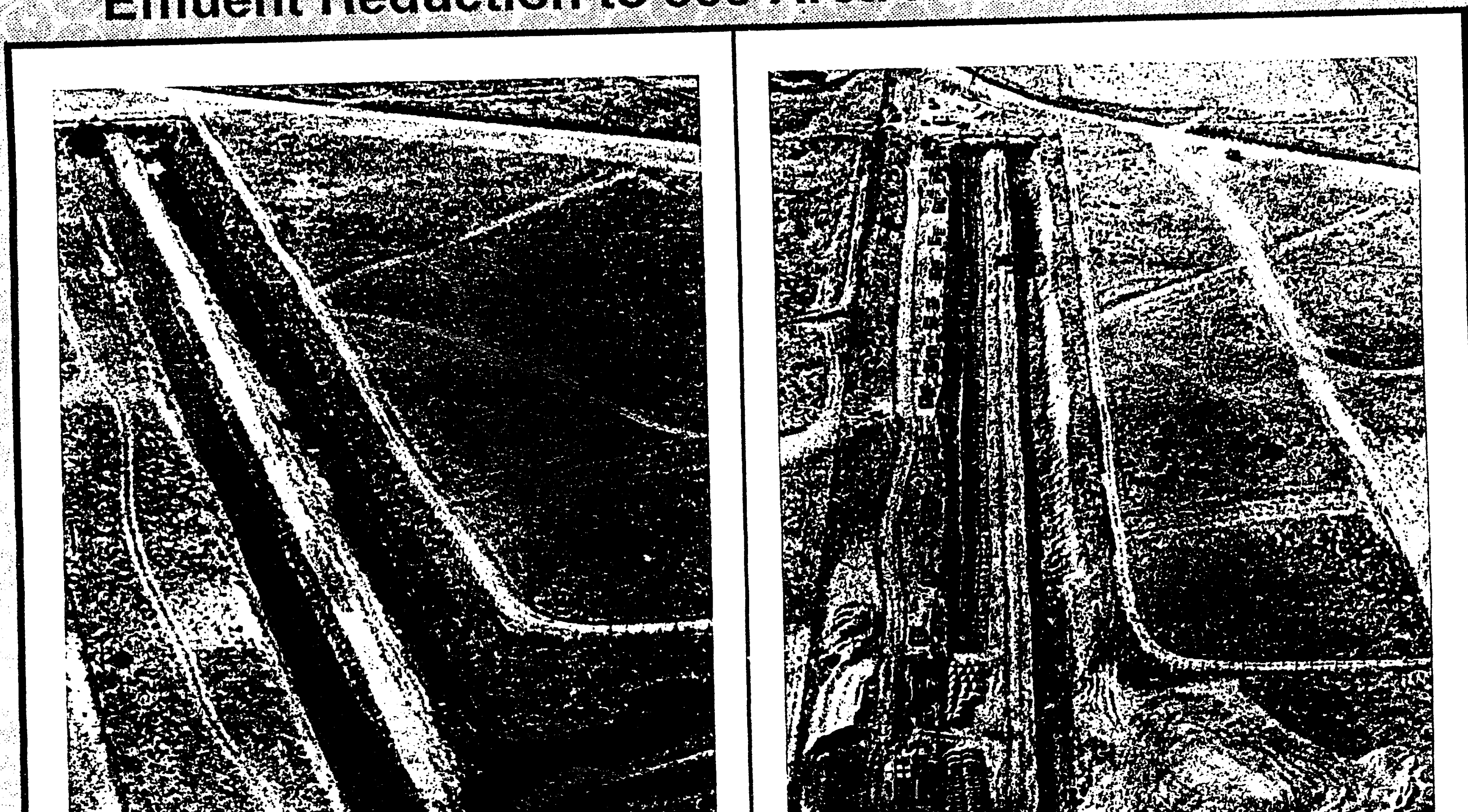


Fig. 7: Effluent Reduction to Process Trenches

