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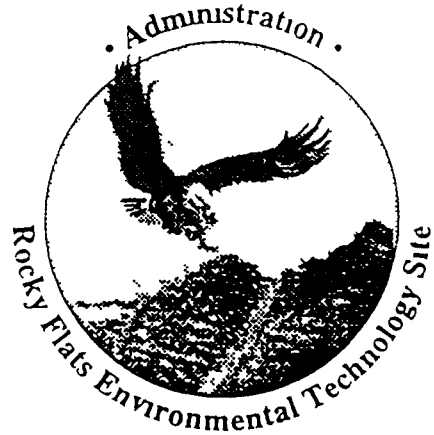
SITEWIDE WASTEWATER TREATMENT STRATEGY



SEPTEMBER 1995

REVIEWED FOR CLASSIFICATION/UCNI
By J F JENCHURA (UNC)
Date 9/29/95

ADMIN RECORD

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EXECUTIVE SUMMARY

STRATEGY SUMMARY

This strategy focused on identifying an approach to improve cost savings in current wastewater treatment systems and to define a low-cost, safe and versatile wastewater treatment system for the future The objectives of the Strategy included lower lifecycle costs, shutdown of Buildings 374 or 774, reduced government capital investment, and meet Site Interim End State goals The recommended option allows for removal of water treatment functions from Building 374 This option affords the lowest capital cost, lowest unit operating cost, lowest technical management risk, greatest support of Interim End State phasing and provides the greatest flexibility for design with unforeseen future needs

The recommended alternative provides for substantial near-term cost and technological advantages over the present operating baseline and planned capital improvement program Accelerated program implementation will produce the desired improvements as specified by the key objectives, and will release capital and operating funds for investment in the Sites higher risk reduction activities, supporting Site closure programs (Interim End State)

RMRS recommends that as a result of the projects low Net Present Value and financial and technical rate of return, the preferred recommendation be implemented through a single consolidated project A single consolidated project will allow for direct focus across multiple functional programs (i e Operations, Permitting, Environmental, etc) assuring schedule and cost compliance RMRS also recommends that the Project Implementation Plan be prepared to support Fixed Price and Fixed Unit Price contracting terms as a means of assuring the following

- Accelerated schedule implementation,
- Competitive project cost,
- Government/commercial risk sharing, and
- Reduced government capital investment

A Project Implementation Plan providing the Permitting, Engineering, technology, and construction resource requirements, schedules and cost estimates could be prepared in sixty to ninety days following Strategy approval Wastestream diversion programs would be performed in parallel, assuring no lost time in implementation

PURPOSE AND OBJECTIVES

The Rocky Flats Environmental Technology Site (Site) will continue to produce diverse wastewater streams as the Site completes its mission of environmental restoration decontamination and decommissioning, and waste management This study included the integration of previous wastewater management strategies into one overall strategy and the provision for cost effective treatment of all wastewater to be produced at the Site Alternatives developed in the study were designed to meet either a ten-year or twenty-year schedule Ten-year alternatives were developed to support the Interim End-State concept Twenty-year alternatives were developed in case funding is unavailable to support achievement of the Interim End-State

The primary objective of this document was to develop and document the basis of this Strategy and to develop short- and long-term implementation plans To achieve the primary objective, the following supporting objectives were identified

- The Strategy must integrate multiple focused wastewater management strategies already in place or in preparation into one overall strategy

- The Strategy must evaluate the routing and treatment of wastewater streams based on composition and regulatory requirements rather than the point of generation

- The Strategy must ensure that adequate capacity is provided for all wastewater treatment over the foreseeable future

- The Strategy will be integrated into the Site's Water Management Plan,

- The Strategy must contain information on the identity and characteristics of all known wastewater sources and conveyance methods on the site This will allow for identification of waste segregation and minimization opportunities In addition, impacts of wastewater stream elimination on the balance of the wastewater to be treated can be evaluated

- The Strategy must identify which wastewater treatment facilities currently in operation can be cost-effective components in an overall strategy

Development of the Strategy considered all current and anticipated sources of wastewater potentially requiring treatment This included wastewater from domestic use, building process operations, facility deactivation, facility decontamination and decommissioning, and environmental restoration Excluding domestic wastewater, the largest sources of wastewater in terms of average annual volume projected for the future include the Interceptor Trench System (ITS) (1 4 million gallons per year), the Building 566 laundry (1 3 million gallons per year), and environmental restoration activities, primarily groundwater (up to 6 5 million gallons per year) The actual volume of environmental restoration water could decrease dramatically depending upon final agreements on cleanup levels Facility deactivation will also produce the most highly contaminated wastewater, although volumes will be low in comparison to the total of the other major sources (greater than 1 million gallons per year) Deactivation wastewater production will also peak fairly rapidly and then begin to decline, and will only be produced over the next one to five years

Development of the Strategy also considered the capacities and capabilities of existing treatment facilities at Building 374, Building 774, Building 910, Building 995 (the Sanitary Treatment Plant, or STP), Operable Unit 1 (OU-1) and Operable Unit 2 (OU-2)

ALTERNATIVES EVALUATED

Four alternatives were identified for wastewater treatment over a ten year period These alternatives support achievement of an Interim End-State in the year 2003, and include the following

- Alternative 1 - Minimum Building 374 upgrades,

- Alternative 2 - Building 374 Liquid Waste Treatment Facility upgrades,
- Alternative 3 - Building 374 Waste system Evaporator upgrades, and
- Alternative 4 - Building 374 Elimination

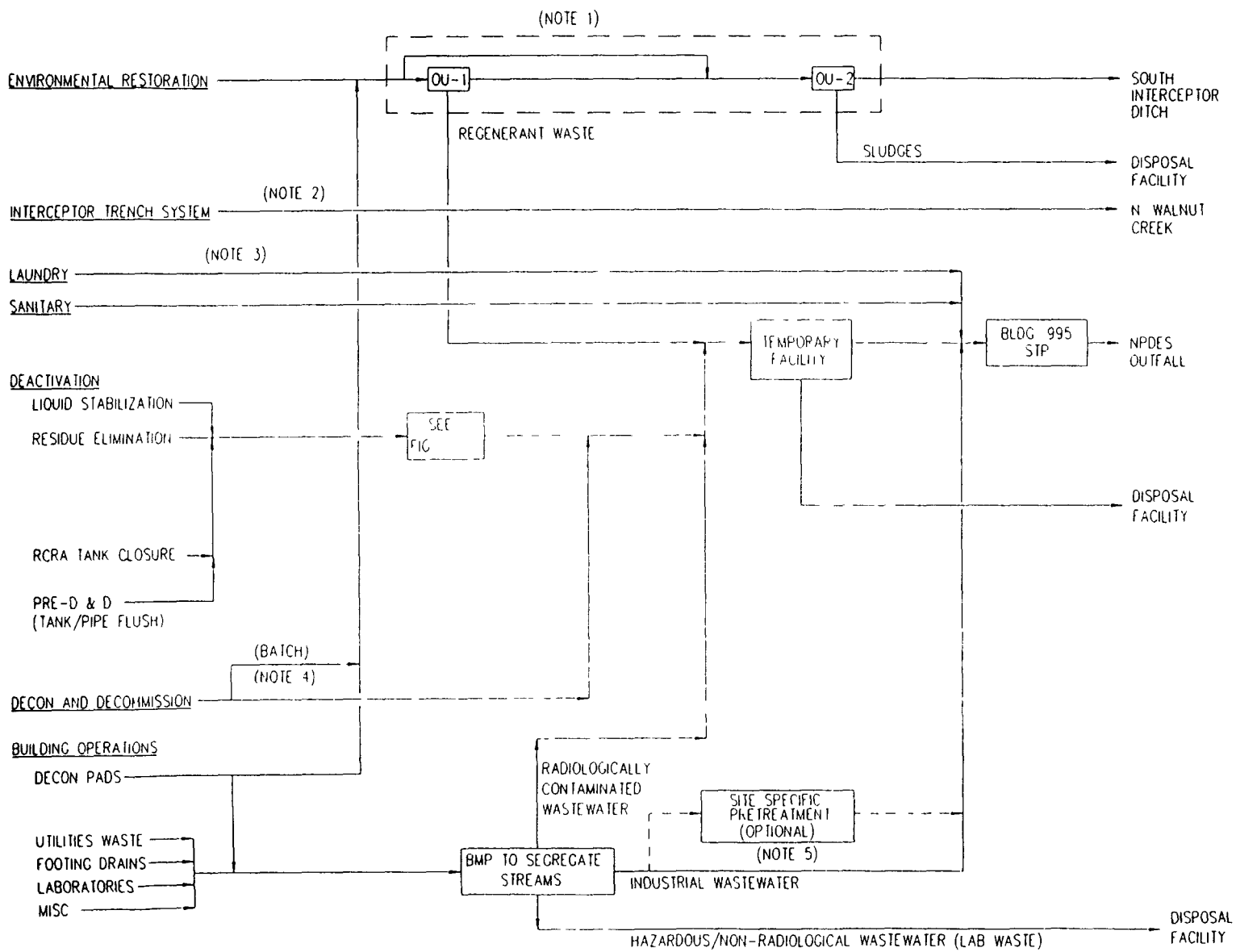
Two additional alternatives were identified for wastewater management over a twenty year life if funding is not available to achieve the Interim End State of 2003

