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**summaries of solid waste management  
contracts**

**JULY 1, 1970—MARCH 31, 1975**

An environmental protection publication in the  
solid waste management series (SW-5.4)

Requests for technical information related to specific contracts should be addressed to the Office of Solid Waste Management Programs, U.S. Environmental Protection Agency, Washington, D.C. 20400. Requests for published information should be address to Solid Waste Management Publications Distribution, Cincinnati, Ohio 45268.

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# SUMMARIES OF SOLID WASTE MANAGEMENT CONTRACTS

July 1, 1970--March 31, 1975

*This publication (SW-5.4) was compiled  
by RALPH J. BLACK.*

U.S. ENVIRONMENTAL PROTECTION AGENCY  
1975



## FOREWORD

THE CONTRACT MECHANISM is an important tool of the Office of Solid Waste Management Programs of the U.S. Environmental Protection Agency. Technical investigations are conducted by the Office's own staff, but this staff is not large enough to carry on all the research and studies needed for working out the Nation's problems in managing its solid wastes. While capabilities of universities and other nonprofit organizations are being tapped through research grants as well as other types of grants, <sup>1-3</sup> contracts make it possible to use the accumulated practical experience and trained staffs of business and professional consultants.

Contracts are administered by means of regular written reports and oral discussion on a basis comparable to the review of work performed within the Office itself. This helps to ensure that the contract research fully meets the study intent. At the same time it keeps the Office staff informed on research progress and findings as they develop.

It is also important that the research world and the public at large learn of the results of contract investigations. Although a full report on each contract is usually published upon conclusion of the work, there is a legitimate demand for publication of prospectuses of the contracts and any information that can be made available on contract progress.

The present compilation is intended to satisfy that need. It contains abstracts on contracts undertaken from the beginning of activities conducted with funds appropriated under the Solid Waste Disposal Act. In the initial stages, many of the subjects for study were suggested by

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<sup>1</sup> LEFKE, L. W., A. G. KEENE, R. A. CHAPMAN, and H. JOHNSON, comps. Summaries of solid waste research and training grants--1970. Public Health Service Publication No. 1596. Washington, U.S. Government Printing Office, 1971. 134 p.

<sup>2</sup> SPONAGLE, C. E., and P. L. STUMP. Solid waste management demonstration grant projects--1971; for grants awarded during the period June 1, 1966-June 30, 1971. Public Health Service Publication No. 1821. Washington. U.S. Government Printing Office, 1971. 247 p.

<sup>3</sup> TOFTNER, R. O., D. D. SWAVELY, W. T. DEHN, and B. L. SWEENEY, comps. State solid waste planning grants, agencies, and progress--1970, report of activities through June 30, 1970. Public Health Service Publication No. 2109. Washington. U.S. Government Printing Office, 1971. 26 p.

applicants and led to unsolicited contracts. As more detailed information was developed, it became easier to pinpoint gaps in our solid wastes knowledge and, therefore, to utilize contracts that are directed toward meeting these deficiencies.

The variety and extent of subject matter defy easy characterization and can be judged only by a look at the table of contents. The contracts described in this publication, as well as other contracts planned, hold great promise of extending the field of knowledge on solid waste management.

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# SUMMARIES OF SOLID WASTE MANAGEMENT

## CONTRACTS

July 1, 1970--March 31, 1975

THIS IS A COMPENDIUM of contract projects supported by the Office of Solid Waste Management Program and its predecessors since the passage of the Solid Waste Disposal Act of 1965. This publication is intended to inform readers of the variety of contracts being supported so that information developed from this activity can be made quickly available and disseminated to those persons who can best use the information. We hope that the publication may stimulate prospective contractors to conceive new approaches that through research and development will lead to an advancement of technology and to better methods of solid waste management.

The Solid Waste Disposal Act of 1965, as amended by the Resource Recovery Act of 1970, directs the Secretary of the Department of Health, Education, and Welfare (functions transferred by Reorganization Plan No. 3 to the Administrator, Environmental Protection Agency) to conduct and encourage--and to cooperate with and assist appropriate public authorities, agencies, and institutions; private agencies and institutions; and individuals in the conduct of: (1) research, training, demonstrations, surveys, and other studies relating to adverse health and welfare effects caused by solid wastes; (2) operation and financing of solid waste disposal programs; (3) reduction of the amounts of such waste and unsalvageable waste materials; (4) development and application of new and improved methods of solid waste processing and materials and energy recovery; (5) identification of solid waste components and potential recoverable materials and energy.

In carrying out the provisions as directed, the Secretary is authorized to: (1) collect and make available, through publications and other means, the results of such research and other activities; (2) cooperate with public and private agencies, institutions, and industries in the preparation and conduct of such research and other activities; (3) make grants-in-aid and contracts with public or private agencies, institutions, and individuals for research, training, surveys, and demonstrations.

Any grant, agreement, or contract made or entered into is to contain provisions to ensure that all information, uses, processes, patents, and other developments resulting from any activity undertaken pursuant to such grant, agreement, or contract will be made readily available on fair and equitable terms to those industries utilizing methods of solid waste disposal and to industries engaged in furnishing devices, facilities, equipment, and supplies to be used in connection with solid waste disposal.

The summaries, arranged alphabetically by contractor, represent the efforts made to carry out this contract authority. One can readily see that there is no single approach applicable to the wide variety of solid wastes produced and that, as the concept of solid waste management has developed, so has the scope of our contracts. The characteristics of solid wastes are continually changing through product innovation, industrial process modification, and changes in living habits of the general population. Storage, collection, transport, processing, utilization, and disposal practices must continually be modified to keep pace with these changes.

Research contracts are used to implement the efforts directed by the Solid Waste Disposal Act of 1965 and the Resource Recovery Act of 1970. The contract mechanism makes it possible to support projects for which neither staff nor equipment is available. This mechanism permits the national program to utilize specialized facilities, organizations, and capabilities wherever they may exist. A contract may be a separate project in itself or may complement in-house research.

Solicited contracts are awarded to qualified contractors who submit the best proposals in response to advertised requests as they appear in the Commerce Business Daily. This competitive mechanism is used to ensure that the work required will be performed in the most economical manner by those best qualified.

