FINAL

PROCESS WASTE MINIMIZATION STUDY

Rocky Flats Plant Site

Task 19
of the
Zero-Offsite Water-Discharge Study

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EXECUTIVE SUMMARY

This is a report of one of thirty identified tasks being conducted for, and in the development of a Zero-Offsite Water- Discharge plan (ZDP) for the Rocky Flats Plant (RFP). The ZDP is being developed in response to Item C.7 of the Agreement in Principle between the Colorado Department of Health (CDH) and the Department of Energy (DOE). The CDH/DOE Agreement states in Item C.7 "Source Reduction and Zero Discharges Study: Conduct a study of all available methods to eliminate Rocky Flats discharges to the environment including surface waters and groundwater. This review should include a source reduction review."

This Process Waste Minimization (WM) task is designed to evaluate existing and proposed WM projects at the RFP, make recommendations for additional WM if appropriate, and classify these planned or potential projects as to their impacts to the downstream collection and treatment facilities and the potential for additional water reuse from the Sewage Treatment Plant (STP)

According to the US Environmental Protection Agency (EPA) Guidelines (US EPA, 1988), the major elements of an effective WM program as outlined in this document are:

A. Top management support - company-wide policy with goals, commitment, rewards and training.

B. Characterization of Waste Generation - waste accounting system to track types, amounts and hazardous constituents of wastes and when and how they are generated.

C. Periodic WM assessments - "cradle to grave" tracking, including a determination of the "true" cost of the waste.

D. A cost allocation system - making those responsible for generating waste accountable for the "true" cost of the waste.

E. Encourage technology transfer.

F. Program evaluation - periodic review of program effectiveness with feedback loops.

The RFP has been criticized in the past (US DOE Tiger Team Review, August 1989) for not meeting the minimum criteria in their WM Program. EG&G has established a Waste Minimization Office in the Process Waste Department with full-time staffing directed to better facilitate WM efforts. As addressed in this report, this new WM emphasis is coalescing into a synthesized program but not all of the minimum program standards have been met (especially the cost allocation system).

There are two primary aqueous wastewater collection and treatment systems currently in use at the RFP. Process waste water of various types is currently collected in a process water collection system and routed to the Building 374 Evaporator. This system is closed-loop and the effluent is 100% consumed as boiler feed water and cooling tower makeup water. Sanitary wastewater is collected in the sanitary sewer system and routed to the Building 995 STP. These systems have been more fully defined in the STP Evaluation Study (Task 10) and the Process Water Reuse/Wastewater Recycle Study (Tasks 11 and 13). The potential for interaction occurs as the effluent from the STP may be used for additional process water supply based upon the recommendations presented in the Tasks 11/13 Report.

The RFP WM program offers both opportunities that enhance the potential ZDP and constraints which could potentially detract from the achievement of the ZDP. In some cases, a RCRA driven WM project may reduce the quantity of hazardous materials that must be handled or treated but the conventional pollutant and/or hydraulic loading may increased at the STP. Likewise, the ongoing effort to reduce loading on the landfill by switching away from disposable products in the cafeteria may increase loads to the STP. On the other hand, proposed water conservation programs may provide significant hydraulic reductions to the STP although organic loading may not be improved. Other proposed or potential projects could reduce both hydraulic and organic loading to the downstream Buildings 374 and 995 treatment facilities.

A WM Assessment (NFT and S.M. Stoller, 1989) was performed for the RFP as a requirement of the RFP Land Disposal Restrictions (LDR) Federal Facilities Compliance Agreement (FFCA). This assessment provided little detail on potential impacts to the aqueous wastewater collection and treatment systems. The WM Team has just completed a FY-91 Work Plan (EG&G, 1991) and has started a Process Waste Assessment using the DOE Defense Programs Process Waste Assessment Guidance (September 11, 1990). It is expected that this assessment will take several years to complete.

The Process Waste Assessment will be accomplished in several phases. Phase 1, scheduled for completion at the end of FY91, will document a "top-level" facility process flow and material balance. Phase II will include selected follow-up assessments and detailed material balances and evaluation of WM options. The recently completed WASTREN waste characterization study (WASTREN/Ebasco, 1990) was previously thought to contain the requisite databases and waste generation features to become a prime tool for developing this assessment. However, recent communications with the WM Group indicate that the waste characterization work is complete but not easily integrated into their planning efforts.

The FY-91 Work Plan was recently finalized for the WM activities at the RFP. The FY91 WM Work Plan identifies a systematic evolution of WM projects at the RFP. The following is a summary of the WM projects identified in this Work Plan which would impact aqueous wastestreams along with their Work Breakdown System (WBS) identifier:

Low-Level/Low-Level Mixed Waste:

- Kelly Decontamination System (WBS 2.2.1)
- Wash/Remelt/Recycle Uranium Chips (WBS 2.2.3)

Hazardous Waste:

- Aqueous Ultrasonic Cleaning, Buildings 334 and 444 (WBS 2.3.2)

Process Wastewater:

- Laundry Water Rinse Recycle (WBS 2.4.1)
- X-OMAT Wash Recycle, Buildings 444, 460, 707, 779 and 991 (WBS 2.4.2)
- Reroute Deaerator Overflow, Building 443 (WBS 2.4.3)

Solid Waste:

- Shower Water Reduction (WBS 2.5.1)
- Cascade Rinse Recycle (WBS 2.5.2)

- o Cafeteria Waste Reduction (WBS 2.5.4)

Halogenated Solvent Elimination:

- o Aqueous Cleaning of Oralloy Parts (WBS 2.6.1)

Several other projects were identified in the FY91 Work Plan which could impact the aqueous waste water streams but are not yet well defined and/or implementation is quite a few years in the future. These projects were noted but potential aqueous impacts are not included in this report.

The revised WM Process Waste Assessment just underway is anticipated to be significantly expanded and enhanced from the earlier efforts and will provide a much greater degree of potential impacts on the process and sanitary sewer systems and the various wastewater management alternatives. The FY91 WM Workplan indicates that the currently planned WM projects, by FY95, will decrease Process Water flows to the Building 374 Evaporator by 4.4 MGY and decrease sanitary wastewater to the Building 995 STP by 9.4 MGY. (In some cases the individual projects cause increased flows. These figures are the net result.)

The changes of water management and wastewater generation resulting from proposed and anticipated WM projects have direct impact to the wastestreams and indirect impact to the zero-offite water-discharge alternatives by modifying the use characteristics of potential industrial reusers of treated STP wastewater effluent. In addition, proposed and anticipated operating characteristics of the Building 374 Evaporator directly impacts the planning for the STP recycle system. (Tasks 11/13)

The current RFP WM Program is developing into one that has the potential to adequately address WM in a holistic fashion and meet the various regulatory standards such as the EPA minimum

guidelines (US EPA, 1988). However, there appears to be persistent reluctance at the RFP to accept change and the logical tracking and assignment of responsibility of waste production to those areas generating the waste. This culture contributes to the difficulty in obtaining a true waste volume and characterization picture by the building, let alone the various processes contained in the building.

As such, the EPA criteria of adequately assigning responsibility and true cost to the various contributing processes appear to be still unmet at the RFP. Until these basic precepts of WM are integrated at the RFP, it will be difficult to expand the WM program into the newly emerging "pollution prevention" focus of the US EPA and other regulatory bodies. In addition, the lack of responsibility and cost allocation to the waste generators will contribute to the perception that the RFP is not fully behind waste minimization and environmental controls in general.

1.0 INTRODUCTION

1.1 REVIEW OF ZERO-DISCHARGE PROJECT AND HOW WASTE MINIMIZATION (WM) TASK IMPACTS OVERALL PROGRAM

This report describes the Study results of one of thirty identified tasks being conducted for, and in the development of a Zero-Offsite Water-Discharge plan (ZDP) for the Rocky Flats Plant (RFP). It is incumbent upon any evaluation of the potential to reduce off-site water discharges to zero at the RFP to address all incoming sources of water (supplies, precipitation, upstream drainage basins), all RFP users of water (both direct and indirect), all known and potential sources of contamination to water on the site (from point and non-point sources), and all potential methods to contain the release of water, contaminated or non-contaminated.

Any reduction of the usage of water and/or the reduction of contamination of the water within the facility will assist in the downstream handling, treatment, and potential reuse opportunities and complement the achievement of this goal. This Process Waste Minimization Study is designed to evaluate existing and proposed waste minimization (WM) projects at the RFP, make recommendations for additional WM if appropriate, and classify these planned or potential projects as to their impacts to the downstream collection and treatment facilities and the potential for additional water reuse from the Sewage Treatment Plant (STP). This reuse potentially could be potentially coupled with a proposed WM project or accomplished separately. This report is not to the detail of a typical Waste Minimization Opportunity Assessment or similar study; rather it is a programmatic review of the current RFP WM Activities, planned and future WM Projects at the RFP, and a quantification of the program's impact to the wastestreams that are important to the overall goal of a Zero-Offsite Water-Discharge Plan.