- Alternative 5 - Prudent Building 374 upgrades, and
- Alternative 6 - New Facilities

These alternatives were subjected to a technical and cost effectiveness evaluation and a sensitivity analysis, and a final selection made

Alternative 4 was selected as the recommended ten-year alternative, and is shown schematically on Figures 1 and 2 This alternative includes the following features

- Building 374 would be closed as soon as practical, and a new temporary facility designed and constructed to treat wastewater from building operations, deactivation, and decontamination and decommissioning This facility would be located near Building 374 to take advantage of existing collection and support systems Either leased or modular equipment would be utilized in the facility as the operational life of the facility would be less than ten years



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX

2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N. WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE FAILURE TO OBTAIN RELIEF WOULD REQUIRE DESIGN AND CONSTRUCTION OF A DEDICATED TREATMENT FACILITY FOR THIS STREAM

3 ONLY MODESTY CLOTHING CLEANED ONSITE ALL OTHER LAUNDRY SHIPPED OFF-SITE LOCAL PRETREATMENT MAY BE REQUIRED

4 SOME BATCHES OF DECONTAMINATION AND DECOMMISSIONING WASTE MAY CONTAIN ORGANICS OR OTHER CONSTITUENTS MORE APPROPRIATE FOR TREATMENT AT OU-1 OR OU-2 THESE BATCHES WILL BE TRANSPORTED VIA TANKER TRUCK OR PORTABLE TANK

5 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

DEFINITIONS

OU-1 - EXISTING OPERABLE UNIT-1 TREATMENT SYSTEM

OU 2 = EXISTING OPERABLE UNIT-2 TREATMENT SYSTEM

LWTF = BUILDING 374 LIQUID WASTE TREATMENT FACILITY KNOWN AS THE HOT SIDE AND TREATS RADIOACTIVELY CONTAMINATED WASTEWATER

WSE = BUILDING 374 WASTE SYSTEM EVAPORATOR KNOWN AS THE COLD SIDE AND TREATS DECONTAMINATED AND OTHER SLIGHTLY CONTAMINATED WASTEWATER