Profit and nonprofit organizations desiring to perform research within the scope and intent of the Solid Waste Disposal Act are invited to submit proposals for consideration. All proposals submitted are evaluated for technical contribution and program relevancy, and compete with other proposals, both solicited and unsolicited, for priority funding.

Each project summary in this compilation includes the objectives, the approach used, and a summary of progress where available. The subject index, at the end of the publication, is the work of Miss Julie Larsen, to whom we are also indebted for much assistance in preparation of this volume. The compendium omits many contracts for which information was incomplete but which we hope to include in the next edition.

Battelle Pacific Northwest Laboratories

PROGRAM FOR THE MANAGEMENT OF HAZARDOUS WASTES

CONTRACT NO. 68-01-0762

CONTRACTOR: Battelle Pacific Northwest Laboratories	COST: \$580,000
Richland, Washington 99352	PROJECT START: September 1972
PROJECT DIRECTOR: Ward H. Swift	PROJECT END: May 1973

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OBJECTIVE

To examine the technical and economic feasibility of a system of national disposal sites (NDS) for the processing or disposal of hazardous wastes.

APPROACH

The contract was the last in a series of five separate, but interrelated, contract studies commissioned by EPA to generate the information needed for the report to Congress mandated by Section 212 of the Solid Waste Disposal Act (P.L. 89-272), as amended. The major investigative phases of the work included: (1) review and analysis of the information and data generated by the previous contract studies in this series; (2) recommendations on quantities and categories of hazardous wastes to be processed at national disposal sites; (3) recommendations on methods of processing recovery and disposal to be established at the sites; (4) development of criteria for selection, evaluation, and recommendation of potential sites; (5) preparation of conceptual designs for hazardous waste processing and disposal systems at the sites; (6) preparation of capital and operational cost estimates for the facilities; (7) examination of financing and cost distribution mechanisms; and (8) recommendations on implementation mechanisms for the establishment of a system of national disposal sites.

SUMMARY OF PROGRESS

A final report has been submitted, which contains: (1) data, analysis, and rationale for defining and indentifying hazardous waste streams according to industry classification and by hazardous constituents; (2) a ranking system that may be used to develop a priority-of-concern list of hazardous wastes; (3) conceptual designs and process types of systems and subsystems (e.g., liquids-solids separation module, resource recovery, effluent monitoring); (4) detailed cost estimates for small, medium, and large site-types; (5) specific site selection criteria, site screening procedures, characteristics and locations of existing and potential sites, and a rating system to be used in site selection; (6) an analysis of economic and financing considerations, including public and private sector financing; (7) a listing of twelve institutional alternatives for implementing a system of national disposal sites along with an analysis of the advantages and disadvantages of each; and (8) a listing of existing State and Federal legislation and regulations dealing with transportation, processing, disposal, and storage of hazardous wastes.

BATTTELLE MEMORIAL INSTITUTE. Program for the management of hazardous wastes.  
v.1. Environmental Protection Publication SW-54c. U.S. Environmental  
Protection Agency, 1974. 385 p.

BATTELLE MEMORIAL INSTITUTE. Program for the management of hazardous wastes.  
v.2. Environmental Protection Publication SW-54c. U.S. Environmental  
Protection Agency, 1974. 778 p.

Biospherics, Inc.

VERIFICATION OF BIBLIOGRAPHIC CITATIONS AND EDITING AND TYPING OF  
OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS REPORTS

CONTRACT NO. 68-01-2600

CONTRACTOR: Biospherics, Inc.  
4928 Wyaconda Road  
Rockville, Maryland 20852

COST: \$60,542

PROJECT START: April 1974

PROJECT DIRECTOR: Karen Levin

PROJECT END: June 1975

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OBJECTIVE

Verification of reference citations; preparation of verified references according to printing process planned; preparation of subject and author indexes; cataloging of reports and open file reports.

APPROACH

Manuscripts and publications are submitted to the contractor for verification of reference citations, technical editing, or cataloging and indexing. This service is used to provide input for a variety of publications.

SUMMARY OF PROGRESS

A total of 398 hours of editing has been utilized, 622 references have been verified, and 316 publications catalogued.

Publication: This service is used to provide input for a variety of publications.

Booz-Allen & Hamilton

AN EVALUATION OF THE IMPACT OF DISCRIMINATORY TAXATION  
ON THE USE OF PRIMARY AND SECONDARY MATERIALS

CONTRACT NO. 68-01-0792

CONTRACTOR: Booz-Allen & Hamilton  
Management Consultants  
1025 Connecticut Avenue, N.W.  
Washington, D.C.

COST: \$97,358

PROJECT START: January 1973

PROJECT DIRECTOR: John Reilly

PROJECT END: July 1974

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OBJECTIVE

To identify and discuss the different tax incentives available to suppliers of virgin and secondary materials and to compare the tax savings at the raw material and product levels where virgin and secondary materials compete. The ultimate effect of tax incentives on prices of and demand for secondary materials will also be discussed.

APPROACH

The literature was surveyed to identify tax incentives and their value to various industries; additional information was gathered by discussions with industry personnel. Price and demand effects were then determined.

SUMMARY OF PROGRESS

A final report is being reviewed for publication by the National Technical Information Service.

Calspan Corporation

ENVIRONMENTAL IMPACTS OF RECYCLING:  
FERROUS, ALUMINUM AND PLASTICS

CONTRACT NO. 68-01-0794

CONTRACTOR: Calspan Corporation  
P.O. Box 235  
Buffalo, N.Y. 14221

COST: \$91,000

PROJECT START: February 1973

PROJECT DIRECTOR: S. M. Yaksich

PROJECT END: April 1974

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OBJECTIVE

To develop data on the comparative air and water pollutant emission, solid waste generation, energy consumption and other environmental impacts of production of basic steel, aluminum, and plastics materials via alternative virgin and secondary (recycle) production systems. Costs of pollution control are also considered.

APPROACH

The entire material production system from raw material extraction through processing stages was studied to develop technical data on a modular (industry/process) basis. Basic methods used were a literature search and general interviews. 1975-1977 air and water pollution control standards governed emission-level and cost-of-control data acquisition and analysis.