1.1.1 Opportunities and Constraints

The concept of WM has been widely construed as a priority control step in the RCRA system whereby hazardous waste is reduced, to the extent feasible, prior to the treatment, storage or disposal of the waste. However, the term more recently is being broadly defined to encompass such items as water conservation, multi-media pollution prevention, low and non-waste technologies, etc. At the RFP, the WM team in the Process Waste Department uses a somewhat broadened approach which includes water conservation, reduction of solid waste that is non-hazardous (mainly due to landfill capacity issues), among other measures. Their approach is not yet to the stage of multi-media pollutant reduction as this concept involves many layers of departments and regulatory control at the RFP.

The RFP WM program offers both opportunities that enhance the potential ZDP and constraints which could potentially detract from the achievement of the ZDP. In some cases, a RCRA driven WM project may reduce the quantity of hazardous materials that must be handled or treated but the conventional pollutant and/or hydraulic loading may increased at the STP. Likewise, the ongoing effort to reduce loading on the landfill by switching away from disposable products in the cafeteria may increase loads to the STP. On the other hand, proposed water conservation programs may provide significant hydraulic reductions to the STP although organic loading may not be improved. Other proposed or potential projects could reduce both hydraulic and organic loading to Buildings 374 and 995 treatment facilities.

1.1.2 Process Water Reuse Task

Task 11, Process Water Reuse Study (as now combined with Task 13 Treated Sanitary Wastewater Recycle Study), has quantified to the extent possible, the existing water usages within the RFP and where there are potential users for additional recycled wastewater effluent from the

STP. The Tasks 11/13 Report, coupled with the ongoing waste quantification work being performed by the WM Process Waste Group, will provide the basis for establishing the status quo of water use at the RFP. This Study report will provide likely or potential modifications to this existing water usage pattern through the implementation of proposed or possible WM projects. Because Process Water at the RFP is already segregated from sanitary wastewater and treated in a separate closed-loop system using the Building 374 Evaporator, the integration of this potential reuse involves synthesizing the interrelationships of water usage and potential impacts to both wastewater collection systems.

1.2 REGULATORY DRIVING FORCES FOR RFP WM

The RFP Inter-Agency Agreement required the RFP to prepare a WM Assessment by December 1989. As discussed in Section 2.0, there are no direct performance standards for WM applied to large industrial facilities such as the RFP. WM is usually driven more by economics when the true total cost of environmental system management (and liability) is factored into the operating processes.

The US EPA has established minimum guidelines for an effective WM program. The August 1989 DOE "Tiger Team" review of environmental programs at the RFP identified several areas of deficiency in the RFP WM programs (US DOE, August 1989). The Tiger Team review and the EG&G responses are discussed in Section 3.2. The RFP has a newly expanding WM Section in the Process Waste Department that is integrating the WM programs at the RFP in a synthesized fashion rather than the previous piecemeal efforts.

2.0 NATIONAL PERSPECTIVE OF WASTE MINIMIZATION

Prior to evaluating the current WM programs at the RFP and their potential impact to the ZDP, it is important to have a national perspective of WM and the emerging "pollution prevention" focus of the regulatory agencies. The RFP has very direct regulatory driving forces behind the implementation of WM as discussed in 1.2. However, this evaluation must also be cognizant of this new focus on pollution prevention, the potential for new regulatory action requiring performance standards for WM, and that recommendations for WM program adjustments to assist with the ZDP do not acerbate disposal problems in other medias (air, solid waste).

2.1 OVERVIEW AND HISTORICAL REVIEW

The major driving force behind RCRA WM is the 1984 Hazardous and Solid Waste Amendments (HSWA) to RCRA in which the Congress stated "it is the national policy of the United States that wherever feasible, the generation of hazardous waste is to reduced or eliminated as expeditiously as possible." Figure 1 provides a generalized schematic of the RCRA WM techniques. This figure indicates that Source Reduction and Recycling are the high priority waste management strategies and that the lower priority strategies of treatment and disposal are to follow only after exhausting WM opportunities.

The HSWA of 1984 requires every generator of hazardous waste to report on activities undertaken to reduce the volume and toxicity of wastestreams and to certify that the facility has a program in place to minimize waste generation. In 1986, the EPA performed an intensive survey of WM in the US as part of a Report to Congress (US EPA, 1986) on the subject. Considerable time was spent in the evaluation of the need for regulatory requirements for WM versus other market driven incentives. It was decided not to formulate regulations that require specific waste minimization accomplishments or quotas on the part of generators. This decision was based upon three key factors:

- it was thought that mandatory programs would second-guess industry's production decisions, quite possibly leading to counterproductive results

- mandatory programs would be difficult and expensive to design and administer (based upon the experience of the industrial categorical guidelines for NPDES permitting)

- generators already face strong economic incentives to reduce their wastes.

As a result of this decision, EPA developed a three-point strategy for WM (US EPA, 1986):

1. Information gathering - quantifying industry response to WM for further evaluation of the desirability of performance standards and/or required management practices.

2. Core technical assistance program - including information transfer to foster growth of WM.

3. Long-term options - based upon continuing data-gathering, mandatory requirements could be imposed, if necessary, once the HSWA of 1984 have taken full effect and their impacts on waste generation have been assessed.

Market forces remain the primary driving forces behind RCRA WM. Although there are several EPA programs aimed at increasing WM at federal facilities (see 2.2), the market forces that are driving private industry into WM may be somewhat muted at federal sites where items such as National Security are more a driver than profit.

The EPA did publish on June 12, 1989 some draft guidance for what constitutes an effective WM program. The major elements of an effective WM program as outlined in this document are:

A. Top management support - company-wide policy with goals, commitment, rewards and training.

B. Characterization of Waste Generation - waste accounting system to track types, amounts and hazardous constituents of wastes and when and how they are generated.

C. Periodic WM assessments - "cradle to grave" tracking, including a determination of the "true" cost of the waste.

D. A cost allocation system - making those responsible for generating waste accountable for the "true" cost of the waste.

E. Encourage technology transfer.

F. Program evaluation - periodic review of program effectiveness with feedback loops.

2.2 EXISTING EPA WM PROGRAMS

Three offices within the EPA house the evolving Pollution Prevention Program. These are the Office of Solid Waste (OSW), the newly created (1989) Pollution Prevention Office (PPO) within the Office of Program Planning and evaluation (OPPE), and the Office of Research and Development (ORD).

OSW has concentrated on WM under RCRA. The PPO has generally been involved in information dissemination and administering a pollution prevention set-aside initiative program. The ORD is charged with providing technical support via the Risk Reduction Research Laboratory (RREL) and the Pollution Prevention Research Branch (PPRB) specifically. The main programs of the RREL include:

WREAFS - Waste Reduction Evaluations at Federal Sites

This program is designed to conduct WM workshops, develop technical information transfer opportunity assessments, provide EPA developed research information to Federal facilities, demonstrate WM technologies at federal sites, and promote WM at federal sites.

PPIC - Pollution Prevention Information Clearinghouse

This includes a public-domain, computerized information network for the exchange of pollution prevention information. (Joint effort of ORD and PPO)

WRISE - Waste Reduction Institute for Scientists and Engineers

This is a joint university/EPA institute which counsels EPA with regard to pollution prevention activities and serves as liaisons to private industry.

WRAP - Waste Reduction Assessments Program

This program is designed to assist users in applying WM assessments as a tool in identifying option for waste reduction.

WRITE - Waste Reduction Innovative Technology Evaluation

This is aimed at identifying, demonstrating or enhancing the efficiency of technologies via research and development projects that hold promise in the reduction of waste. This involves cooperative approaches with state an local governments in addressing small and medium size industries, dealing with large industries, and providing support for promising new and unproven technologies and research.

2.3 POLLUTION REDUCTION VERSUS POLLUTION CONTROL

Pollution controls have been a function of downstream wastewater treatment facilities, either within the industrial facility as final treatment or pretreatment or at a further downstream municipal treatment facility. The control of pollution from these facilities have been through performance standards regulated through pretreatment or NPDES discharge permits. The contaminants that are "controlled" by these facilities and permits are not destroyed but rather transformed from the liquid phase to an aerosol or solid form. The control of air emissions and disposal of sludge from these facilities are problems that must be concurrently addressed to avoid cross-media transfers rather than control. Classic WM in the RCRA sense may reduce the toxicity of the wastewater and sludges but not necessarily the overall hydraulic or pollutant load.

The primary goal of pollution prevention is to eliminate the initial production of wastes and pollutants. Cross-media integration is essential to this agenda. The EPA PPO has outlined four strategic objectives for the program (and the entire EPA regulatory structure) (Kotas, US EPA, 1989):

1. Developing a multi-media EPA approach. Promote a cross-media, preventive approach within the regulatory, research, and enforcement programs.

2. Support regional, state, and local multi-media prevention programs.

3. Build consensus and commitment for national agenda on prevention.

4. Establish data strategy to develop indicators, evaluate progress, and target opportunities.

Pollution prevention or reduction is often seen as a long-term goal rather than an immediate and practical route to pursue since it is not performance based (eg. There are few reliable measures to evaluate effectiveness of a pollution prevention program). Capital investments for downstream pollution control take precedence over waste-reduction techniques. The challenge at the RFP is to meet current downstream regulatory requirements while maintaining a focus toward the future of pollution prevention. It is also necessary to remain be aware of the multi-media prevention aspects while developing the long-term water management strategies.