BMP = BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION

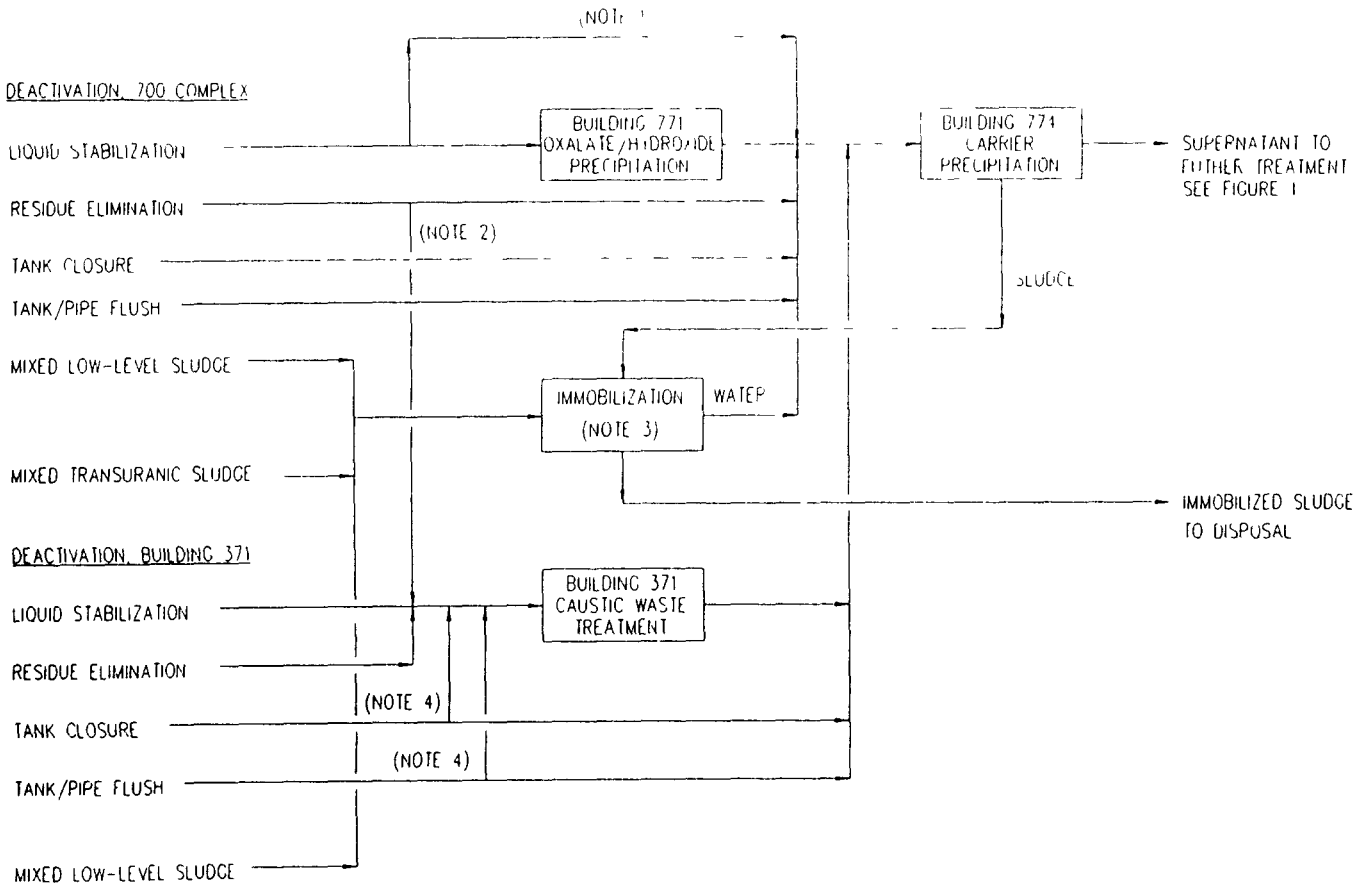
STP = SANITARY TREATMENT PLANT

FIGURE 1

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 4

BUILDING 374 ELIMINATION



NOTE
DEACTIVATION IN THE 700 COMPLEX AND BUILDING 371
IS ASSUMED TO BE COMPLETE IN FOUR YEARS

NOTES

1 DEPENDING ON ACTIVITY LEVELS SOME LIQUID STABILIZATION WASTEWATER WILL NOT REQUIRE OXALATE /HYDROXIDE PRECIPITATION

2 SOME RESIDUE ELIMINATION WASTEWATER MAY BE TRANSPORTED TO BUILDING 371 FOR TREATMENT

3 FINAL IMMOBILIZATION SYSTEM PLANNING FOR THESE SLUDGES ARE IN DEVELOPMENT

4 DEPENDING ON ACTIVITY LEVELS SOME TANK CLOSURE AND TANK/PIPE FLUSH WASTEWATER MAY BE PRETREATED IN THE BUILDING 371 CAUSTIC WASTE TREATMENT SYSTEM

FIGURE 2

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

FACILITY DEACTIVATION SCHEMATIC

- Liquids produced from deactivation activities in Building 371 would be treated for initial reduction of radionuclide and metal concentrations in the caustic waste treatment system to be installed in Building 371 Treated effluent from this process could then be treated in the Building 774 carrier precipitation process for additional radionuclide removal The supernatant wastewater from both Building 371 and 774 would then be treated for further reduction of radionuclides and metals in the new temporary facility replacing Building 374

- The general approach to handling of deactivation wastewater is shown schematically on Figure 2 Liquids produced from deactivation activities in Building 771 would be treated for initial reduction of radionuclide and metal concentrations in the oxalate precipitation process and hydroxide precipitation process located in Building 771 Additional treatment of the effluent from these processes plus other miscellaneous liquids produced in Building 771 and 774 would be treated in the carrier precipitation process in Building 774

- Immobilization Systems are provided for sludges currently stored in building 374 and Building 774, and for sludges produced by the Building 774 carrier precipitation process

- Regulatory relief on nitrate and radionuclide limits would be sought to allow for direct discharge of ITS wastewater This relief is based on changing the use classification of North Walnut Creek from domestic to agriculture thereby allowing for compliance with nitrate standards In addition, the adoption of DOE Order 5400 0 Derived Concentration Guidelines (DCGs) for radionuclides must occur These actions are

estimated to save $20 million dollars over a ten year period While this relief is sought, continued processing of ITS wastewater will take place in the Building 374 Waste System Evaporator If relief is not obtained prior to closure of Building 374, a temporary system possibly utilizing leased equipment would be required If the relief cannot be obtained at all, a dedicated facility just for treatment of the ITS wastewater would be required

- Environmental restoration wastewater would be treated primarily at the combined OU1/OU2 facility

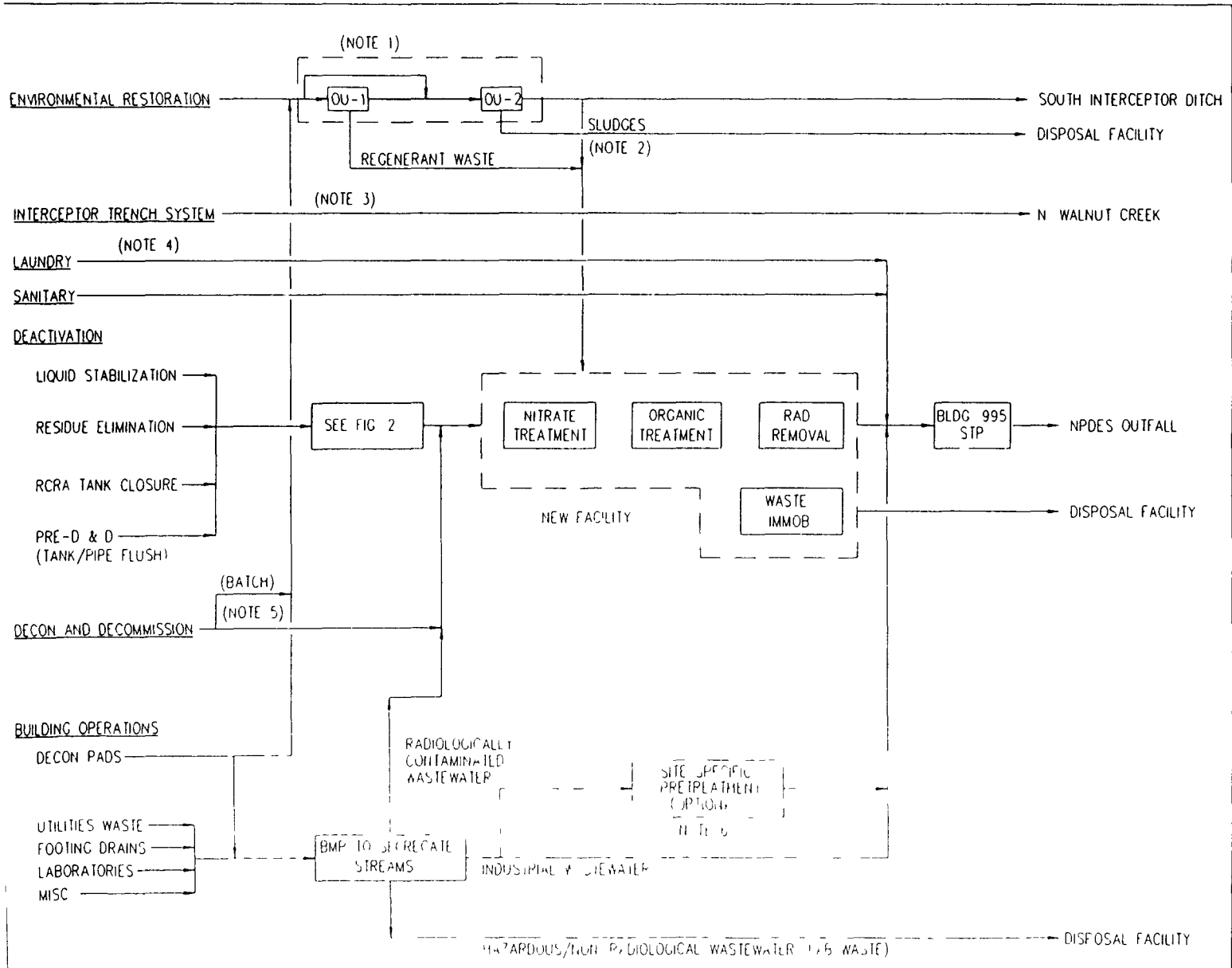
- Domestic wastewater would continue to be treated at the STP

- Characterization of Building 566 laundry wastewater will be conducted to verify that discharge to the STP can take place This approach assumes that only modesty clothing will continue to be laundered at the Site

Alternative 6 was selected as the recommended twenty-year alternative, and is shown schematically on Figure 3 This alternative includes the following features

- Building 374 would be closed as soon as practical, and a new facility designed and constructed to treat wastewater from building operations, deactivation, and decontamination and decommissioning This facility would be located outside the Protected Area

- Wastewater from deactivation would be handled in the same manner as for Alterative 4



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX
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DEFINITIONS

OU-1 - EXISTING OPERABLE UNIT 1 TREATMENT SYSTEM
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BMP - BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION
STP - SANITARY TREATMENT PLANT