SUMMARY OF PROGRESS

The final report draft covering steel and aluminum has been completed.

Dimpex Associates, Inc.

INVESTIGATION AND EVALUATION OF INNER-CITY  
SOLID WASTE PROBLEMS

CONTRACT NO. 68-01-0577

CONTRACTOR: Dimpex Associates, Inc. 51 East 42nd Street New York, New York 10017	COST: \$95,783  PROJECT START: October 1972
PROJECT DIRECTOR: Vernon R. Hazlewood	PROJECT END: May 1973

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OBJECTIVE

To look for, assess, and compare the causes of poor solid waste conditions in seven inner-city areas.

APPROACH

Data were sought on: (1) physical and social characteristics of each target area, including income levels, population density, incidence of home ownership, numbers of vacant lots and dilapidated buildings; (2) the solid waste itself, including the amount and kinds of litter, bulk, and miscellaneous waste such as white goods, abandoned autos, tires; (3) solid waste storage facilities, including a count of all forms of containerization within the target areas and an assessment of both their storage capacity and utilization by container type; (4) solid waste collection methodology, including a description of collection methods, level of service, charges, the role of supplemental public agencies in the collection process, and the role of private collectors in the inner city; (5) municipal ordinances and codes pertaining to solid waste management, including an examination of their currency, scope, the extent to which authority for environmentally sound solid waste management is fragmented throughout city operating departments, and problems of providing resources to meet code standards.

SUMMARY OF PROGRESS

All phases of the project have been completed and a final report submitted.



AN ESTIMATION OF CONSUMER DEMAND ELASTICITIES

CONTRACT NO. 68-01-2284

CONTRACTOR: Ernst & Ernst  
1225 Connecticut Avenue  
Washington, D.C. 20036

COST: \$59,617

PROJECT START: April 1974

PROJECT DIRECTOR: Frederick L. McCoy

PROJECT END: April 1975

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OBJECTIVE

To develop elasticities for various products and product classes to determine whether fiscal policy is a viable tool for effecting source reduction in the products that significantly contribute to the solid waste stream.

APPROACH

A survey of current literature and techniques of elasticity estimation was conducted to indicate areas already estimated and gaps in knowledge. A detailed data base will be assembled to enable specific product estimation to be undertaken. Elasticity coefficients will be estimated and the results evaluated.

SUMMARY OF PROGRESS

The survey of literature and techniques for elasticity estimation is now complete.

Stuart Finley, Inc.

SOLID WASTE MANAGEMENT ANNUAL FILM REPORT

CONTRACT NO. CPE-69-111

CONTRACTOR: Stuart Finley, Inc. 3428 Mansfield Road Falls Church, Virginia 22041	COST: \$246,436  PROJECT START: July 1969
PROJECT DIRECTOR: Stuart Finley	PROJECT END: March 1975

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OBJECTIVE

To develop 16-mm, color, sound motion pictures on solid waste management activities. These will help fulfill the program's basic responsibility for improving solid waste management in the United States through the dissemination of technical information.

APPROACH

The contractor provides all production personnel, materials, and services necessary for the preparation and completion of motion pictures.

SUMMARY OF PROGRESS

Six films have been completed.

The stuff we throw away (June 1970).  
What's new in solid waste management (November 1970).  
Recycling (May 1971).  
The realities of recycling (August 1971).  
5,000 Dumps (May 1971).  
The big pickup (March 1975).

The Franklin Institute

EDITING AND TYPING OF OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS  
SUMMARY REPORTS AND VERIFICATION OF BIBLIOGRAPHIC CITATIONS

CONTRACT NO. 68-01-1804

CONTRACTOR:	The Franklin Institute	COST:	\$38,720
	Benjamin Franklin Parkway		
	Philadelphia, Pennsylvania 19103	PROJECT START:	February 1973
PROJECT DIRECTOR:	Dawn Spickler	PROJECT END:	May 1974

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OBJECTIVE

To edit and type approximately 3,500 pages of summary reports resulting from Office of Solid Waste Management Programs (OSWMP) grants and contracts, and to verify approximately 2,200 references.

APPROACH

The contractor provides all the necessary personnel, services, materials, supplies, and facilities. Citations are checked against previously verified OSWMP references on file and new citations verified against the source document. The edited reports and verified bibliographic citations are typed on MTST tapes with an MTSR element for input into the SWM/EPA Electronic Composition System.

SUMMARY OF PROGRESS

A total of 3,533 manuscript pages have been completed and 2,275 references verified.

The Franklin Institute

UPDATING AND OPERATION OF THE SOLID WASTE  
INFORMATION RETRIEVAL SYSTEM (SWIRS)

CONTRACT NO. 68-01-0447

CONTRACTOR: The Franklin Institute Benjamin Franklin Parkway Philadelphia, Pennsylvania 19103	COST: \$538,500 PROJECT START: August 1972
PROJECT DIRECTOR: Alec Peters	PROJECT END: December 1974

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OBJECTIVE

To continue the day-to-day operations of the Solid Waste Information Retrieval System (SWIRS), Office of Solid Waste Management Programs.

APPROACH

The contractor provides continuous input from the world's open literature, both in abstract and document form, to the existing information bank. This input consists of periodical, nonperiodical, and patent literature. Output provided consists of responding to day-to-day inquiries for literature searches in the area of solid waste management from a wide range of users, preparing Linotron coded computer tapes of monthly abstract bulletins, preparing limited translations upon the request of the Project Office, and conducting annual user surveys regarding the effectiveness of the system.

SUMMARY OF PROGRESS

In the first 22 months, specific user needs were satisfied, and the input requirements were completed, as were two user surveys. One report as a result of the first user survey was completed during the first year's effort. The required number of issues of the monthly abstract bulletin have been delivered to the program.

CONNOLLY, J. A., ed. Solid Waste Management; Abstracts from the Literature: Monthly Bulletin. 1972-1975. (In preparation.)

Solid waste information retrieval system (SWIRS) user survey no. 1.  
Rockville, Md., The Franklin Institute Research Laboratories Science  
Information Services, May 23, 1973. 37 p.