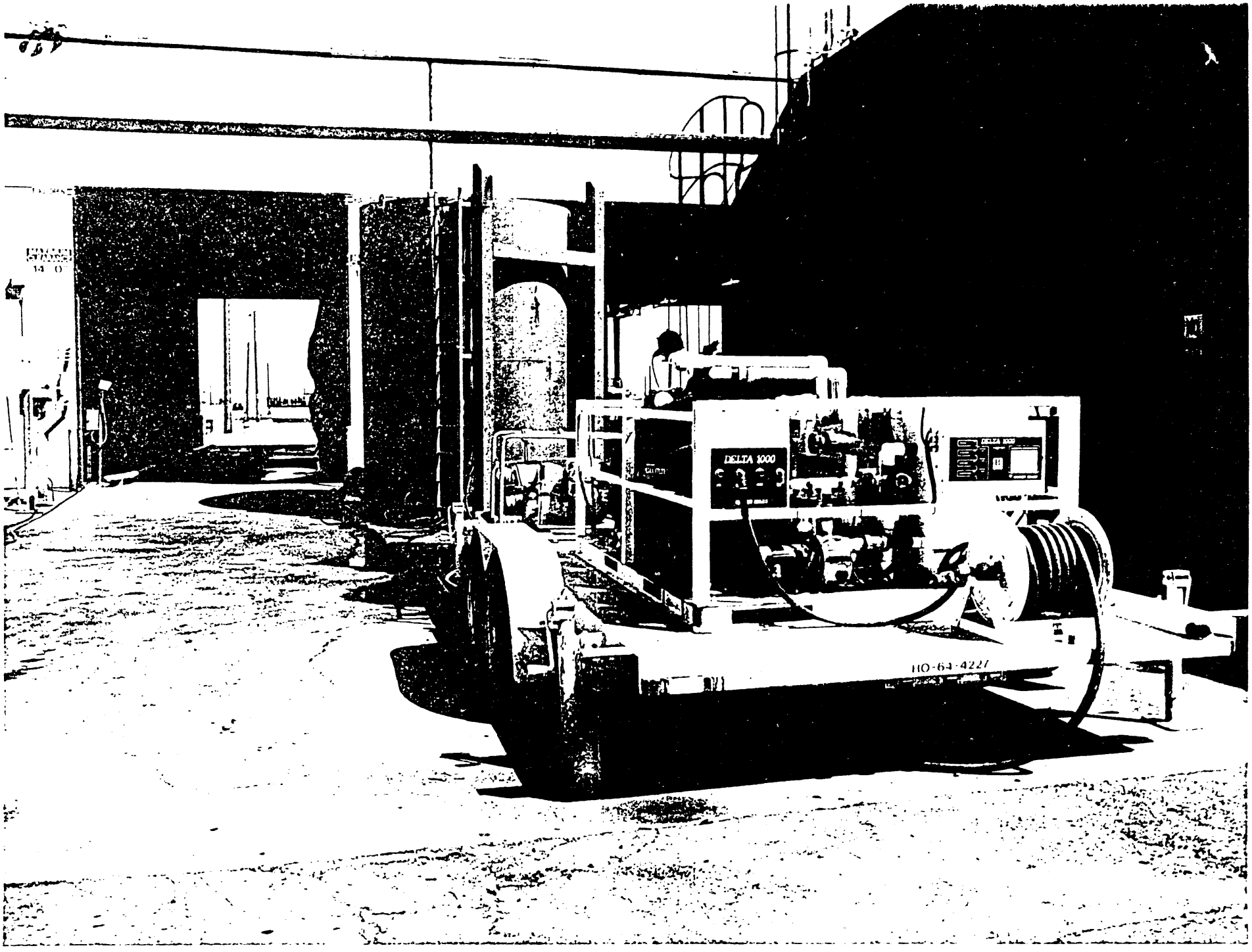
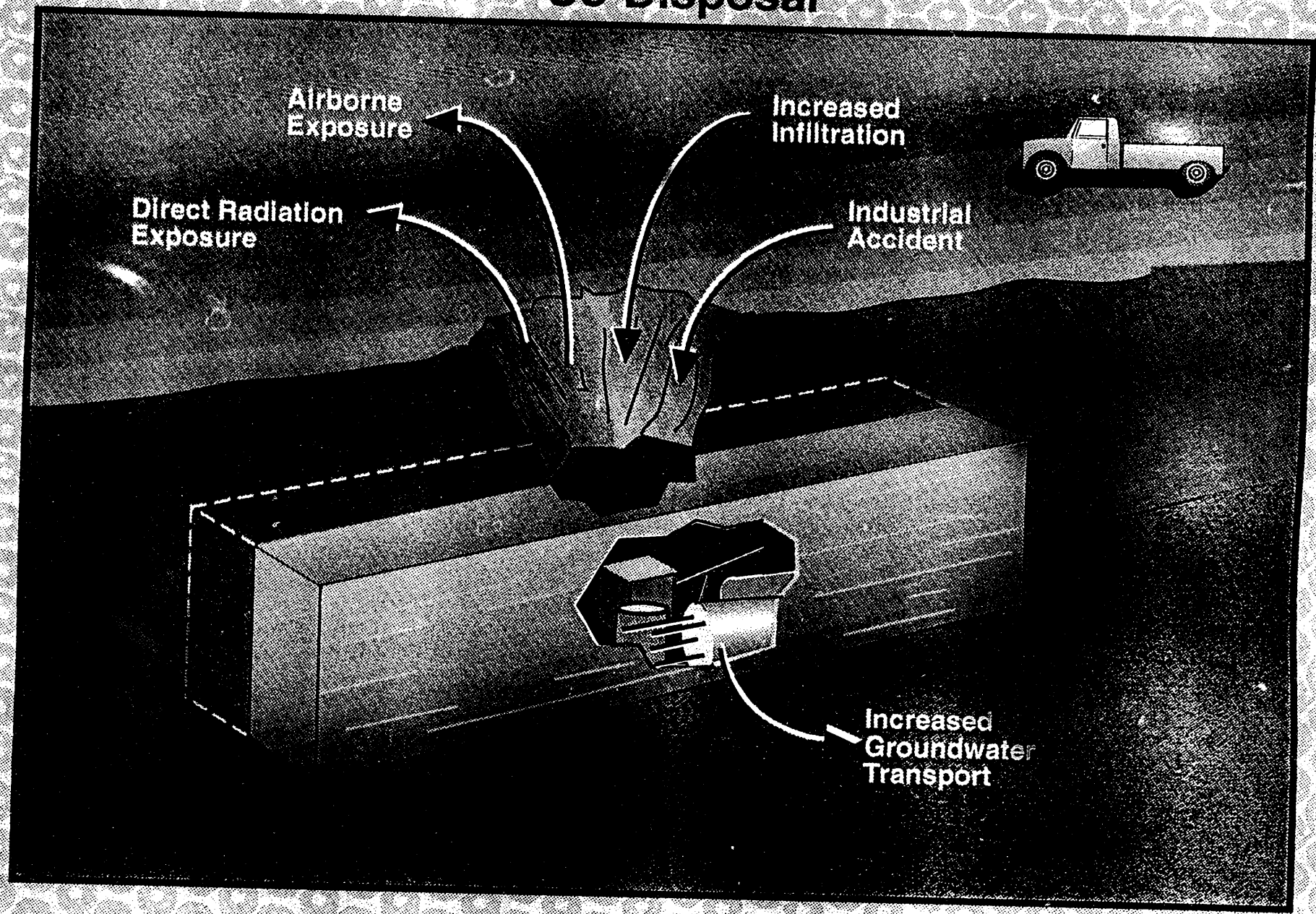


Fig. 8: Engine Steam Cleaning

Co-Disposal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