FIGURE 3

RFETS SWTS STUDY
CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 6
NEW FACILITIES

- Regulatory relief will be sought to allow for direct discharge of ITS wastewater as discussed for Alternative 4 While this relief is sought, continued processing of ITS wastewater will take place in the Building 374 Waste System Evaporator If relief is not obtained prior to closure of Building 374, a temporary system possibly utilizing leased equipment would be required If the relief cannot be obtained at all, a dedicated facility just for treatment of the ITS wastewater would be required

- Environmental restoration wastewater would be treated primarily at the combined OU-1/OU-2 facility

- Domestic wastewater would continue to be treated at the STP

- Characterization of Building 566 laundry wastewater will be conducted to verify that discharge to the STP can take place This approach assumes that only modesty clothing will continue to be laundered at the Site

RECOMMENDATIONS

Alternative 4 is the recommended ten-year alternative for the following reasons

- It is the only alternative capable of supporting an early closure of Building 374 and can also support closure of building 771/774,

- It has the lowest overall life cycle cost of dollars and capital cost dollars of the ten-year alternatives,

- It has low risk of delay in implementation because of relatively low capital funding requirements,

- It is ranked high technically due primarily to minimization of waste and overall flexibility in addressing changes in wastewater characteristics, and

- It is the best alternative to support achievement of the Interim End State

Alternative 6 was selected as the recommended twenty-year alternative for the following reasons

- It is the only alternative capable of supporting the closure of Building 374 and can also support closure of building 771/774,

- It has the lowest overall life cycle cost and capital cost of the twenty-year alternatives,

- It is ranked high technically due primarily to minimization of waste and overall flexibility in addressing changes in wastewater characteristics,

The estimated costs of these two recommended alternatives are summarized as follows

Cost Element	Alternative 4	Alternative 6
Total Capital Investment	$6,800,000	$24,600,000
Total Unescalated O&M Cost a/	$81,000,000	$186,100,000
Average Annual O&M Cost	$8,100,000	$9,300,000
Net Present Value b/	$74,300,000	$144,000,000
Real Annualized Cost c/	$12,100,000	$16,900,000

NOTES
a/ This is total O&M cost throughout lifetime of facilities based on 1996 dollars
b/ Net Present Value assuming an escalation of annual costs of four percent and a discount rate of ten percent
c/ Annual equivalent of Net Present Value assuming a discount rate of ten percent

The costs presented above demonstrate the following savings over current operations

- The total estimated capital expenditures for the ten-year and twenty-year alternatives are $6 8 million and $24 6 million, respectively Both of these values are considerably lower than the current capital funding level of approximately $65 million for full upgrades to Building 374

- The current operating budget of Building 374 is approximately $9 3 million If operations of OU1 and OU2 and waste disposal are added, this cost increases to approximately $14 2 million The recommended ten- and twenty- year alternatives save approximately $6 1 million and $4 9 million per year, respectively

- An overall graphic of cumulative cost versus time for each of the ten- and twenty- year alternatives is provided as Figure 4 and 5 These figures further demonstrate the cost effectiveness of Alternatives 4 and 6

Kaiser-Hill and RMRS have committed to accelerated closure of Site buildings as a means of substantial cost savings to the Government Implementation of either the recommended ten- or twenty-year alternatives are in keeping with this philosophy as they allow for early closure of Building 374 Assuming that accelerated funding was available and a design build approach to procurement was approved, Building 374 can be closed in mid-FY 1997 for Alternative 4 and the end of FY 1997 for Alternative 6 The driver for both of these dates is the completion of the design and construction of the new facilities Without an accelerated funding approval and procurement approaches (i e design-build and/or operate or equipment lease) this schedule would slip by as much as six to twelve months

OBSTACLES/BARRIERS TO BE OVERCOME

Potential barriers to the successful implementation of this Strategy have been identified as follows

- New NPDES permit,
- WWTU exclusion,
- Regulatory relief for ITS wastewater,
- Variance from DOE Order 6430 1A for new facilities,