Solid waste information retrieval system (SWIRS) user survey no. 2.  
Rockville, Md., The Franklin Institute Research Laboratories Science  
Information Services, Sept. 20, 1974. 15 p., app.

The Franklin Institute

VERIFICATION OF BIBLIOGRAPHIC CITATIONS

CONTRACT NO. 68-03-0044

CONTRACTOR: The Franklin Institute Benjamin Franklin Parkway Philadelphia, Pennsylvania 19103	COST: \$31,158.09 PROJECT START: July 1971
PROJECT DIRECTOR: Alec Peters	PROJECT END: June 1972

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OBJECTIVE

To verify, restyle, and type bibliographic citations from contract, grant, and research studies sponsored by the Office of Solid Waste Management Programs. These citations will then be published in the reports on each study.

APPROACH

The contractor checked reference citations submitted by OSWMP against those on file that had already been verified by OSWMP and the Franklin Institute and verified new citations by locating the source document.

SUMMARY OF PROGRESS

The project is completed.

ANALYSIS OF THE ENVIRONMENTAL IMPACTS  
OF PRODUCTION FROM VIRGIN  
AND SECONDARY PAPER, GLASS, AND RUBBER

CONTRACT NO. 68-01-1815

CONTRACTOR: Gordian Associates  
30 Rockefeller Center  
New York, N.Y.

COST: \$64,513

PROJECT START: March 1973

PROJECT DIRECTOR: Robert Kapner

PROJECT END: February 1974

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OBJECTIVE

To develop data on the comparative air and water pollutant emissions, solid waste generation, energy consumption, and other environmental impacts of production of primary paper, rubber, and glass products via alternative virgin and secondary (recycle) production systems. The cost of pollution control in the paper sectors considered is also to be studied.

APPROACH

The entire material production system from raw material extraction through processing was considered, and technical data on a modular (unit process) basis was developed. Methods employed included a literature search, interviews, and engineering calculations. 1975-1977 air and water pollution control standards were used to figure emission-level control costs.

SUMMARY OF PROGRESS

A final report is being written for publication.

INDUSTRIAL ENERGY REQUIREMENTS DATA  
AND ENVIRONMENTAL IMPACTS OF SELECTED MATERIAL  
RECYCLE AND PRODUCT REUSE OPTIONS

CONTRACT NO. 68-01-11105

CONTRACTOR: Gordian Associates  
30 Rockefeller Center  
New York, N.Y.

COST: \$75,000

PROJECT START: October 1972

PROJECT DIRECTOR: Adel Hakki

PROJECT END: December 1974

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OBJECTIVE

To develop basic data on energy requirements for total production systems for six basic materials industries, and on environmental impacts of alternative material and product industry systems.

APPROACH

Through a literature search, interviews, and engineering calculations, modular data for all major stages and components of material production systems were developed. Basic material industries include ferrous metal, aluminum, glass, rubber, plastic, and paper for the energy data development. Products and materials included in the environmental impact comparisons are principally related to containers and paperboard packaging.

SUMMARY OF PROGRESS

A final report has been submitted and approved: An Energy Analysis of the Production of Selected Products in Six Basic Material Industries, April 4, 1974. A revised draft final report has been received: Environmental Impacts Associated with Selected Options for the Recycling of Materials, Reuse of Products, and Recovery of Energy from Solid Waste, July 1, 1974.

Ross Hofmann, Associates

A STUDY OF PNEUMATIC SOLID WASTE COLLECTION  
SYSTEMS AS EMPLOYED IN HOSPITALS

CONTRACT NO. 68-03-0300

CONTRACTOR: Ross Hofmann, Associates  
2908 Salzedo  
Coral Gables, Florida 33134

COST: \$87,174

PROJECT START: June 1973

PROJECT DIRECTOR: Ross Hofmann

PROJECT END: January 1974

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OBJECTIVE

To evaluate and determine the technical, economic, and environmental feasibility of handling hospital solid waste via pneumatic transport; and to compare a pneumatic tube system with more conventional handcarting and gravity chute systems.

APPROACH

The three main pneumatic tube systems used by hospitals today were studied. They are: (1) single tube for trash/linen--thin wall construction; (2) dual, individual tube for trash/linen--thin wall construction; (3) dual, individual tube for trash/linen--heavy wall construction. Three hospitals were selected; and user rates and methodologies were studied in detail, as were maintenance aspects, environmental aspects, and total system costs. Cost comparisons were made with traditional handling techniques.

SUMMARY OF PROGRESS

The study was completed in January, 1974. In addition to the above the final report also discusses: (1) solid waste management in hospitals in general, (2) architectural design influences on transport systems, (3) design and construction considerations for pneumatic transport systems, and includes specific descriptions of the hospitals surveyed.

ROSS HOFMANN, ASSOCIATES. A study of pneumatic solid waste collection systems as employed in hospitals. Environmental Protection Publication SW-75c. U.S. Environmental Protection Agency, 1974. 260 p., app. (Distributed by National Technical Information Service, Springfield, Va., as PB-236 543.)



John F. Holman, Co., Inc.

TECHNICAL WRITING AND EDITING SERVICES

CONTRACT NO. 68-01-2643

CONTRACTOR: John F. Holman, Co., Inc.  
1346 Connecticut Avenue, N.W.  
Washington, D.C. 20036

COST: \$39,662

PROJECT START: June 1974

PROJECT DIRECTOR: John F. Holman

PROJECT END: June 1976

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OBJECTIVE

To obtain editorial and writing services to supplement Office of Solid Waste Management Programs Technical Information Staff resources.

APPROACH

The contract was designed to purchase 4,500 hours of editorial support and writing services on a fixed-price basis. This service is used to provide input for a variety of publications.

SUMMARY OF PROGRESS

Approximately 650 hours of services have been utilized.

Arthur D. Little, Inc.

ALTERNATIVES TO THE MANAGEMENT OF HAZARDOUS  
WASTES AT NATIONAL DISPOSAL SITES

CONTRACT NO. 68-01-0556

CONTRACTOR: Arthur D. Little, Inc.  
Acorn Park  
Cambridge, Massachusetts

COST: \$156,807

PROJECT START: June 1972

PROJECT DIRECTOR: Dr. John Funkhouser

PROJECT END: March 1973

---

OBJECTIVE

To define and evaluate on technical, economic, safety, and legal grounds the various alternatives for managing hazardous wastes.