2.4 DOE WM PROGRAMS AND ENVIRONMENTAL RESTORATION FIVE-YEAR PROGRAM PLAN

Five Year Program Plan

The Department of Energy (DOE) has recently been formalizing its WM program. The Secretary of Energy initiated the Environmental Restoration and Waste Management 5-Year Plan to coordinate and consolidate all DOE waste and cleanup activities. The Plan was instituted in August 1989 and includes research, development, and demonstration of new technologies and management concepts to minimize waste in current production. A Waste Minimization Program Office was established under the Plan.

DOE Order 5820.2A

DOE issued Order DOE 5820.2A, Radioactive Waste Management, establishing the policy that "the generation, treatment, storage, transportation, and/or disposal of radioactive wastes, and the other pollutants or hazardous substances they contain, shall be accomplished in a manner that minimizes the generation of such wastes across program office functions." (DOE, 1988) As a result of this order, each waste-generating facility must develop plans to reduce the quantity of waste sent to storage. In October 1988, a specific waste reduction policy was established for the Defense Programs Office of DOE. This policy included a hierarchy of waste management actions:

- generation of low-level, high-level, transuranic, hazardous and mixed wastes should be avoided
- wastes which are generated will be recycled of reused to the maximum extent possible
- remaining wastes will be treated to reduce their toxicity and volume.

Defense Programs

The Defense Programs waste reduction activities are coordinated by the Office of Defense Waste and Transportation Management. Defense Programs has defined waste minimization activities to include source reduction and recycling. The activities cover radioactive, hazardous, and mixed wastes. A Waste Reduction Steering Committee has been assigned to coordinate the Defense Programs waste reduction activities. The Committee's objectives include maximizing information exchange, identifying current and future data needs and reporting requirements, and guiding future activities between the DP program organizations and their respective sites. In 1989, the

Steering Committee began visiting Defense Programs waste-generating and management sites. The purpose of these visits is to review waste generation operations and personnel activities, determine progress in waste reduction activities, and obtain information to develop a method for success demonstration. The Steering Committee will also use this information to develop guidance and requirements for systemwide waste reduction.

HAZWRAP

The Hazardous Waste Remedial Actions Program support office (HAZWRAP) coordinates technology transfer and information exchange. As part of this effort, the DOE Waste Information Network (WIN), an electronic communications network, was developed for the purpose of collecting information, promoting technology transfer, and supporting overall waste minimization efforts. The WIN system is composed of:

- a data base with information on hazardous and mixed waste operations
- bulletin boards for information on conferences, workshops, seminars, and regulatory issues
- data file transfer enabling electronic transmission.

Office of Waste and Transportation Management

The Office of Waste and Transportation Management has held WM workshops and continues to sponsor these approximately every six months. Topics covered at the previous workshops are as follows:

- In July 1988 for Headquarters and Operations Offices and site contractors, examined waste minimization strategies and successes.

- On January 31-February 1, 1989, reviewed methods of employee education and training, procurement control, waste minimization surveys, and methods for recycling and reuse of metal wastes.

- In October 1989, reviewed a proposed Waste Reduction Success Demonstration, recycle and reuse techniques, solvent substitution and procurement controls.

DOE Order 5400.1

DOE Order 5400.1, General Environmental Protection Program requires each Head of Field Organization to prepare plans for a Waste Minimization Program and Pollution Prevention Awareness Program (DOE, 1988). Each Waste Minimization Program should contain goals for minimizing volume and toxicity of all wastes generated, annual reductions obtained, annual changes in waste generation, and the proposed methods of waste minimization. These plans were to be completed by the spring of 1990.

The Pollution Prevention Awareness Program is intended to promote pollution prevention as a component of project plans and mission statements. Each program will contain specific elements such as staff training, incentives, and awards. These plans were also to be completed by the spring of 1990. The Office of Environment, Safety and Health prepared a Department-wide waste reduction policy committing the Department to reduce the total amount of hazardous, non-hazardous solid, radioactive and radioactive mixed waste generated and disposed of by DOE operations facilities through waste minimization, to eliminate or minimize the generation of waste, and treatment to reduce the volume, toxicity and mobility of waste that is generated.

Waste minimization guidance was prepared by the DOE Office of Environment, Safety and Health to:

- develop a comprehensive waste minimization program with goals and schedules
- develop a method for characterizing and tracking waste streams
- identify applicable methods and technologies for waste minimization
- develop employee training and awareness programs
- comply with Federal and State regulations and DOE requirements for waste minimization.

2.5 INTEGRATED WM INCLUDING RCRA WM, POLLUTION PREVENTION, RECYCLE/REUSE AND WATER CONSERVATION

Although the regulatory driving forces and institutional structures are not yet in place, it is evident that the precedence of downstream pollution "control" may be supplanted by a multi-media pollution prevention emphasis. It may be only a matter of time before there are direct performance standards and facility goals for WM. The practical method to address a reduction of pollution is to reduce the sources of water and/or contamination entering the facility. The RCRA WM goals of reducing hazardous waste from subsequent downstream handling and treatment must be integrated with overall wastewater and air quality planning for optimal multi-media approaches. This will involve sophisticated tracking systems to identify and quantify all water use and wastewater contaminant sources from each industrial process.

In a sense, the management of water use and wastewater generation must become as sophisticated (or more so) than the industrial production processes at each location. Large integrated industrial facilities such as the RFP will essentially be subject to small multi-media environmental

assessments to minimize pollutant impact on a holistic basis. For example, a proposed new industrial production facility will be reviewed concurrently for air, water and residuals management to assure an optimal environmental management system is developed rather than individual medium reviews and fragmented system development.

The EG&G Process Waste Department's new initiatives into waste characterization will provide the basis for setting baseline conditions at the RFP for aqueous wastestreams and the requisite database for moving toward more integrated WM programs. Given the protracted history of environmental controls at the RFP, it appears to be essential that the ultimate ZDP for water at the facility be far-sighted and progressive. This will require nothing short of the integrated approach of multi-media pollution prevention.

DOE and EG&G have embarked on what appears to be the start of a systematic approach to WM at the RFP. However, an inherent culture exists at the RFP which appears to work against the assignment of responsibility and costs directly to the waste generation sources. As such, it is difficult to determine how the current and projected WM programs at the RFP compare to the WM programs at other DOE facilities, other federal facilities, and in other integrated industrial production facilities.

3.0 EXISTING AND PROPOSED WM PROGRAMS AT RFP

3.1 OVERVIEW OF PROCESS WATER HANDLING AND TREATMENT SYSTEMS

The process waste system is comprised of two liquid waste treatment facilities, Buildings 374 and 774, and the Process Waste transfer and Collection System which is used to transfer wastes to Buildings 374 and 774 (NFT and S.M. Stoller, 1989). Hazardous wastes, radioactive mixed wastes, and transuranic (TRU) mixed wastes are treated in the process waste system.

Sixteen buildings at the RFP have direct connections to the process waste treatment plants. These buildings are Buildings 122, 123, 371, 443, 444, 460, 559, 707, 771, 776, 778, 779, 865, 881, 883 and 889. Building 371 transfers wastes directly to Building 374 and Building 771 wastes transfer directly to Building 774. The remaining fourteen buildings are directly connected via the process waste lines and valve vault system to Building 374, and indirectly to Building 774 via the reverse flow line connecting the two treatment buildings. Ancillary equipment in the process waste system includes piping, pumps, valves, and ancillary sump systems. Wastes generated by the processing buildings listed above are collected in sumps and/or tanks in each building prior to being transferred to Building 374. In addition there are several process waste transfer stations which collect wastes from one or more buildings.

3.2 RFP WM OPPORTUNITY ASSESSMENTS

As required by Section VI of the FFCA, the RFP completed a Waste Minimization Assessment Report (NFT Inc. and SM Stoller Corporation, 1989). The Waste Minimization Assessment Report was an independent assessment of opportunities to minimize waste at the RFP. It contained descriptions of the processes and the buildings in which hazardous or radioactive waste are generated, recent and current efforts that are in progress to reduce the generation of waste, and the recommended options and plans for further reductions.

The five major categories of waste streams at the RFP analyzed in this report were:

- Plutonium-contaminated solvent waste
- Oil and solvent waste from uranium, non-nuclear and maintenance areas (non-plutonium)
- Process waste water
- Transuranic waste and recoverable residue
- Low-level waste

Because the focus of this Study is the potential minimization of treated effluent discharges from the RFP, this WM Task is mainly concerned with the aqueous wastewater streams (process waste water and sanitary wastewater). The previous WM Opportunity Assessment did not evaluate sanitary wastewater sources, generalized pollution prevention, or water conservation. As such, the Process Waste Water section is the only one relevant to this Study and this section is again geared toward RCRA WM options only. Figure 2 is a schematic of process waste water collection systems at the RFP for reference from the assessment and Figure 3 is a schematic of the Building 374 treatment systems.

The thrust of the Process Waste Water section is that any reductions in process waste water reduces the influent to the Building 374 Evaporator (the process wastewater treatment facility) and thereby reduces the volume of evaporator salt and precipitated sludge that requires disposal. This would have to be integrated into the overall water management and other RFP environmental planning strategies. The largest volume of low-level waste at the RFP is Building 374 Evaporator salt which is mixed with cement and brine to make "saltcrete."