FIGURE 4
CUMULATIVE CASH FLOWS- TEN YEAR

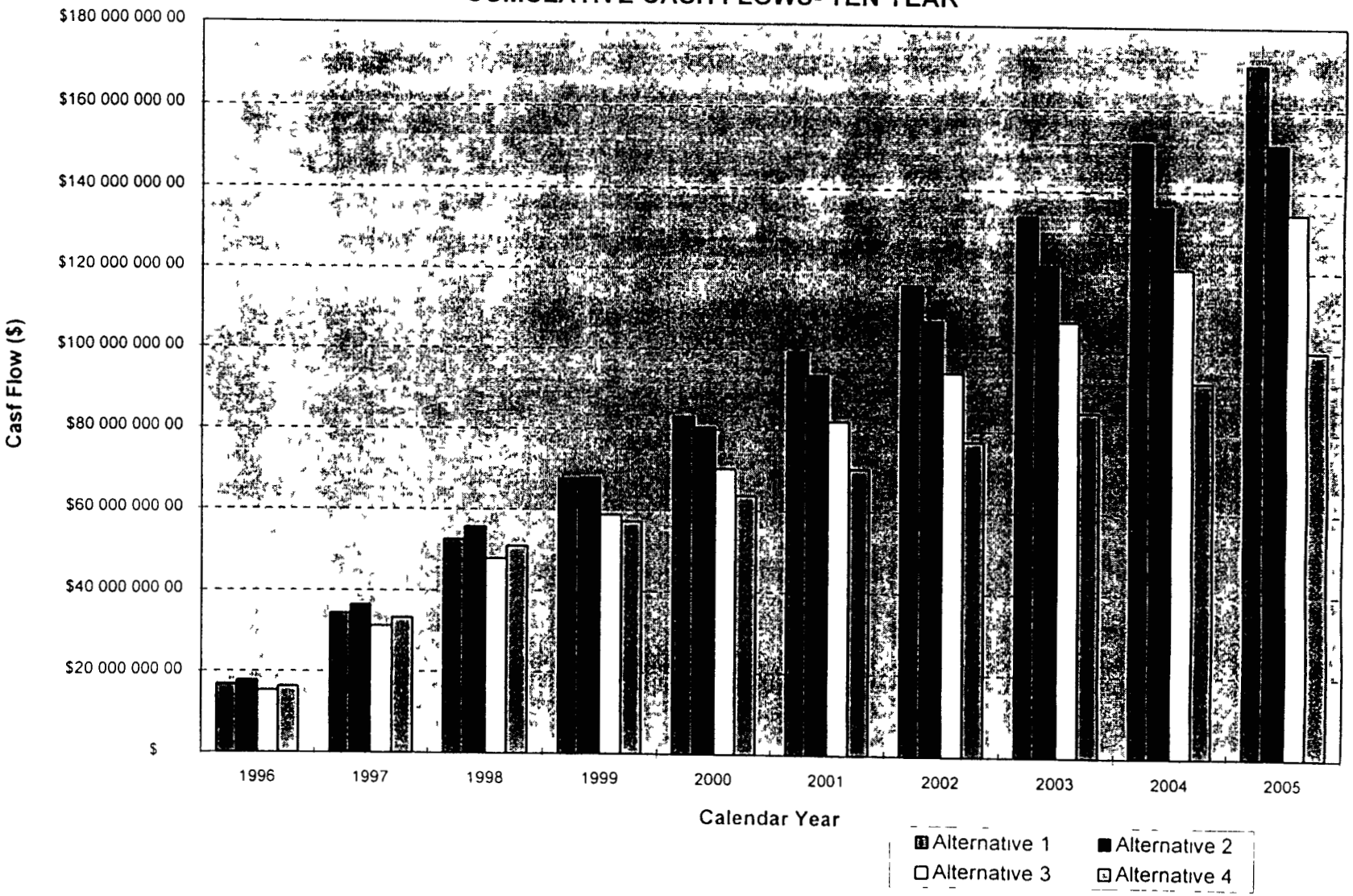
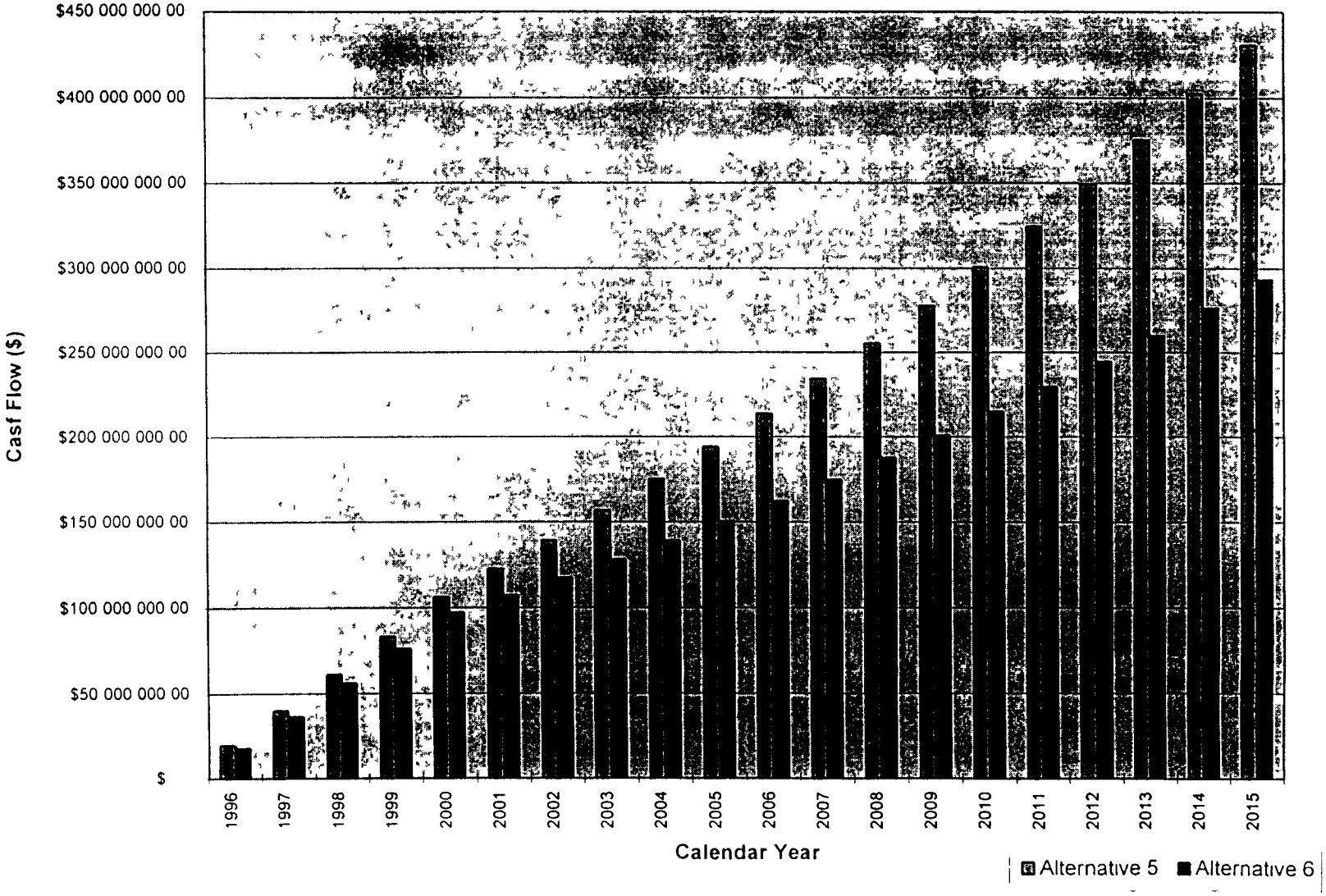


FIGURE 5
CUMULATIVE CASH FLOWS- TWENTY YEAR



- Funding availability, and

- Procurement approach

Each of these barriers may result in cost or schedule impacts

FUTURE PLANNING AND INTEGRATION

The schedules for implementation of this Strategy for both the ten- and twenty-year cases are presented as Figures 6 and 7, respectively