APPROACH

The contract was part of a series of five separate, but interrelated, contract studies commissioned by EPA to generate the information needed for the report to Congress mandated by Section 212 of the Solid Waste Disposal Act (P.L. 89-272) as amended. The basic alternative approaches considered included: on-site processing; offsite processing; and onsite pretreatment with offsite treatment and disposal of hazardous wastes. The study was mainly devoted to assessing differences among these alternative approaches in: (1) the economics associated with waste treatment; (2) the immediate risk to human safety, as well as the eventual hazard to the environment; and (3) the legal and institutional issues that would have an impact on a national treatment system.

SUMMARY OF PROGRESS

A report was published, which includes comparisons of costs between offsite and onsite processing facilities, and concludes that the economies of scale associated with offsite processing facilities, in most cases, outweigh the transportation costs required to ship the wastes to the offsite facilities. A series of economic decision maps" was developed and can be used in making decisions about whether a waste producer would select onsite versus offsite treatment. Risk factor analyses were performed on all operations, including storage, transfer, transport, processing, and ultimate disposal. Analyses of legal and institutional factors indicated that: (1) few existing laws relate specifically to hazardous wastes; (2) there is a strong need for regulations to ensure that hazardous wastes are either properly treated or disposed of or not created in the first place; and (3) most of the substances found in a hazardous waste stream are not receiving adequate attention--especially with regard to ultimate disposal.

ARTHUR D. LITTLE, INC. Alternatives to the management of hazardous wastes at national disposal sites. Environmental Protection Publication SW-46c. U.S. Environmental Protection Agency, 1973. 85 p. (Distributed by National Technical Information Service, Springfield, Va., as PB-225 164.)

ARTHUR D. LITTLE, INC. Alternatives to the management of hazardous wastes at national disposal sites. v.2. Appendices. Environmental Protection Publication SW-46c.1. U.S. Environmental Protection Agency, 1973. 235 p. (Distributed by National Technical Information Service, Springfield, Va., as PB-237 264.)

Midwest Research Institute

BASE LINE FORECASTS OF RESOURCE RECOVERY 1972 TO 1990

CONTRACT NO. 68-01-0793

CONTRACTOR: Midwest Research Institute  
425 Volker Boulevard  
Kansas City, Missouri 64110

COST: \$64,000

PROJECT START: January 1973

PROJECT DIRECTOR: William Franklin

PROJECT END: September 1974

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OBJECTIVE

To develop forecasts of waste materials generated, recoverable waste materials, and resource recovery for seven types of materials common in solid wastes--paper, ferrous metals, aluminum, glass, rubber, plastics and textiles.

APPROACH

Forecasts of production and consumption of each material studied were prepared. Various products were forecast where intermaterial competition could shift material usage patterns. Waste quantities were estimated, and current and expected technology (energy and materials recovery facilities) for recovery of waste were considered. Combined forecasts for the amount of waste produced, the amount potentially recoverable, and the amount that would actually be recovered were made.

SUMMARY OF PROGRESS

Detailed data for all materials and forecasts have been prepared. A final report has been written.

EVALUATION AND COMPARISON OF SIZE-REDUCTION EQUIPMENT

CONTRACT NO. 68-03-0137

CONTRACTOR:	Midwest Research Institute 425 Volker Boulevard Kansas City, Missouri 64110	COST:	\$33,720.97
		PROJECT START:	June 1972
PROJECT DIRECTOR:	Hugh S. Hass	PROJECT END:	March 1973

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OBJECTIVE

To develop a detailed procedure for the evaluation and comparison of size-reduction equipment.

APPROACH

Manufacturers and operating installations were contacted for basic data concerning size reduction. Various types of equipment were described in detail, and current techniques were listed. A complex decisionmaking algorithm was developed to help the solid waste manager select size-reduction equipment.

SUMMARY OF PROGRESS

The project was completed.

RESOURCE AND ENVIRONMENTAL PROFILE ANALYSIS  
OF NINE BEVERAGE CONTAINER ALTERNATIVES

CONTRACT NO. 68-01-1848

CONTRACTOR: Midwest Research Institute	COST: \$50,000
425 Volker Boulevard	
Kansas City, Missouri 64110	PROJECT START: May 1973
PROJECT DIRECTOR: William Franklin	PROJECT END: August 1974

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OBJECTIVE

To discover the impact of the use of alternative beverage containers on resource and energy consumption and the generation of solid waste and other pollutants.

APPROACH

A detailed study of each manufacturing and transportation step in the life cycle of a container was undertaken from the extraction of raw materials through the fabrication of the product, distribution, use, and final disposal.

Throughout the container life cycle, seven resource and environmental impact categories were identified and quantified: (1) virgin raw materials use, (2) energy consumption, (3) water use, (4) industrial solid waste production, (5) post-consumer solid waste generation, (6) air pollution emissions, (7) water pollution effluents.

To assure the accuracy of the analysis, a draft report was provided for review by industrial and other technical experts.

SUMMARY OF PROGRESS

A report on the resource and environmental impact of nine different beverage container systems has been accepted. Detailed data for each process in the life cycle of a beverage container are included. A summary section compares alternative container systems and describes the impact of recycling on all container systems and the impact of various trip rates (number of times actually reused) for reusable containers. The analysis shows that a shift from current beverage container systems to a returnable system that maximizes reuse and recycling of containers would result in a significant reduction in raw material and energy use, and a decrease in environmental pollution.

HUNT, R. G., W. E. FRANKLIN, et al. Resource and environmental profile analysis of nine beverage container alternatives. Environmental Protection Publication SW-91c. Washington, U.S. Government Printing Office, 1974. 178 p.