The ultimate plan for the Building 374 Evaporator is not addressed in the WM Opportunity Assessment. The Evaporator was initially thought to have a capacity of 21 MGY but more recently (1988-1989) is running at a capacity of 13-14 MGY. There are projects in the planning phase for a new evaporator and refurbishing the existing evaporator as a backup unit for redundancy. It is unknown what future evaporator(s) capacity is being considered given the potential reductions in existing process waste water in conjunction with additional water from some on-site ponds being treated by the evaporator. The Zero-Offsite Water-Discharge Study is evaluating RO and Mechanical Evaporation in another Task Report.

Treatment of process water at the source (prior to or instead of sending it to Building 374) is an integral part of WM strategies and was only minimally assessed in the Opportunity Assessment. The WM Team will evaluate such opportunities after reviewing and integrating the ongoing waste characterization work.

The WM Opportunity Assessment provides a table of planned or potential WM projects but does not quantify the potential impacts of these projects on downstream wastewater collection and treatment facilities. As such is difficult to determine the net impact to the Building 374 process water treatment facilities. Also, some projects involve potential increases in the wastewater flows to the process water or sanitary wastestreams. As an example, there may be increased hydraulic loading to the process waste stream by product and water-usage changes from hazardous solvents. There is also a discussion that the removal of hazardous solvents may allow for reclassification of some wastestreams which could increase wastewater flows to the sanitary systems.

The WM Team has just completed a FY-91 Work Plan (EG&G, 1991) and has started a Process Waste Assessment using the DOE Defense Programs Process Waste Assessment Guidance (September 11, 1990). It is expected that this assessment will take several years to complete.

The Process Waste Assessment will be accomplished in several phases. Phase 1, scheduled for completion at the end of FY91, will document a "top-level" facility process flow and material balance. Phase II will include selected follow-up assessments and detailed material balances and evaluation of WM options. The recently completed WASTREN waste characterization study (WASTREN/Ebasco, 1990) was previously thought to contain the requisite databases and waste generation features to become a prime tool for developing this assessment. However, recent communications with the WM Group indicate that the waste characterization work is complete but not easily integrated into their planning efforts.

3.3 DOE TIGER TEAM REVIEW OF WM PROGRAM AT THE RFP AND THE EG&G RESPONSE IN THE CORRECTIVE ACTION PLAN

DOE/EG&G recently published a "Corrective Action Plan" (DOE, July, 1990) to synthesize the DOE/EG&G response to the Tiger Team "Assessment of Environmental Conditions at the Rocky Flats Plant, August 1989" (DOE, August 1989). The Tiger Team assessment was an independent review of the RFP environmental, safety and health programs and was designed to evaluate compliance with applicable federal, state, and local regulations; permit requirements; agreements; orders and consent degrees; and DOE orders. In addition to assessing compliance, the Team examined RFP operations for conformance with applicable "best" and "accepted" industrial practices to evaluate the adequacy of the plant's management programs.

The Corrective Action Plan reviews the 52 audit findings and 43 best management practices (BMP) contained in the Tiger Team report. After EG&G became operating contractor at the RFP (after this Tiger Team report was published), a formal planning process for waste and environmental programs through the preparation of five-year planning documents which are to be updated annually was instituted. Additional funds have been requested to support programs identified within the five-year plan.

The following prioritization system was developed for Tiger Team Action Plan Activities (DOE, July 1990):

Priority 1 Action that is necessary to prevent significant risk to the public, worker health and safety, or the environment, whether or not it is required by statute or DOE orders.

Priority 2 Action that is necessary to meet statutes or DOE Orders, although lack of action would not result in a significant risk to the public, worker health or safety, or the environment.

Priority 3 Action that is consistent with Best Management Practices (BMP).

Priority 4 Practice that is not required by law, regulation, or agreement, but would be desirable to accomplish.

In the following sections, responses are summarized where the particular topic is important to the WM evaluations of the RFP ZDP.

Page 40 - Environment SW/BMP-6

Laundry Building 566 sends significant load to the 374 Evaporator.

> Various methods of reducing this loading are being investigated such as reusing rinse water for the next wash cycle. DOE EIS policies prohibit sending wash water to the sanitary wastewater system.

Page 78 - Environment WM/BMP-1

Large overall environmental authority comment including 9 specific comments. Comment 8 dealt with waste characterization and minimization.

Deficiencies in this comment have been addressed by the formation of the Waste Programs directorate which serves as the principal coordinating body for these areas by providing administrative and engineering support to waste operations. Support to waste handling and storage issues is provided by compliance guidance and inspection activities; engineering support for waste form characterization, certification, and offsite facility liaison actions; and administrative assistance such as procedure preparation, quality control, and training. In addition, a formal WM program has been established with quantifiable goals and documented implementation plans. Waste characterization has been reinstituted to augment the study completed in 1987 as part of RCRA permitting requirements. This program coupled with the WEMs and Chemical tracking program will provide traceable, near real-time control of materials processed through production and support operations.

Page 84 - Environment WM/BMP-2

RFP WM Program does not meet minimum EPA Guidelines for an effective WM Program.

The RFP has developed a WM Program Plan that has been submitted to DOE and will address all elements in the EPA guidelines. This plan will also satisfy the requirements of DOE Order 5400.1. The allocation of costs for waste management to the waste generating has not been incorporated at RFP due to the required major revisions to the accounting and budgetary systems. Plan submitted to DOE/RFO and HQ in May 1990.

Page 87 - Environment WM/BMP-3

Deficiencies in previous waste characterization work at RFP.

Waste Stream Characterization (WSC) study of 1987 is being upgraded and expanded by 9/90.

3.4 RFP FIVE-YEAR PROGRAM PLAN AND FY-91 WORK PLAN

The purpose of the Five-Year Plan (FYP) is to establish an agenda for compliance and cleanup against which progress will be measured. This plan is revised annually, with a five-year planning horizon.

The FYP encompasses total program activities and costs for DOE Corrective Activities (CA), Environmental Restoration (ER), Waste Management (WM), and Research and Development, Demonstration, Test and Evaluation (RDDT&E). It addresses hazardous wastes, radioactive wastes, mixed wastes (RW+HW+sanitary). It also addresses facilities and sites contaminated with or used in the management of those wastes.

The FYP consists of Activity Data Sheets (ADSs) which describe the activities at the Rocky Flats Plant. The ADSs provide narrative and define budgets and schedules for these activities.

A few of the items of major significance to the WM review for the RFP ZDP are described below (EG&G, April 1990).

Pages 244-248 Waste Minimization

This is Environmental Management WM. Six major identified elements are:

1. Program administration.
2. TRU and TRU mixed wastes.
3. Low level and low level mixed wastes.
4. Haz waste (solid and liquid).
5. Sanitary waste including water to the STP and solid wastes that are currently sent to the landfill.
6. Process liquid waste.

Pages 249-253 Waste Minimization

This is Defense Programs WM which is the same as above as it is a funding source delineation only.

Pages 286-289 Building 374 Liquid Waste Upgrade

Involves upgrading 15-year old facility in areas of pumps, piping, instrumentation, etc on several process trains.

Pages 302-305 Building 374 Normal Operations

Basically a continuation of operations, indefinitely.

Pages 322-325 Process Waste Transfer System

This activity will replace the existing underground liquid mixed waste transfer system which is of extreme concern to the CDH and the EPA. The old system has failed in past but was detected.

Pages 342-345 Building 374 Evaporator Renovation

Plan to renovate existing evaporator as a backup system after the current evaporator is replaced with a new unit.

Pages 350-353 ZDP

Pages 354-357 ZDP Implementation

Overview of the ZDP Project.

Pages 515-519 Simulation Modeling of RFP

This activity is a joint LANL/RFP proposal submitted by the Los Alamos Technology Office at RFP. Technical development will focus on augmenting the development of the ongoing RFP simulation model. The RFP model will describe the types of materials processed and generated for each unit process at RFP and the interaction results. The purpose of the model will be to 1) identify principle areas of haz, mixed and radioactive waste generation, 2) identify which technologies should be developed and focused on RFP to minimize waste generation, and 3) once new technologies have been developed, predict impacts on the RFP.

3.5 FY91 WASTE MINIMIZATION WORK PLAN

The FY-91 Work Plan was recently finalized (EG&G/S.M.Stoller, March 1991) for WM activities at the RFP. The Work Plan identifies a systematic evolution of WM projects at the RFP as shown in Figure 4. When a proposed WM project is formulated, it enters the first phase of the work flow, which is the feasibility study. At this stage, the project is evaluated for feasibility based on easily obtained information. The practical application of the method is closely

examined at this stage, while the costs and benefits may be only roughly estimated. If a project is found to have merit, a priority is assigned, and the project and if the project requires capital funding, it enters the second phase of the work flow which is the Engineering Scope and Estimate. In some cases, a project may require only Waste Minimization Program funding or expense funding from a functional group. In some cases, the project moves to the third phase, which is the cost-benefit analysis, which also follows the Engineering Scope and Estimate. Finally, if a favorable result is obtained from cost-benefit analysis, the project is submitted for funding.

Table 1 is a listing of the FY 91 Workplan Projects that could impact the aqueous wastestreams along with their funding status. The WBS number refers to the Work Breakdown Structure system used in the WM Program at the RFP.

