

REPORT

DRAFT-FINAL

A FLUID SORBENT

RECYCLING DEVICE FOR

INDUSTRIAL FLUID USERS

TECHNOLOGY EVALUATION REPORT

WRITE PROGRAM

To

POLLUTION PREVENTION RESEARCH BRANCH

U.S. ENVIRONMENTAL PROTECTION AGENCY

CINCINNATI, OHIO

NOVEMBER 1991

November 1991

**A FLUID SORBENT RECYCLING DEVICE FOR
INDUSTRIAL FLUID USERS
TECHNOLOGY EVALUATION REPORT**

by

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**Contract No. 68-CO-0003
Work Assignment No. 0-06**

Technical Project Monitor

**Johnny Springer
Pollution Prevention Branch
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OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY
CINCINNATI, OHIO 45268**

November, 1991



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February 14, 1991

Andrew V. Latham, President
American Manufacturing
469 Victoria Terrace
Ridgefield, New Jersey 07657

Dear Mr. Latham:

DESCRIPTION OF U.S. EPA WRITE PROGRAM

As we discussed, the U.S. EPA is interested in doing an on site evaluation of your Extractor Waste Minimization System. We would like to confirm that your company is interested in participating and that Cook Industrial or another site is available for field testing. The following information briefly describes the program we're conducting under the auspices of the U.S. EPA and the reason we called you for possible participation. A more detailed discussion is attached.

To promote multimedia pollution prevention, the U.S. EPA has introduced a new program to foster application of pollution prevention technologies in industry. This activity is called the "Waste Reduction Innovative Technology Evaluation" or WRITE Program.

Battelle is assisting the EPA in selecting and evaluating technologies under this program. Candidate technologies typically have been developed to pilot scale or larger and are either already implemented or planned for near term implementation by a company such as yours. Consequently, we are currently looking for companies with candidate technologies for which Battelle can establish reliable performance and cost information through in-shop technical and economic evaluations. The evaluation will be done at no cost to American Manufacturing or Cook Industrial, if you decide to participate.

As part of the program, we will prepare a report evaluating the selected technology and provide it to both yourself and the EPA. After satisfactory resolution of any comments, the report will be available to the public, consultants, and other governmental agencies nationwide. As is our usual practice with industry, sensitive business and proprietary information will be respected and kept confidential.

The Program will not evaluate treatment or disposal technologies. While "innovative" technologies are the primary focus, EPA has indicated that we

ABSTRACT

A roller compression extractor that extracts fluids from reusable sorbent pads was evaluated as a method of waste reduction. The extraction device, evaluated for industrial fluid users in New Jersey, was found to be effective in recycling unpleated sorbent pads, especially for low-viscosity fluids. The unpleated sorbent pads can be reused for at least eight times for low-viscosity fluids and up to three times for medium-viscosity fluids. However, the extractor cannot be used for pads soaked with high-viscosity fluids. The annual savings in dollar can be substantial; 56% to 79% savings would be possible if pads are reused two and eight times, respectively. The cost per use can be as low as \$1.00 for eight reuse cycles, versus \$4.80 for single usage. The savings come primarily from cost reductions in sorbent pads' disposal.

This report was submitted in partial fulfillment of Contract Number 68-CO-0003, Work Assignment 0-06, under the sponsorship of the U.S. Environmental Protection Agency. This report covers a period from February 1991 to November 1991, and the study was completed as of November 30, 1991.

ACKNOWLEDGEMENTS

The U.S. Environmental Protection Agency and Battelle acknowledge the important contribution made by representatives of the New Jersey Department of Environmental Protection, Division of Hazardous Waste Management, in identifying and locating a site for this technology evaluation. Andrew Latham of Environmental Management Products, Inc. and Dick Cariss of Cook's Industrial Lubricants, Inc. are acknowledged for providing the extractor and support for the on-site evaluation, and for reviewing the test results.

NOTICE

This material has been funded wholly or in part by the U.S. Environmental Protection Agency (U.S. EPA), under Contract No. 68-CO-0003 to Battelle. It has been subjected to the Agency's peer and administrative review and approved for publication as a U.S. EPA document. Approval does not signify that the contents necessarily reflect the views and policies of the U.S. EPA or Battelle; nor does mention of trade names or commercial products constitute endorsement or recommendation for use. This document is intended as advisory guidance only to the industrial fluid users in developing approaches to waste reduction. Compliance with environmental and occupational safety and health laws is the responsibility of each individual business and is not the focus of this document.