The Mitre Corporation

ASSISTANCE FOR THE OFFICE OF SOLID WASTE MANAGEMENT PROGRAMS,  
EPA, IN EVALUATING PROPOSALS FOR RESOURCE RECOVERY SYSTEMS  
DEMONSTRATION GRANTS

CONTRACT NO. 68-01-0749

CONTRACTOR: The Mitre Corporation	COST: \$130,300
P.O. Box 208	
Bedford, Massachusetts 01730	PROJECT START: June 1972
PROJECT DIRECTOR: Stephen G. Lewis	PROJECT END: November 1972

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OBJECTIVE

To assist the Office of Solid Waste Management Programs (OSWMP) in developing an impartial, consistent, comprehensive evaluation plan for ranking proposals for resource recovery demonstration grants to be awarded under section 208 of the Solid Waste Disposal Act of 1965, as amended, and using the plan developed, to assist the Office in the evaluation of grant proposals.

APPROACH

Evaluation criteria were developed from OSWMP objectives for the grant program. These criteria were grouped into three principal categories: technical feasibility, local feasibility, and national applicability. The grant proposal evaluation was conducted by a team composed of EPA and contractor personnel, who worked with the proposals and made site visits to gather information for the evaluation structure. After data gathering, the teams assigned scores to evaluation factors and subfactors, summarized their findings in narrative form, and made recommendations to the Director, Resource Recovery Division, OSWMP. Division recommendations were submitted to the Deputy Assistant Administrator, Solid Waste Management Programs, for final decision and grant award.

SUMMARY OF PROGRESS

The contract has been completed and a final report, A Framework for Evaluation of Demonstration Resource Recovery System, is available. However, it was not produced in volume, since the evaluation structure presented applies only to the Federal demonstration grant program.

Moshman Associates

TRANSPORTATION RATES AND COSTS  
FOR SELECTED VIRGIN AND SECONDARY COMMODITIES

CONTRACT NO. 68-02-0790

CONTRACTOR: Moshman Associates  
6400 Goldsboro Road  
Bethesda, Maryland 20034

COST: \$59,175

PROJECT START: December 1972

PROJECT DIRECTOR: David G. Abraham

PROJECT END: September 1973

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OBJECTIVE

To examine and compare transportation rates for competing secondary and virgin materials and to examine the basis for these rates. The reasonableness of the rates for each commodity, the fairness of the level of rates for secondary commodities compared with their virgin counterparts, and the magnitude of the effect of transportation charges on commodity prices will be determined.

APPROACH

The study was primarily concerned with the rail movement of virgin and secondary commodities although barge and truck traffic were briefly considered. Common moves from processors to mill were established for competing virgin and secondary materials. The materials studied were steel, paper, aluminum, glass, and rubber. The freight rates charged were ascertained, and the costs to the carriers to provide these services calculated. Costs and revenues were compared, and, finally, the effect of the transportation charges upon the delivered price of the material was described.

SUMMARY OF PROGRESS

A report on the findings has been published. The average rates for all commodities were reasonable, but numerous examples of inequities were found. For longer moves, secondary materials (scrap iron and most moves of glass cullet and reclaimed rubber) were at a disadvantage compared to substitutable virgin commodities. Only cullet prices were significantly affected by transportation charges.

ABRAHAM, D. G., W. B. SAUNDERS, and T. G. WOODALL. Transportation rates and costs for selected virgin and secondary commodities. Environmental Protection Publication SW-59c. U.S. Environmental Protection Agency, 1974. 234 p. (Distributed by National Technical Information Service, Springfield, Va., as PB-233 871.)



National Center for Resource Recovery, Inc.

CONTINGENCY PLANNING FOR RESOURCE RECOVERY

CONTRACT NO. 68-01-1831

CONTRACTOR: National Center for  
Resource Recovery, Inc.  
1211 Connecticut Avenue, N.W.  
Washington, D.C. 20036

COST: \$40,000

PROJECT START: April 1973

PROJECT DIRECTOR: Frank Bernheisel

PROJECT END: September 1974

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OBJECTIVE

To obtain a report of the experience of the National Center for Resource Recovery, Inc., in the conduct of a series of contingency planning studies for resource recovery systems for municipal solid waste. The results will be used by EPA to provide technical assistance.

APPROACH

The Center prepared analytical summaries of data accumulated in the course of its studies. One report describes a planning effort that resulted in the establishment of a resource recovery facility, and a second report summarizes the Center's total contingency planning effort, involving a number of municipalities.

SUMMARY OF PROGRESS

The contractor has completed the studies and is in the process of writing the final reports.

Raytheon Service Company

TECHNICAL WRITING AND EDITING SERVICES

CONTRACT NO. 68-01-2635

CONTRACTOR:	Raytheon Service Company Presidential Building 6525 Belcrest Road Hyattsville, Maryland 20782	COST:	\$31,552
PROJECT DIRECTOR:	Fred Krester	PROJECT START:	June 1974
		PROJECT END:	June 1976

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OBJECTIVE

To obtain editorial and writing services to supplement OSWMP/TIS staff resources.

APPROACH

The contract was designed to purchase 4,500 hours of editorial support and writing services on a fixed-price basis. These services provide input for a variety of publications.

SUMMARY OF PROGRESS

Currently two manuscripts are being prepared: a revised SWIRS request form and an ASCE sanitary landfill manual.

AN EVALUATION OF THE EFFECTIVENESS AND COSTS  
OF REGULATORY AND FISCAL POLICY INSTRUMENTS  
ON PRODUCT PACKAGING

CONTRACT NO. 68-01-0971

CONTRACTOR: Research Triangle Institute  
P.O. Box 12194  
Research Triangle Park  
North Carolina 27709

COST: \$75,849

PROJECT START: January 1973

PROJECT DIRECTOR: Tayler Bingham

PROJECT END: July 1974

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OBJECTIVE

To evaluate the costs and effectiveness of government policy instruments (regulation and tax) that may be used to influence the quantity and composition of consumer products packaging and the use of recycled materials in consumer product package manufacture.

APPROACH

The contractor developed detailed data on current consumer packaging practices and materials use by product class and analyzed the effectiveness of government policy in reducing solid waste generation and raw materials consumption, increasing post-consumer waste consumption, and reducing energy utilized and costs of implementation. This analysis of consumer packaging changes will be made for four government policies at various rates. The four policies are: regulation requiring recycled material use (at 10, 20, and 30 percent use of recycled materials), a tax per ton of packaging materials used (at 10, 22, 50 and 100 dollars-per-ton rates), a tax per ton of packaging materials used with an exemption for recycled material (same rates as tax per ton with no exemption) and a tax per container (at 0.5 cents, 1.0, 1.5 and 2.0 per unit).