Figure 6
Ten Year Alternative Schedule

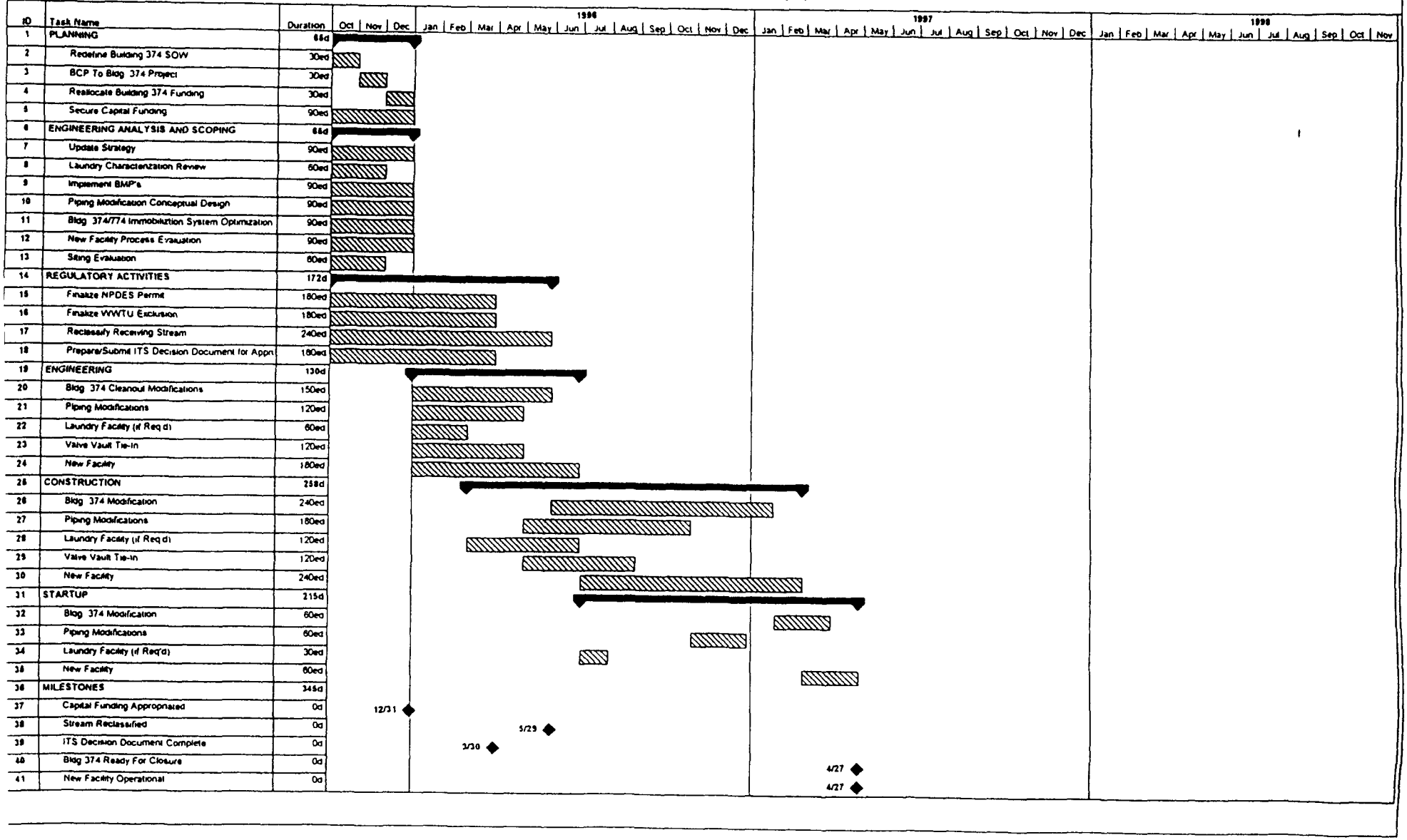


Figure 7
Twenty Year Alternative Schedule

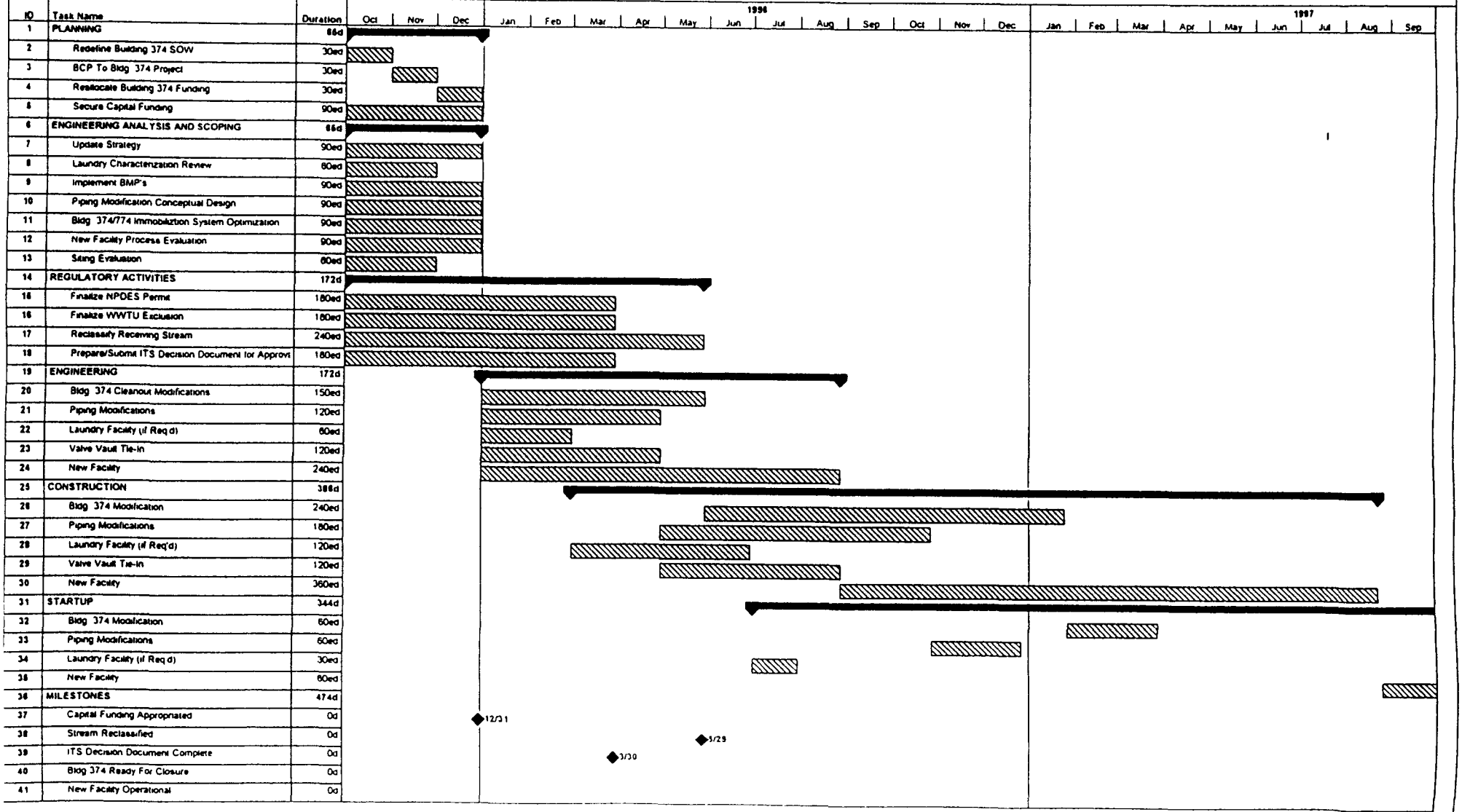
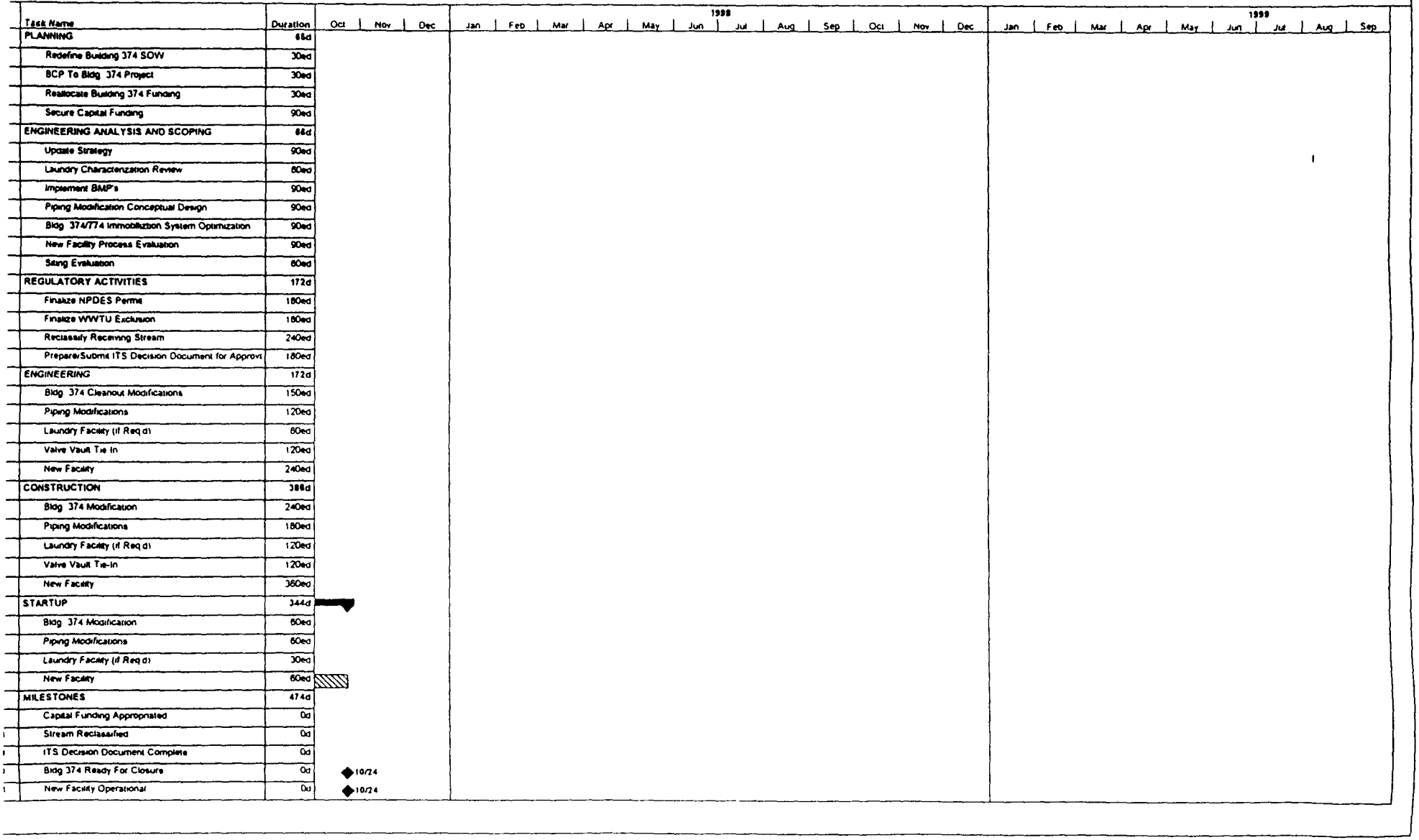