The following is a description of these WM Projects as shown in the Final Draft Workplan (EG&G, October 1990):

Radioactive Waste:

o Kelly Decontamination System (WBS 2.2.1)

This project would consist of installing a manufactured system for cleaning areas of heavy radioactive contamination. The system is comprised of a main unit water heater, a vacuum pump assembly, a HEPA filter-demister, a cyclone separator, spray tools, hoses, and two 350-liter annular tanks for waste collection and transfer. This system would eliminate the use of large quantities of wet paper towels and cloths typically used during clean-up operations. This project would add a minor amount of process waste water to Building 771 wastestream. The system is scheduled to be installed and in production use by the end of September 1991.

Table 1
FY-91 Work Plan Waste Minimization Project Status

WBS # Project Number	Project Name/ Description	Estim. Complete In Oper.	Waste Type	Author. Number	ESTIMATED COSTS (In $1,000's) Capital	Expense
2.2.1	Kelly Decontam. System, Bldg. 771	10/92	LLW	None	0	40
2.2.3	Wash/Remelt/Recycle Uranium Chips	1/93	LLW	304456	113	0
2.3.2	Aqueous Ultrasonic Cleaning, 334/444	12/90	Haz	394438	145	50
2.4.1	Laundry Water Rinse Recycle, 778	10/91	Proc	402088	0	84
2.4.2	X-OMAT Wash Recycle (460 only in FY91)	12/90+	Proc	374424	40	68
2.4.3	Reroute Deaerator Overflow, 443	10/91	Proc	(a)	0	30
2.5.1	Shower Water Reduction	10/91	SW	492051	0	41
2.5.2	Cascade Rinse Recycle	10/91	SW	310181	74	30
2.5.4	Cafeteria Waste Reduction	10/91	SW	300408	235 (b)	90
2.6.1	Aqueous Cleaning of Oralloy Parts, 707	10/91	Halog.	312370	285	0

LLW - Low Level Waste
Haz - Hazardous Waste
Proc - Process Wastewater
SW - Solid Waste
Halog. - Halogenated Solvent Reduction

(a) Project consolidated with the Central Steam Plant Renovation Project, Auth. #319003.

(b) Funding provided by the Office of Environmental Restoration and Waste Management (EM) in FY 90.

Source: FY91 Waste Minimization Program Work Plan
EG&G for the US DOE, Rocky Flats Plant, March 1, 1991

o Wash/Remelt/Recycle Uranium Chips (WBS 2.2.3)

This project would consist of purchasing and installing a centrifugal washer and dryer for the recycle of uranium chips. This off-the-shelf unit would replace the current method of managing of uranium chips known as chip roasting. It would have insignificant impact to aqueous wastestreams. It is scheduled for completion in August 1991.

Hazardous Waste:

o Aqueous Ultrasonic Cleaning, Buildings 334 and 444 (WBS 2.3.2)

The aqueous ultrasonic cleaning system would have application in the Heat Treatment operation of Building 444 and in the Maintenance Shop of Building 334. Both operations require the use of trichloroethane. Consequently, waste generated from these processes are RCRA regulated. The projects would consist of (1) stripping out and replacing an existing aqueous cleaning system with an oakite detergent, aqueous cleaning system in Building 444, Heat Treatment, and (2) stripping out the existing bench-working area in Building 334 and installing a detergent aqueous cleaning system. This equipment will be installed and start-up testing will be performed in FY91. The projects would involve a minor increase in process waste water sent to Building 374.

Process Waste Water:

o Laundry Water Rinse Recycle (WBS 2.4.1)

This project would involve a modification to the existing waste water handling system at the laundry to reduce the waste load to the Building 374 Evaporator. This project is

evaluating the recycle of the third cycle rinse for the first cycle wash. This project is estimated to reduce process waste water by 2.0 MGY. The Engineering Scope and Estimate was completed in July of 1990 and it would be submitted for expense funding and implementation in FY91.

o X-OMAT Wash Recycle, Buildings 444, 460, 707, 779 and 991 (WBS 2.4.2)

This project would consist of the installation of Pacex processors to reduce the silver dioxide concentration of waste water discharged from film processing in Buildings 444, 460, 707, 779, and 991 to the Building 374 Evaporator. Recent information has quantified potential reductions in waste streams from these buildings although Building 991 reductions are thought to be to sanitary wastestream. Funding was obtained and construction started during FY90 on the system in Building 460. It is planned to install the system in one building per year.

o Reroute Deaerator Overflow, Building 443 (WBS 2.4.3)

Aqueous waste from Building 443 consists primarily of steam condensate from the deaerators (96% of flow). The remaining 4% consists of low pH water from the demineralizers. These two wastestreams are mixed and the resultant low pH wastewater is sent to the Building 374 Evaporator. This project would divert the approximately 1.5 MGY of steam condensate to the sanitary sewer system, reducing the load on the Building 374 Evaporator while increasing the load on the Building 995 STP. An Engineering Scope and Estimate was completed in August of 1990 and expense funding would be requested in FY91.

Solid Waste:

o Shower Water Reduction (WBS 2.5.1)

This project would consist of replacement of all existing shower heads with water saving type shower heads. It is estimated that a total replacement of shower heads at the RFP could reduce domestic water usage by 60% or 7.8 MGY. These potential savings are to the sanitary wastewater system. This project would be submitted for expense funding and installation in FY91.

o Cascade Rinse Recycle (WBS 2.5.2)

This project would re-route sanitary waste water from eight cascade rinse tanks into a 100-gallon tank for recycle. This waste water is of sufficient quality for recycle to the deionized water return loop. The project would reduce the plant's raw water usage and sanitary wastewater by 2.0 MGY. The Engineering Scope and Estimate is completed and it will be submitted for FY91 funding authorization. If approved, it will be implemented in FY91.

o Cafeteria Waste Reduction (WBS 2.5.4)

This project would involve the replacement of disposable dishware, flatware, etc., in cafeterias at the RFP with washable, reusable counterparts. The required dishwashing equipment will increase loading to the sanitary sewer system by 0.811 MGY. An Engineering Scope and Estimate has been initiated, with completion scheduled for October 1991.

Halogenated Solvent Reduction:

o Aqueous Cleaning of Oralloy Parts, Building 707 (WBS 2.6.1)

This project would include evaluation and development of an aqueous cleaning process for Oralloy and other non-plutonium parts. This project would evaluate ultrasonic-assisted cleaning with and aqueous detergent. Plans in FY91 would include an experimental aqueous cleaning system using the analytical rinse methods. The project would cause a small increase in loading the Building 374 Process wastewater.

After the WM Team completed this FY-91 Work Plan (EG&G, 1991), they have started a Process Waste Assessment using the DOE Defense Programs Process Waste Assessment Guidance (September 11, 1990). It is expected that this assessment will take several years to complete. The WM Department is intending to utilize the ongoing waste characterization work as the focal point for this new WM Assessment.

3.6 REVIEW OF EXISTING AND PROPOSED WM PROJECTS BY LOCATION, SCHEDULE, POTENTIAL IMPACT TO ZERO-DISCHARGE ALTERNATIVES

Table 2 is a summary of the existing process water generation figures by RFP Building in 1989 based upon interviews and records collected by Chuck Rose and summarized in the Tasks 11/13 report. This is the best information currently available on Process Water generation at the RFP until the Waste Characterization Study is completed. Table 3 summarizes the WM Workplan Projects previously described along with the estimated effect of the on the process and sanitary wastestreams. In some cases, the estimates of water savings seemed somewhat inflated, especially when the 1989 estimated process water generation figures are compared to the water savings. In such cases, the numbers were fine-tuned by the WM staff prior to entering the table. These numbers indicate that the currently planned WM projects, by FY95, will decrease Process

Table 2
Building 374, 1989 Aqueous Wastewater Volumes

NON-PLUTONIUM OPERATIONS

Buildings

Month	123	443	444 Cyan.	444 Acid Pl	444 Proc.	460	Bldg 444 and 460 Subtotal
Jan	3,970	73,659	500	5,350	56,400	85,000	147,250
Feb	9,152	103,704	0	3,800	59,500	100,500	163,800
Mar	4,007	22,222	0	600	70,300	84,000	154,900
Apr	4,000	139,527	100	100	62,700	89,550	152,450
May	11,723	40,764	0	0	91,950	81,500	173,450
Jun	15,336	60,148	0	3,850	82,500	63,000	149,350
Jul	5,183	51,805	500	700	55,100	118,300	174,600
Aug	7,940	68,694	0	1,500	53,650	186,200	241,350
Sep	12,927	116,137	750	300	53,700	165,925	220,675
Oct	13,970	48,370	1,000	1,000	31,900	157,125	191,025
Nov	5,274	98,668	0	1,500	49,800	57,100	108,400
Dec	8,767	69,098	0	1,200	26,900	62,200	90,300
TOT	**102,249**	**892,796**	**2,850**	**19,900**	**694,400**	**1,250,400**	**1,967,550**
AVG	**8,521**	**74,400**	**238**	**1,658**	**57,867**	**104,200**	**163,963**