SUMMARY OF PROGRESS

A final report has been completed.

BINGHAM, T. H., et al. An evaluation of the effectiveness and costs of regulatory and fiscal policy instruments on product packaging. Environmental Protection Publication SW-74c. Cincinnati, U.S. Environmental Protection Agency, 1974. 301 p.

Research Triangle Institute

THE SELECTION OF MATERIALS AND PRODUCTS FOR SOURCE REDUCTION

CONTRACT NO. 68-01-2248

CONTRACTOR: Research Triangle Institute  
P.O. Box 12194  
Research Triangle Park,  
North Carolina 27709

COST: \$118,656

PROJECT START: February 1974

PROJECT DIRECTOR: Tayler Bingham

PROJECT END: February 1975

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OBJECTIVE

To develop data and criteria necessary to select specific materials and products for a source reduction program and to analyze all major material and products in the municipal waste stream in relation to these criteria.

APPROACH

Specific criteria will be established in the general areas of resource conservation, waste management, and environmental impact. Data pertaining to all major materials, products, and product classes in the waste stream will be developed from published sources and industry contacts. An analysis of this data in relation to the criteria will be performed to indicate specific candidates for a source reduction program.

SUMMARY OF PROGRESS

Criteria development and data collection tasks are in progress.

Resource Planning Associates

EFFECTIVENESS OF FEDERAL REGULATORY PROGRAM

CONTRACT NO. 68-01-2256

CONTRACTOR: Resource Planning Associates  
14 Story Street  
Cambridge, Massachusetts 02138

COST: \$57,593

PROJECT START: February 1974

PROJECT DIRECTOR: Henri-Claude Bailly

PROJECT END: February 1975

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OBJECTIVE

To describe in detail the implementation and enforcement of past and present Federal programs that directly regulate material usage or product quantity and characteristics.

APPROACH

A survey of current regulatory efforts by all Federal agencies was made. Specific programs were identified that fit the objective. Interviews with operating program personnel and literature reviews will be conducted to analyze the effectiveness, impact, and costs of the programs.

SUMMARY OF PROGRESS

The survey of Federal regulatory programs has been completed, and specific programs have been selected for further examination. Interviews and reviews of the literature are in progress.

COST ANALYSIS OF SOURCE SEPARATE COLLECTION OF SOLID WASTE

CONTRACT NO. 68-01-0789

CONTRACTOR: SCS Engineers	COST: \$82,600
4014 Long Beach Boulevard	
Long Beach, California 90807	PROJECT START: December 1972
PROJECT DIRECTOR: Robert P. Stearns	PROJECT END: August 1974

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OBJECTIVE

To quantify and analyze the costs and revenues involved in recovering waste materials for recycling through separation at the source.

APPROACH

The contract was divided into three segments corresponding to the three major methods of source separation: (1) separate curbside collection of recyclable materials, (2) separation at recycling centers, (3) office separation. Case studies were performed in all three categories to ascertain real-world costs, and a computer model was developed. Time-motion studies were also conducted at the collection area. A householder impact study was performed in which approximately 20 families kept cost, time, and weight data on their recycling activities.

SUMMARY OF PROGRESS

The contract has been completed.

SCS ENGINEERS. Analysis of source separate collection of recyclable solid waste. v.1. Separate collection studies. Environmental Protection Publication SW-95c.1. U.S. Environmental Protection Agency, 1975. (In press; distributed by National Technical information Service, Springfield, Va., as PB-239 775.)

SCS ENGINEERS. Analysis of source separate collection of recyclable solid waste. v.2. Collection center studies. Environmental Protection Publication SW-95c.2 U.S. Environmental Protection Agency, 1975. (In press; distributed by National Technical Information Service, Springfield, Va., as PB-239 776.)

Solid Waste Engineering and Transfer Systems

THE ECONOMIC FEASIBILITY OF ADDING RESOURCE  
RECOVERY SYSTEMS TO EXISTING SOLID WASTE TREATMENT  
FACILITIES

CONTRACT NO. 68-01-1880

CONTRACTOR:	Solid Waste Engineering and Transfer Systems	
	501 Tunnel Avenue	COST: \$25,000
	San Francisco, California 94134	PROJECT START: June 1973
PROJECT DIRECTOR:	Wayne Trewhitt	PROJECT END: August 1974

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OBJECTIVE

To study the economic feasibility of adding resource recovery systems to existing solid waste treatment facilities, and to provide this information in report form.

APPROACH

The study was a cooperative effort among designers, engineers, system operators, and potential customers for recycled materials. A system was designed; the cost of equipment and facilities was estimated from bids from suppliers; and operating costs and revenues were estimated.

SUMMARY OF PROGRESS

The contractor has completed the study and is writing the final report.

Ralph Stone and Company, Inc.

EVALUATION OF A FULL-SCALE SOLID WASTE BALER

CONTRACT NO. 68-03-0332

CONTRACTOR: Ralph Stone and Company, Inc.  
10954 Santa Monica Boulevard  
Los Angeles, California 90025

COST: \$88,665

PROJECT START: June 1973

PROJECT DIRECTOR: Richard Kahle

PROJECT END: July 1974

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OBJECTIVE

To evaluate the technology and economics of a full-scale solid waste baling operation as well as the environmental impacts of landfilling baled solid waste.

APPROACH

Bale production rate, density, and springback over varying periods were studied. Incoming solid waste was sampled and the composition (including moisture) determined. Maintenance and operating procedures were described and analyzed, and a test cell for baled solid waste was constructed and evaluated. The cell was monitored on a regular basis for leachate and gas generation and composition, settlement, and load-bearing capacity. Total system costs were determined.

SUMMARY OF PROGRESS

All cost analysis, baled production, and bale characterization work has been completed. Monitoring of the test cell was completed in November 1974 and a draft final report submitted in December 1974.



Thor Associates, Inc.