SECTION 1 PROJECT DESCRIPTION

The objective of the U.S. Environmental Protection Agency's (U.S. EPA) Waste Reduction Innovative Technology Evaluation (WRITE) Program is to evaluate, in a typical workplace environment, examples of prototype technologies with potential for reducing wastes at the source or for preventing pollution. In general, when evaluating each technology, we have three tasks at hand.

The first is to ask, is the new technology effective in obtaining a satisfactory work product? Because waste reduction and pollution prevention technologies usually involve recycling or reusing materials, or using substitute materials or techniques, it is important to verify that the quality of the materials and the quality of the work product are satisfactory for the intended purpose. Second, we ask, does using the technology measurably reduce waste and/or prevent pollution? Last, we must quantify and compare the economics of the new technology with that of the existing technology and/or the technology to be replaced. It should be noted, however, that improved economics is not the only criterion for the use of the prototype technology. There may be justifications other than saving money that would encourage adoption of new operating approaches. Nevertheless, information about the economic implications of any such potential change is useful.

This evaluation involves a commercially available technology, offered by a specific manufacturer, for fluid recycling using sorbent pads. The unit evaluated was manufactured by Environmental Management Products, Inc. in Ridgefield, New Jersey. Other sorbent pad recycling units and technologies for similar applications may also be commercially available from other manufacturers.

1.1 PROJECT OBJECTIVES

The goal of this study is to evaluate a technology that extracts fluids such as mineral oils, cutting fluids, and solvents from sorbent pads by roller compression. In the current method, the pad and the sorbed fluid have to be disposed of when the pad becomes fully saturated with fluid. With the roller compression extraction process, the saturated sorbent pads can be reused several times before disposal. In some cases, it is also possible to recover the fluid. This study has these objectives:

1. To evaluate the waste reduction potential of this technology (see section 1.4.1 and Chapter 2),
2. To evaluate the fluid retention and fluid pickup of the recycled pads (see section 1.4.2 and Chapter 3), and
3. To evaluate the cost of recycling pads versus the cost of disposal (see section 1.4.3 and Chapter 4).

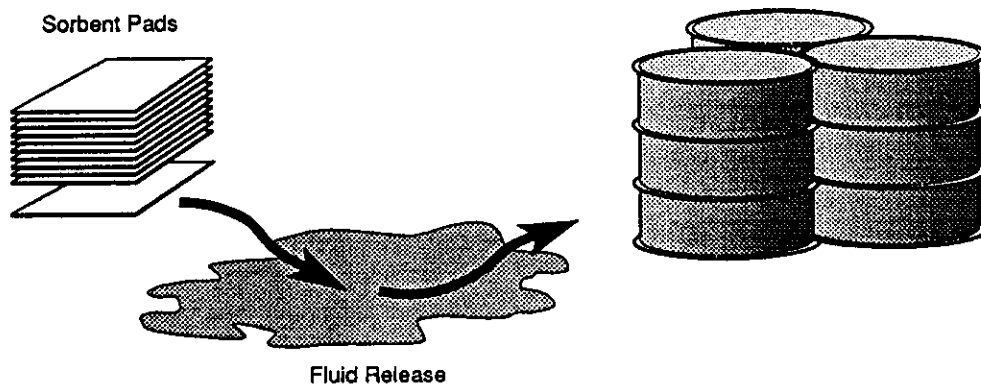
1.2 DESCRIPTION OF THE EVALUATION SITE

The evaluation of the roller compression extractor was performed at Cook's Industrial Lubricants, Inc. in Linden, New Jersey. Cook's Industrial is a custom blender of industrial lubricants. It manufactures over three million gallons of industrial lubricants, including 450 active formulas such as lubricating oils, hydraulic oils, greases, compressor oils, and a full line of metal working fluids. Cook's Industrial's plant occupies approximately 50,000 ft² and employs about 20 full-time workers. Most of Cook Industrial's fluids flow through pipes; therefore, it is not heavily labor intensive.

1.3 DESCRIPTION OF THE TECHNOLOGY

In the process of mixing, handling, and packaging the fluids, spills occasionally occur. At the end users' sites, the fluids may be spilled or cutting oil splattered during its use in the machining process. Currently the spilled or splattered fluid is removed by hand with sorbent pads made of melt-blown polypropylene. Workers simply lay the pads over the spilled fluid and mop the spilled areas. Once the pads are saturated with fluid, they are drummed for disposal. Cook's has undertaken an effort to reduce its own waste production and that of the end users of its products. Cook's is using the Environmental Management Products' Extractor™ to recover the spilled fluid from the saturated sorbent pads (see Appendix I for the description of the Extractor™). The Extractor™ recovers the fluid by compressing the pads between two gear-driven counter-rotating rollers. The rollers squeeze the fluid out of the pads. Figure 1.1 shows the schematic of the old process of sorbent pad use and disposal and that of the new sorbent pad recycle system.