Buildings

Month	865	881	883	889	Group 800 Subtotal	Non-Pu Bldgs Subtotal
Jan	3,600	7,800	10,500	0	21,900	246,779
Feb	3,600	5,200	9,200	0	18,000	294,656
Mar	6,000	13,000	8,100	800	27,900	209,029
Apr	3,600	10,400	1,500	1,100	16,600	312,577
May	3,600	34,300	4,500	0	42,400	268,337
Jun	3,600	10,400	8,700	400	23,100	247,934
Jul	2,400	26,000	9,050	400	37,850	269,438
Aug	2,400	20,800	6,800	0	30,000	347,984
Sep	2,400	35,800	750	0	38,950	388,689
Oct	2,600	28,900	2,100	300	33,900	287,265
Nov	3,600	18,200	5,250	1,600	28,650	240,992
Dec	2,400	20,200	2,250	900	25,750	193,915
TOT	**39,800**	**231,000**	**68,700**	**5,500**	**345,000**	**3,307,595**
AVG	**3,317**	**19,250**	**5,725**	**458**	**28,750**	**275,633**

Table 2, Cont'd
Building 374, 1989 Aqueous Wastewater Volumes

PLUTONIUM OPERATIONS

	Buildings						
Month	559	707	774	776	778	779	Plutonium Bldgs Subtotal
Jan	3,400	6,250	10,500	7,500	562,582	14,475	604,707
Feb	0	2,500	52,500	8,750	618,919	10,325	692,994
Mar	0	5,000	84,500	3,750	551,505	7,375	652,130
Apr	0	3,750	187,500	9,250	624,104	13,320	837,924
May	4,600	5,000	105,000	5,000	552,834	5,900	678,334
Jun	0	10,050	158,000	6,250	567,877	7,375	749,552
Jul	0	18,950	116,000	4,593	502,915	7,623	650,081
Aug	0	22,800	42,000	4,339	572,557	5,900	647,596
Sep	800	13,350	44,077	5,000	528,248	5,675	597,150
Oct	0	6,850	118,000	25,203	548,012	11,355	709,420
Nov	0	6,800	96,000	30,150	322,741	5,900	461,591
Dec	4,000	4,950	53,500	10,700	329,732	3,775	406,657
TOT	**12,800**	**106,250**	**1,067,577**	**120,485**	**6,282,026**	**98,998**	**7,688,136**
AVG	**1,067**	**8,854**	**88,965**	**10,040**	**523,502**	**8,250**	**640,678**

	Buildings			OTHER SOURCES		
Month	Non-Pu Subtotal	Pu Subtotal	Total Bldgs	Tank 231	Pond 207C	Total Sources Subtotal
Jan	246,779	604,707	851,486	233,012	43,060	1,127,558
Feb	294,656	692,994	987,650	0	8,762	996,412
Mar	209,029	652,130	861,159	0	12,000	873,159
Apr	312,577	837,924	1,150,501	531,089	12,000	1,693,590
May	268,337	678,334	946,671	0	131,953	1,078,624
Jun	247,934	749,552	997,486	0	64,000	1,061,486
Jul	269,438	650,081	919,519	0	83,218	1,002,737
Aug	347,984	647,596	995,580	0	0	995,580
Sep	388,689	597,150	985,839	293,354	0	1,279,193
Oct	287,265	709,420	996,685	340,691	20,275	1,357,651
Nov	240,992	461,591	702,583	35,082	0	737,665
Dec	193,915	406,657	600,572	377,928	0	978,500
TOT	**3,307,595**	**7,688,136**	**10,995,731**	**1,811,156**	**375,268**	**13,182,155**
AVG	**275,633**	**640,678**	**916,311**	**150,930**	**31,272**	**1,098,513**

REF: Chuck Rose and Nick Hart Water Record Review (All Records are Gallons)

Table 3
FY-91 Workplan Projects Affecting Process and/or Sanitary Waste Streams

Category of Waste	WBS # Project Number	WM Group Staff Engr	Project Name and Building Assigned	Estim. Complete In Operation mo./yr.	Affect. Build. Process Water-89 MGY	PROCESS WASTE WATER STREAM		SANITARY WASTE WATER STREAM	
						Net Annual Increase MGY	Net Annual Increase MGY	Net Annual Increase MGY	Net Annual Increase MGY
Low-Level Wastes: (WBS 2.2)									
	2.2.1	L.Knight	Kelly Decontam. System, Bldg. 771	10/92	0.000	0.002	0.000	0.000	0.000
	2.2.3	L.Knight	Wash/Remelt/Recycle Uranium Chips	1/93	0.695	0.003	0.000	0.000	0.000
Hazardous Wastes: (WBS 2.3)									
	2.3.2	B.Henn	Aqueous Ultrasonic Cleaning, 334/444						
			- 334	12/90	0.100	0.004	0.000	0.000	0.000
			- 444	12/90	0.695	0.004	0.000	0.000	0.000
Process Waste Water: (WBS 2.4)									
	2.4.1	J.Watson	Laundry Water Rinse Recycle, Bldg. 778	10/91	6.282	0.000	2.000	0.000	0.000
	2.4.2	J.Watson	X-OMAT Wash Recycle (460 only in FY91)						
			- 444	10/92	0.695	0.000	0.521	0.000	0.000
			- 460	10/91	1.250	0.000	0.938	0.000	0.000
			- 707	10/93	0.106	0.000	0.080	0.000	0.000
			- 779	10/94	0.120	0.000	0.090	0.000	0.000
			- 991	10/95	0.000	0.000	0.000	0.000	0.375
	2.4.3	J.Watson	Reroute Deaerator Overflow Bldg. 443	10/91	0.893	0.000	0.833	0.000	0.000

Table 3 Cont'D
FY-91 Workplan Projects Affecting Process and/or Sanitary Waste Streams

Category of Waste	WBS # Project Number	WM Group Staff Engr	Project Name and Building Assigned	Estim. Complete In Operation mo./yr.	Affect. Build. Process Water-89 MGY	PROCESS WASTE WATER STREAM		SANITARY WASTE WATER STREAM	
						Net Annual Increase MGY	Net Annual Increase MGY	Net Annual Increase MGY	Net Annual Increase MGY
Solid Waste: (WBS 2.5)									
	2.5.1	J.Watson	Shower Water Reduction 060,119,121,122,250,334,371,440,460,549, 552,559,664,707,771,774,777,778,779,865, 881,883,889,991, T-331-A	10/91	0.000	0.000	0.000	0.000 (60% of shower usage)	7.800
	2.5.2	J.Watson	Cascade Rinse Recycle Bldg. 460	10/91	1.250	0.000	0.000	0.000	2.000
	2.5.4	J.Watson	Cafeteria Waste Reduction (130, 750 now -112 later)	10/91	0.000	0.000	0.000	0.811	0.000
Halogenated Solvent Reduction: (WBS 2.6)									
	2.6.1	B.Henn	Aqueous Cleaning of Oralloy Parts, Bldg. 707	10/91	0.106	0.012	0.000	0.000	0.000
			Subtotals, 10/90 - 10/95			**0.025**	**4.461**	**0.811**	**10.175**
				Net Change		**Decrease by**	**4.436**	**Decrease by**	**9.364**

Notes:

1. Additional long-term projects identified in the FY91 WM Workplan are not shown if the potential impacts to the aqueous wastewater streams are not yet well defined.

2. The potential water savings for the X-OMAT Recycle projects shown in the project description exceeds current (FY89) water usage. A savings of 75% of FY89 water usage was used in this summary as suggested by the EG&G WM staff.

SOURCE: FY 91 Waste Minimization Program Work Plan, EG&G for the US DOE, Rocky Flats Plant, March 1, 1991

Water flows to the Building 374 Evaporator by 4.4 MGY and decrease sanitary wastewater to the Building 995 STP by 9.4 MGY. (In some cases the individual projects cause increased flows. These figures are the net result.)

The changes of water management and wastewater generation resulting from proposed and anticipated WM projects have direct impact to the wastestreams as indicated and indirect impact to the various water management alternatives by modifying the use characteristics of potential industrial reusers of treated STP wastewater effluent. In addition, proposed and anticipated operating characteristics of the Building 374 Evaporator directly impacts the planning for the STP recycle system.

4.0 SUMMARY AND CONCLUSIONS

The FY-91 Work Plan was recently finalized for the WM activities at the RFP. The FY91 WM Work Plan identifies a systematic evolution of WM projects at the RFP. The following is a summary of the WM projects identified in this Work Plan which would impact aqueous wastestreams along with their Work Breakdown System (WBS) identifier:

Low-Level/Low-Level Mixed Waste:

- Kelly Decontamination System (WBS 2.2.1)
- Wash/Remelt/Recycle Uranium Chips (WBS 2.2.3)

Hazardous Waste:

- Aqueous Ultrasonic Cleaning, Buildings 334 and 444 (WBS 2.3.2)

Process Wastewater:

- Laundry Water Rinse Recycle (WBS 2.4.1)
- X-OMAT Wash Recycle, Buildings 444, 460, 707, 779 and 991 (WBS 2.4.2)
- Reroute Deaerator Overflow, Building 443 (WBS 2.4.3)

Solid Waste:

- Shower Water Reduction (WBS 2.5.1)

- o Cascade Rinse Recycle (WBS 2.5.2)

- o Cafeteria Waste Reduction (WBS 2.5.4)

Halogenated Solvent Elimination:

- o Aqueous Cleaning of Oralloy Parts (WBS 2.6.1)

Several other projects were identified in the FY91 Work Plan which could impact the aqueous waste water streams but are not yet well defined and/or implementation is quite a few years in the future. These projects were noted but not included in the review of this report.