Figure 7
Twenty Year Alternative Schedule



1 0 INTRODUCTION

The Rocky Flats Environmental Technology Site (Site) will continue to produce diverse wastewater streams until the Site completes its mission of environmental restoration and decontamination and decommissioning This wastewater will be both conventional in nature with minimal potential for containing hazardous or radioactive materials, and contaminated with hazardous or radioactive substances This comprehensive Sitewide Wastewater Treatment Strategy (Strategy) has been prepared to identify an approach to improve cost savings in current wastewater treatment systems and to define a low-cost, safe and versatile wastewater treatment system for the future The following sections discuss the scope of this Strategy along with project approaches A more detailed discussion of background information is also found in Appendix A In FY 1996, this Strategy will be updated and incorporated into the Site's Comprehensive Water Management Plan

1 1 SCOPE

The scope of this project was to develop a recommended treatment strategy for current and anticipated wastewater generated at the Site As such, the Strategy addresses the following sources of wastewater

- Domestic,
- Facility process (building operations),
- Facility deactivation,
- Facility decontamination and decommissioning, and
- Environmental restoration, including groundwater

Surface water management and the potential for treatment of surface waters are not part of this study but will be evaluated as part of the Site's Water Management Plan

The primary objectives of this study were to develop and document the basis of this Strategy , provide short- and long-term alternatives, and provide recommendations leading to implementation plan development To achieve the primary objectives, the following supporting objectives were identified

- The Strategy must integrate multiple focused wastewater treatment strategies already in place or in preparation into one overall strategy

- The Strategy must evaluate the routing and treatment of wastewater streams based on composition and regulatory requirements rather than the point of generation

- The Strategy must ensure that adequate capacity is provided for all identified wastewater treatment over the foreseeable future

- The Strategy will be integrated into the Site's Water Management Plan to be completed in FY 1996,

- The Strategy must contain information identifying and characteristics of all known wastewater sources and conveyance methods on the site This will allow for identification of waste segregation and minimization opportunities In addition, impacts of wastewater stream elimination on the balance of the wastewater to be treated can be evaluated, and

- The Strategy must identify which wastewater treatment facilities currently in operation can be cost-effective components in an overall strategy

Previous planning at the Site has been based on a strategy that the bulk of deactivation, decontamination and decommissioning will be completed in approximately twenty years However, the concept of an accelerated cleanup and achievement of the Interim End State has been developed This concept includes the following major elements

- Achievement of Interim End State will occur in the year 2003,
- Consolidation of Plutonium will be complete,
- Deactivation, decontamination, decommissioning, and demolition of older buildings will be complete,
- Other facilities will be in a steady-state safe condition,
- Site population will be approximately 500, and
- All landfills will be closed

For this study, two sets of alternatives were developed The first set of alternatives assumes that the Interim End State will be achieved In order to allow for final shut down activities, the actual design life for these alternatives is ten years The second set of alternatives assumes that twenty years will be required for deactivation and decommissioning

The implementation of the Strategy was analyzed with respect to cost and schedule, risks related to funding availability, environmental or worker impact, and potential barriers to be recognized and overcome

1 2 APPROACH

The study was divided into three major activities

- Defining historical, current, and projected quantities and characteristics of wastewater at the Site,
- Assessing existing wastewater treatment facilities including capacities, capability, and planned upgrades, and
- Developing and recommending an overall strategy for wastewater treatment

The inventory of existing and future wastewater sources was completed by reviewing relevant documents, reports, and site databases, and by conducting interviews of Site personnel Relevant documents and reports reviewed included similar studies conducted on a portion of the water management system as well as studies on a site-wide water balance In addition, reports were reviewed on various aspects of site cleanup for process equipment, buildings, existing process wastes and environmental restoration wastes Two primary databases were utilized to determine wastewater quality information, the Rocky Flats Environmental Data System (RFEDS) and the Waste Stream and Residue Identification and Characterization (WSRIC) sampling and Analysis Database The Master Tank Database was also used to evaluate potential

volumes of wastewater generated during both RCRA and non-RCRA tank decontamination activities

Personal interviews were conducted with Site personnel knowledgeable in the generation of water attributed to one of the several phases of final site restoration including environmental restoration, building deactivation, decontamination and decommissioning, and tank management In addition, questionnaires and personal interviews were utilized to gather information from the managers of buildings at the site that still generate wastewater from production or maintenance activities

Facility information was gathered through interviews with Liquid Waste Programs, Building 374, and Building 995 personnel In addition, various design criteria and design documents were reviewed Finally, actual operational data on the various facilities were obtained

The technical evaluation of the alternatives included consideration of twelve environmental and operational criteria The criteria were weighted in terms of relative importance, and each alternative scored from zero to ten for each criterion

The economic evaluation of the alternatives included an evaluation of both capital and operating costs incurred over either a ten- or twenty-year lifetime Assumptions and limitations on the cost estimates are as follows

- Costs for Building 374 Liquid Waste Treatment Facility (LWTF) and Waste System Evaporator (WSE) upgrades were estimated from detailed cost estimates developed for the LWTF and WSE upgrades projects,

- Costs for other facilities and systems were order-of-magnitude estimates using experience and costs incurred at other DOE facilities for similar facilities

- Building 374, 774, 995, and OU1/OU2 operations costs are based on 1996 budget figures which are expected to be approximately thirty percent lower than previous operating years (i e FY 1994, FY 1995)

- Waste disposal costs are based on current Building 374 operations adjusted for relative changes in waste volume between alternatives Disposal costs for low-level waste were provided by Liquid Waste Operations personnel as approximately $95/ft^3$ These are actual costs currently assessed to Building 374, and assumes transportation and disposal at the Nevada Test Site TRU waste disposal costs were unavailable from Site personnel, but have been estimated at approximately $2,000/ft^3$ Government Accounting Office (GAO) estimates provided by DOE are what direct disposal costs will be approximately $7,000 per drum at the Waste Isolation Pilot Plant (WIPP) Site Waste Characterization personnel estimate an additional $5,000 to $10,000 per drum for assay, packaging, and shipping A mid-range value of $8,000 per drum was used resulting in an overall cost of $15,000 per drum, or $2,000/ft^3$

1 3 DOCUMENT ORGANIZATION

This document contains six sections including this introduction Section 2 summaries regulatory considerations important to the study Section 3 presents both the baseline and future estimates of wastewater quantity and characteristics, and develop

wastewater needs Alternatives to meet these needs are identified, evaluated, and recommended alternatives selected as discussed in Section 4 Finally, Section 5 discusses the implementation of the Strategy and Section 6 provides references

Supporting information to this document may be found in appendix A (Project Background), Appendix B (Wastewater Sources and Treatment Facilities), and appendix C (Summary of Alternatives Development and Evaluation) The information provided in Appendix B is actually a summary of information provided in a separate multiple volume Comprehensive Water and Wastewater Evaluation (RTG, 1995)