Old Process



New Process

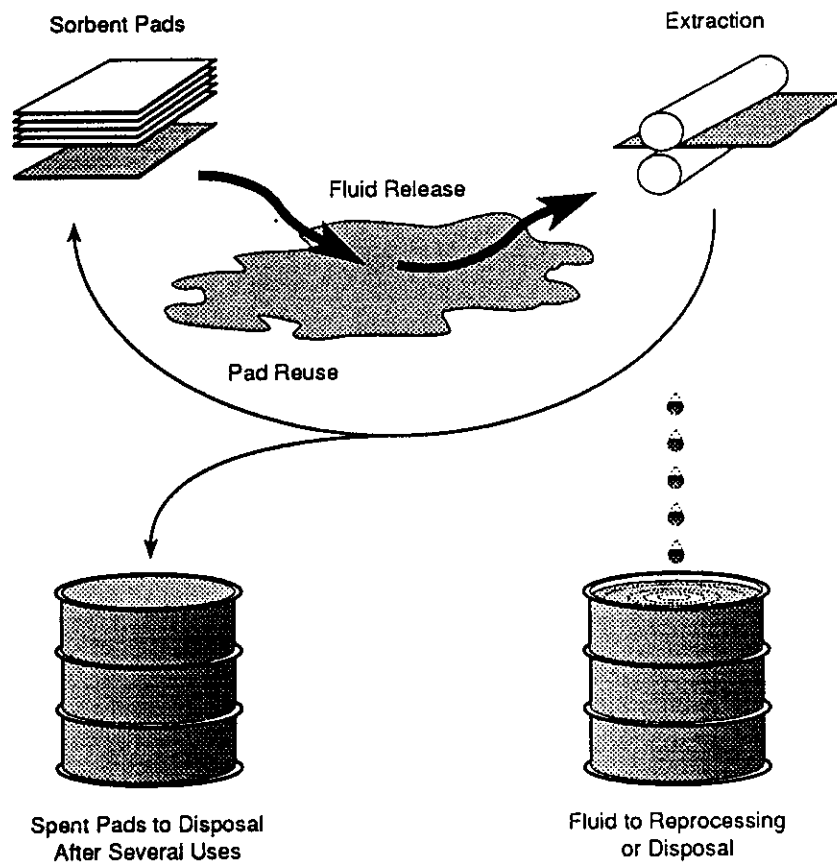


Figure 1.1. Schematic of Pad Disposal and Recycle Processes

1.4 EVALUATION APPROACH

Several measurements were performed to achieve the three specific objectives of the study. Table 1.1 lists the critical and noncritical measurements. The critical measurements are those that directly impact the technical objectives of this study. Table 1.2 summarizes the number of tests performed and the test (or pad) numbers assigned to each of the three critical measurements, i.e., extraction efficiency test, rate-of-release test, and fluid pickup test.

1.4.1 Waste Reduction Potential Objective

Two types of waste were considered in this study: sorbent pads and waste fluids. The sorbent pads are used to sorb spilled or splashed fluids. The current practice is to dispose of the spent pads after one use. The roller compression method extracts the sorbed fluid, allowing the reuse of the pads. The extracted fluid is contaminated with the dirt and debris picked up during the spill, but may be processed for reuse. Therefore, this technology has the possibility of reducing the number of sorbent pads used and the volume of sorbent pads and fluids sent to disposal. Although new pads are not hazardous, the fluid sorbed by them may be. Because the pads take on the characteristics of the sorbed fluid, pad recycling can reduce the volume of hazardous waste disposal.

The extraction efficiency test (see ASTM Standard Method F726-81 in reference 1) was selected to determine the number of saturation/extraction cycles a sorbent pad can endure before becoming unusable due to tearing, deforming, or other general deterioration. The test was also used to examine the rate of decrease in the pads' sorbing capacity (or adsorbency ratio) and the percentage of fluid that can be removed by roller compression. Because fluid removal is dependent on the fluid viscosity, tests were conducted with three different fluids covering a range of viscosities. The fluid viscosity along with specific gravity, boiling point, flash point, etc., were obtained from the manufacturer's material safety data sheets (MSDSs).

1.4.2 Product Quality Objective

The extraction process may affect the sorbent pad's ability to retain fluid and provide a clean surface. These product quality indicators were determined by a rate-of-release test (see