TECHNICAL WRITING AND EDITING SERVICES

CONTRACT NO. 68-01-2644

CONTRACTOR:	Thor Associates, Inc. 3301 New Mexico Avenue, N.W. Suite 248, Foxhall Square Washington, D.C. 20016	COST:	\$39,880
		PROJECT START:	June 1974
PROJECT DIRECTOR:	Carole G. Brownlee	PROJECT END:	June 1976

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OBJECTIVE

To obtain editorial and writing services to supplement OSWMP/TIS staff resources.

APPROACH

The contract was designed to purchase 4,500 hours of editorial support and writing services on a fixed-price basis.

SUMMARY OF PROGRESS

At present, contractor is writing a slide show to communicate the problems of hazardous waste and rewriting manuscripts that deal with OSWMP's major technical assistance to cities.

ASSESSMENT OF INDUSTRIAL HAZARDOUS WASTE PRACTICES  
INORGANIC CHEMICAL INDUSTRY

CONTRACT NO. 68-01-2246

CONTRACTOR:	Versar, Inc. General Technologies Division 6621 Electronic Drive Springfield, Virginia 22151	COST:	\$170,000
PROJECT DIRECTOR:	Dr. Robert G. Shaver	PROJECT START:	January 1974
		PROJECT END:	September 1974

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OBJECTIVE

To identify and quantify the hazardous wastes that are or will be generated by the inorganic chemicals industry (SIC Code 281), to describe current practices for treating and disposing of hazardous wastes and control technologies that might reduce the hazards of disposal, and to estimate the cost of control technology implementation.

APPROACH

The industry was categorized by product and production quantity, process used, location, and age of firms and plants. Types, amounts, and sources of hazardous wastes generated were identified, and the technical adequacy and availability of in-process, treatment and disposal technology (other than techniques used for air and water pollution control) were assessed. Costs to the industry of implementing adequate hazardous waste treatment and disposal practices were also assessed.

SUMMARY OF PROGRESS

Categorization of the industry using 5-digit SIC code classifications has been completed. Tables have been developed showing the following data by State: number of establishments, plant size grouping by daily capacity, plant age groupings, groupings by process type, and annual production tonnage. Mass balance diagrams of numerous processes have been produced identifying points of generation, composition, and quantities of hazardous wastes. Data have been compiled on treatment and disposal technology.

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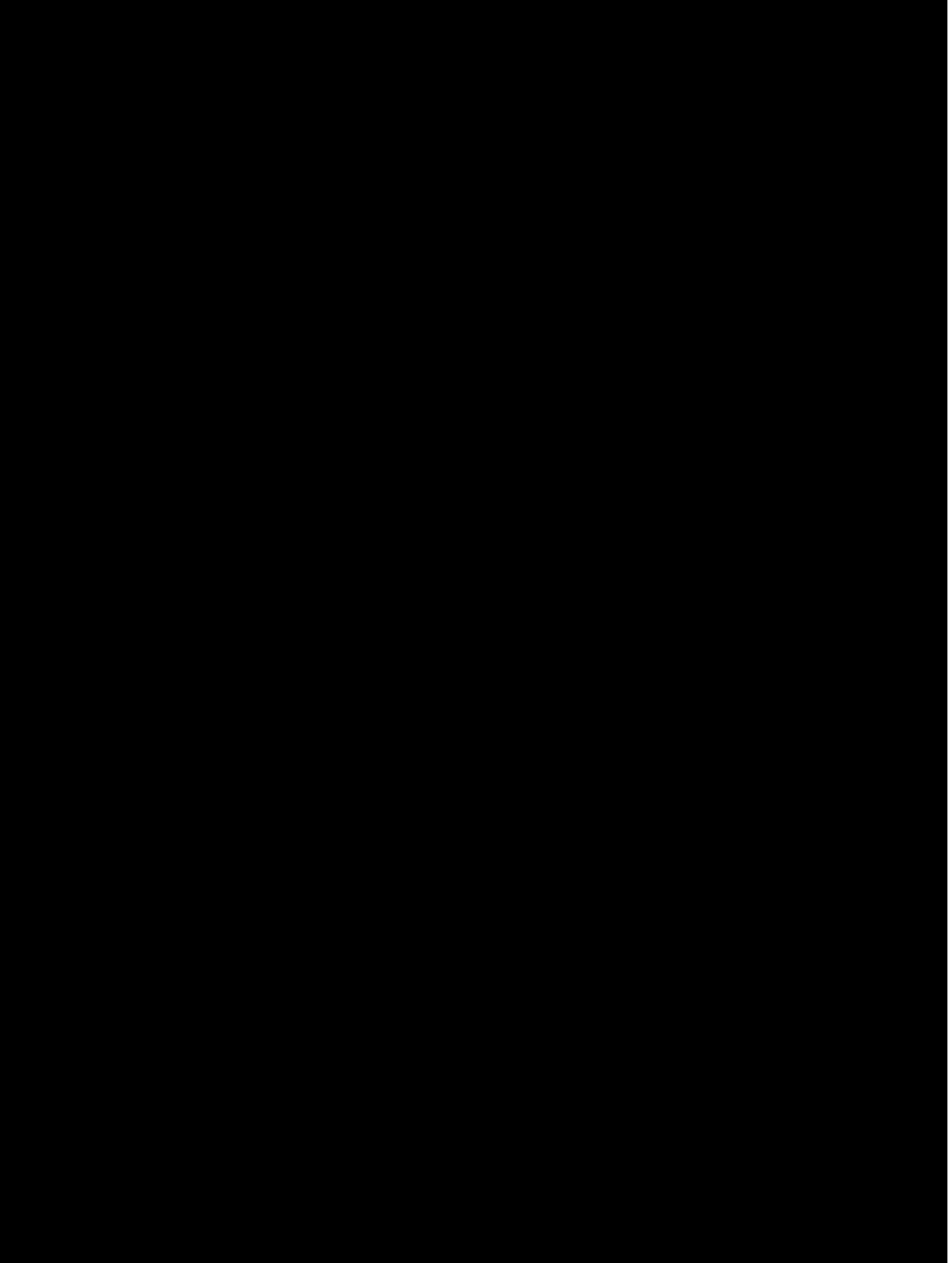
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