The revised WM Process Waste Assessment just underway is anticipated to be significantly expanded and enhanced from the earlier efforts and will provide a much greater degree of potential impacts on the process and sanitary sewer systems and the overall water management alternatives. The FY91 WM Workplan indicates that the currently planned WM projects, by FY95, will decrease Process Water flows to the Building 374 Evaporator by 4.4 MGY and decrease sanitary wastewater to the Building 995 STP by 9.4 MGY. (In some cases the individual projects cause increased flows. These figures are the net result.)

The changes of water management and wastewater generation resulting from proposed and anticipated WM projects have direct impact to the wastestreams and indirect impact to the ZDP alternatives by modifying the use characteristics of potential industrial reusers of treated STP wastewater effluent. In addition, proposed and anticipated operating characteristics of the Building 374 Evaporator directly impacts the planning for the STP recycle system. (Tasks 11/13)

The current RFP WM Program is developing into one that has the potential to adequately address WM in a holistic fashion and meet the various regulatory standards such as the EPA minimum guidelines (US EPA, 1988). However, there appears to be persistent resistence at the RFP to change and the logical tracking and assignment of responsibility of waste production to those areas generating the waste. This culture contributes to the difficulty in obtaining a true waste volume and characterization picture by the building, let alone the various processes contained in the building.

As such, the EPA criteria of adequately assigning responsibility and true cost to the various contributing processes appear to be still unmet at the RFP. Until these basic precepts of WM are integrated at the RFP, it will be difficult to expand the WM program into the newly emerging "pollution prevention" focus of the US EPA and other regulatory bodies. In addition, the lack of responsibility and cost allocation to the waste generators will contribute to the perception that the RFP is not fully behind waste minimization and environmental controls in general.

5.0 ACKNOWLEDGEMENTS

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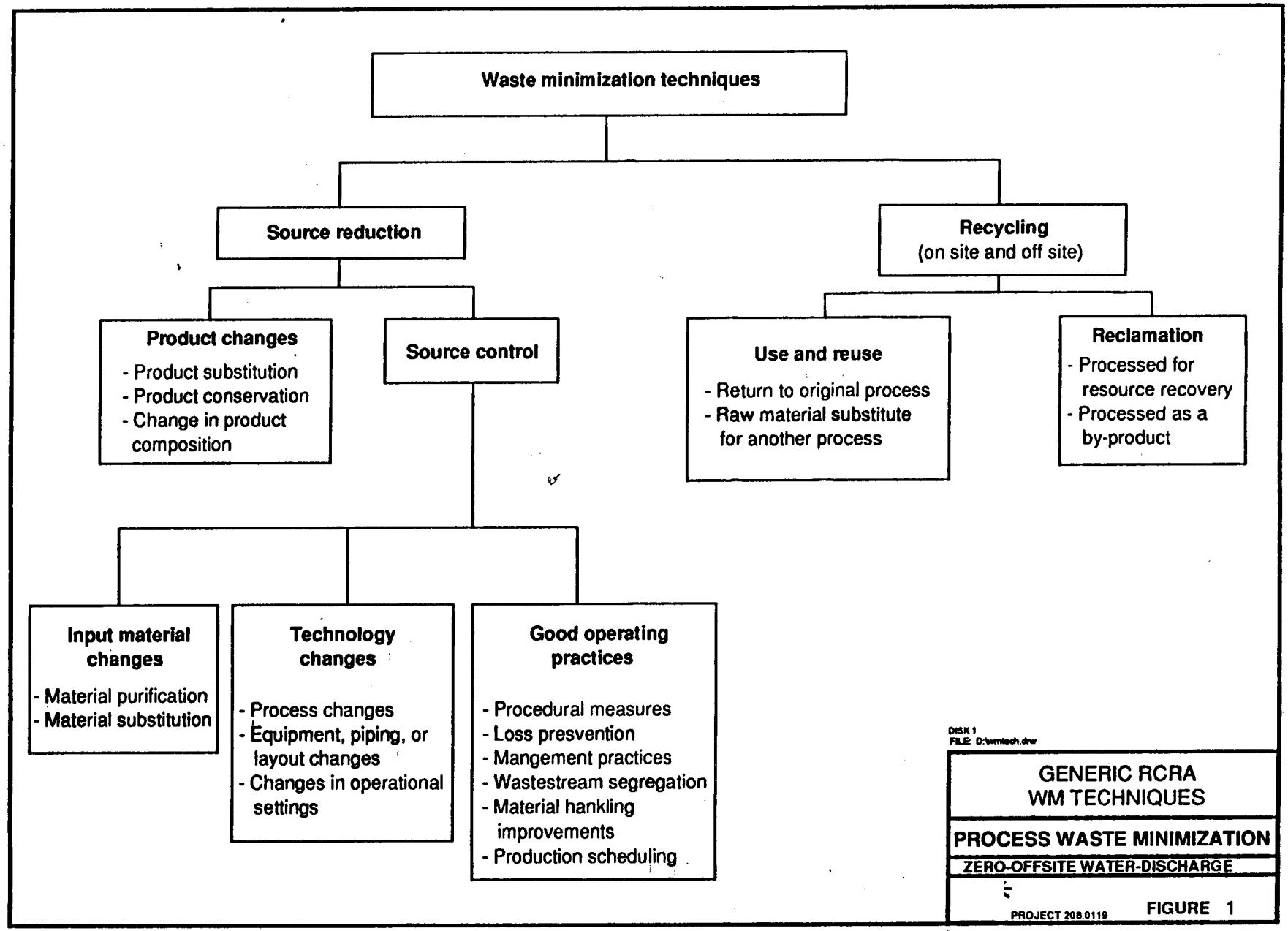
Waste minimization techniques
Source reduction
Recycling
(on site and off site)
Product changes
- Product substitution
- Product conservation
- Change in product composition
Source control
Use and reuse
- Return to original process
- Raw material substitute for another process
Reclamation
- Processed for resource recovery
- Processed as a by-product
Input material changes
- Material purification
- Material substitution
Technology changes
- Process changes
- Equipment, piping, or layout changes
- Changes in operational settings
Good operating practices
- Procedural measures
- Loss presvention
- Mangement practices
- Wastestream segregation
- Material hankling improvements
- Production scheduling
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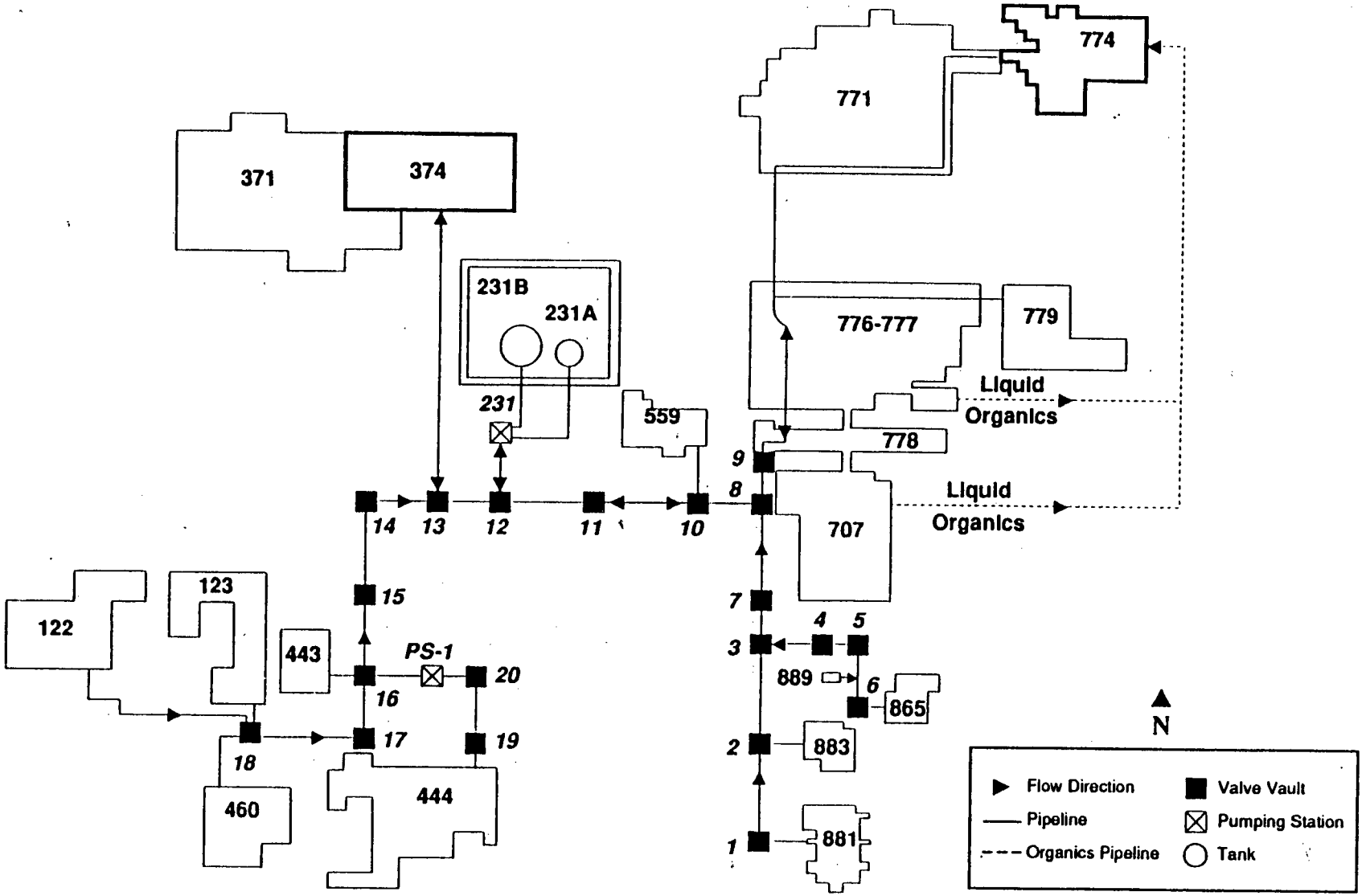
PROCESS WASTE MINIMIZATION
ZERO-OFFSITE WATER-DISCHARGE
PROJECT 208.0119
FIGURE 1

FIG. 1



U. S. Department of Energy Rocky Flats Plant Golden, Colorado	PROCESS WASTE COLLECTION SYSTEM FIGURE 1	Date: Revision: File: Waste Min.

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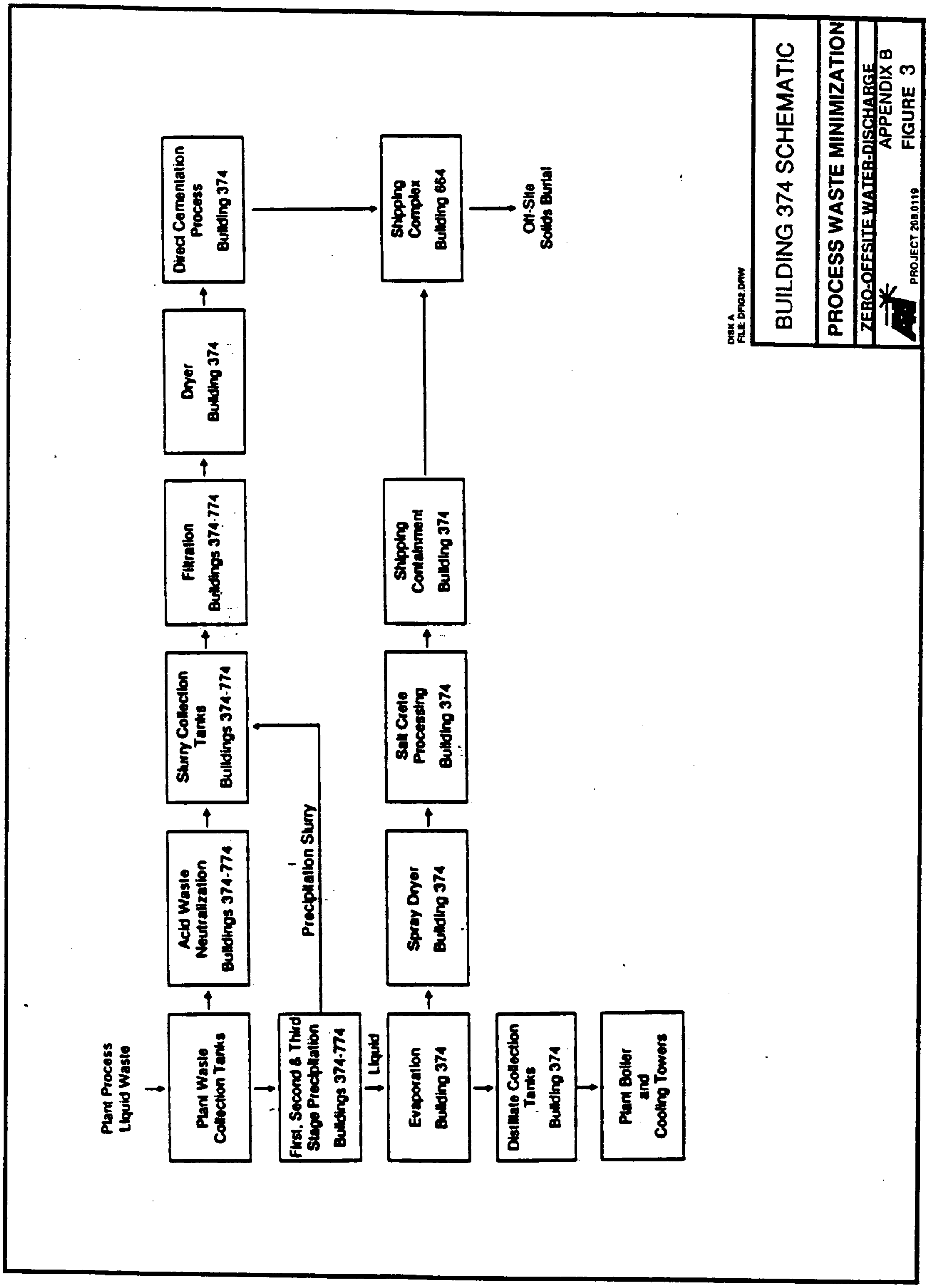
FIG. 2



Process Waste
Minimization Study
Zero-Offsite Water-Discharge Study

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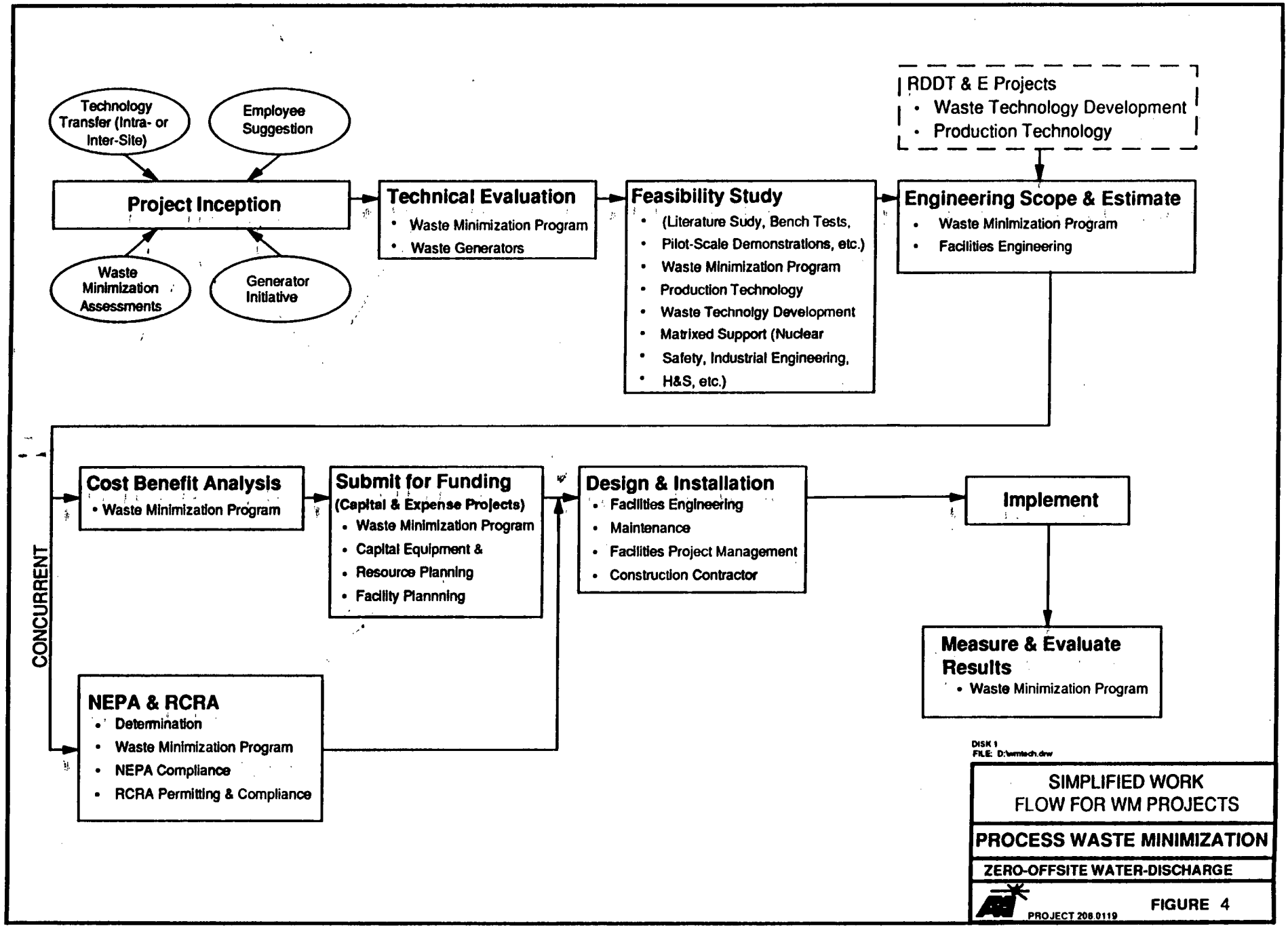
Date: 5/14/91
Revision: 0

FIG 3



Process Waste Minimization Study
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FIG. 4