2 0 REGULATORY CONSIDERATIONS

A number of regulatory requirements and guidance documents apply to the management of wastewater at the Site The environmental legislation which most directly impacts decision making with respect to wastewater management are the Clean Water Act (CWA), the Atomic Energy Act (AEA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) Impacts of these laws on the Strategy are briefly discussed in the following sections

2 1 CLEAN WATER ACT

Under the CWA, the State of Colorado has the authority to issue National Pollutant Discharge Elimination System (NPDES) permits for discharges to surface water streams except for federal facilities Therefore, EPA Region VIII has the only authority to issue NPDES permits at the Site While they do not have permit authority, Colorado does promulgate stream water quality standards which are generally incorporated in Federal NPDES permits

The NPDES permit for the Site is currently being renewed Receipt of this permit is a planning assumption for FY 1996 (Silverman, 1995) and will have the following impact on the Strategy

- The draft NPDES permit will regulate discharge from the Sanitary Treatment Plant (STP) as Building 995 and limit pollutant concentrations in the effluent to the corresponding stream standard,

- The draft NPDES permit proposes to regulate at least one internal wastestream, the discharge from Building 374 The internal wastestream will have monitoring and reporting provisions, and

- The NPDES permit will be renewed for a five year period

There is the potential for changes to future NPDES permits or a modification to the renewed permit due to the beneficial use classification of receiving water segments Completion of Option B and full implementation of the *Surface Water Pond Operations Plan* (DOE, 1995a) may allow for a reclassification of these segments to a non-drinking water classification This change should result in stream standards appropriate for the revised classification which should be less stringent than the current standards

2 2 RESOURCE CONSERVATION AND RECOVERY ACT

Building 374 is currently operated under 40 CFR 264 of RCRA as a Treatment, Storage or Disposal (TSD) facility However, 40 CFR 270 1(c)(2) specifically excludes wastewater treatment units as defined by 40 CFR 260 10 from permitting under RCRA provided the wastewater treatment unit is subject to permitting under the CWA Therefore, obtaining of the RCRA wastewater treatment unit (WWTU) exclusion would allow Building 374 to be operated under the CWA rather than RCRA Receipt of the WWTU exclusion is a planning assumption for FY 1996 (Silverman, 1995)

The implementation of the WWTU exclusion and the removal of Building 374 from direct regulation under RCRA has the potential for substantial cost savings These savings would result if immobilized solids and saltcrete from the facility was determined to be non-hazardous as defined under RCRA Currently, this waste is handled as mixed low-level waste due to trace levels of listed hazardous waste in the

Building 374 influent Administrative costs for a non-RCRA facility would also be decreased due to reduced requirements for inspections, training, regulatory compliance support and documentation Since administrative requirements will be reduced the probability of notices of violation should also be reduced

The primary requirement for the WWTU exclusion concerns the definition of wastewater Compliance with this definition is required to maintain the exclusion The key elements of the definition of wastewater are that total organic carbon concentrations cannot exceed one percent and that the wastewater must be a minimum of ninety percent water A Waste Acceptance Criteria document will be required to ensure that the characteristics of the wastewater at the influent to Building 374 meets this definition

2 3 REGULATION OF RADIONUCLIDES

Currently radionuclide discharges are regulated under the AEA Limitations on radionuclide discharges are currently proposed in the draft NPDES permit, and based on Colorado site-specific stream standards for the Site Slightly different standards from those identified in the draft NPDES permit are currently in place for discharges from the Operable Unit 1(OU-1) treatment facility The DOE has also established standards (Derived Concentration Guides, or DCGs) in DOE Order 5400 5, *Radiation Protection of the Public and the Environment* (DOE, 1990), which are based on risk to human health and differ from ambient-based Colorado stream standards Currently, the DOE standards are proposed as 10 CFR 834

If the Site treats and discharges radionuclides based on the AEA standards, as stated in DOE Order 5400 5, instead of Colorado Site-Specific Stream standards or Nuclear Regulatory Commission (NRC) regulations, not only will cost savings be realized on

monitoring, handling and treating, but the probability of exceeding the standards decreases

2 4 CERCLA

Regulation of environmental restoration activities for the operable units falls under RCRA and CERCLA, or a combination of the two, and is specified in the Interagency Agreement (IAG) Remediation activities under the IAG will examine the volume and constituents to be treated to IAG and groundwater cleanup standards The point of compliance will have a major impact on the capacity and treatment requirements for environmental restoration wastewater (groundwater) The development of discharge criteria for facilities treating environmental restoration groundwater must consider all applicable or relevant and appropriate requirements (ARARs) for the Site Limits on discharges for most inorganic and organic contaminants will generally be surface water standards used for NPDES permitting purposes Recent decision documents for several interim measure/interim remedial actions (DOE, 1995e, EG&G, 1995) utilize DOE 5400 5 radionuclide standards

2 5 EFFECTS OF DIFFERENT STANDARDS FOR WASTESTREAMS

There are two primary issues in which application of different standards for wastewater streams would have a cost impact The first issue concerns the matter of stream segment reclassification If it were to be discharged to the environment, the wastewater collected in the Interceptor Trench System (ITS) would have to be treated for nitrate removal based on the current water supply stream classification Reclassification of the receiving stream to a non-drinking water use would result in a different nitrate limitation, and could eliminate the need for nitrate removal

The second area of potential cost impact is radionuclide standards Implementation of DOE Order 5400 5/10 CFR 834 DCGs may allow for discharge of the ITS wastewater without treatment for radionuclides DCGs represent the levels protective of human health as established by national and international radiological authorities In contrast, the site specific water quality standards were established on the basis of ambient levels at the time of their adoption, and have no human health risk basis

A change in use classification of North Walnut Creek and the application of DCGS to discharges would allow for significant cost savings Therefore, these two major factors have been considered and are included in the evaluation of alternatives

3 0 DESIGN BASIS

The process used in developing the projection of future wastewater treatment needs included the following

- Quantifying past and current wastewater volumes and characteristics,
- Projecting future wastewater production including identification of requirements, constraints, assumptions, and uncertainties, and
- Identifying various scenarios for evaluation which could affect the future wastewater projection

The following sections review each of these elements

3 1 BASELINE ESTIMATE

For this Strategy, the baseline is derived from historical records for approximately the last five years, and is broken down into the following categories

- Environmental restoration groundwater,
- Interceptor Trench System,
- Laundry wastewater,
- Sanitary wastewater,

- Building process operations utilities production, laboratories, and other miscellaneous operations),

- Incidental wastewater including decontamination pads and building footing drains, and

- Solar pond wastewater (no longer produced)

Figure 3 1 summarizes the baseline estimate of wastewater production over the past five years for treatment in Building 374 Table 3 1 includes the general characteristics of each of these sources treated at Building 374 plus wastewater treated at the OU-1 and OU-2 treatment facilities and at the STP (Building 995) A detailed description of the inventory of existing wastewater volumes and characteristics and the development of the future projection is presented in Appendix B

3 2 PROJECTION OF FUTURE WASTEWATER PRODUCTION

The projection of future production of wastewater was made based on historical data and several assumptions The following sections discuss these assumptions and the resulting projection Using this projection, specific future treatment needs are identified

3 2 1 Assumptions, Requirements, and Constraints

The assumptions utilized in this Strategy are factors that either directly or indirectly affect wastewater volumes, characteristics, or management practices, and include the following

FIGURE 3 1
BUILDING 374 HISTORICAL WASTEWATER VOLUMES

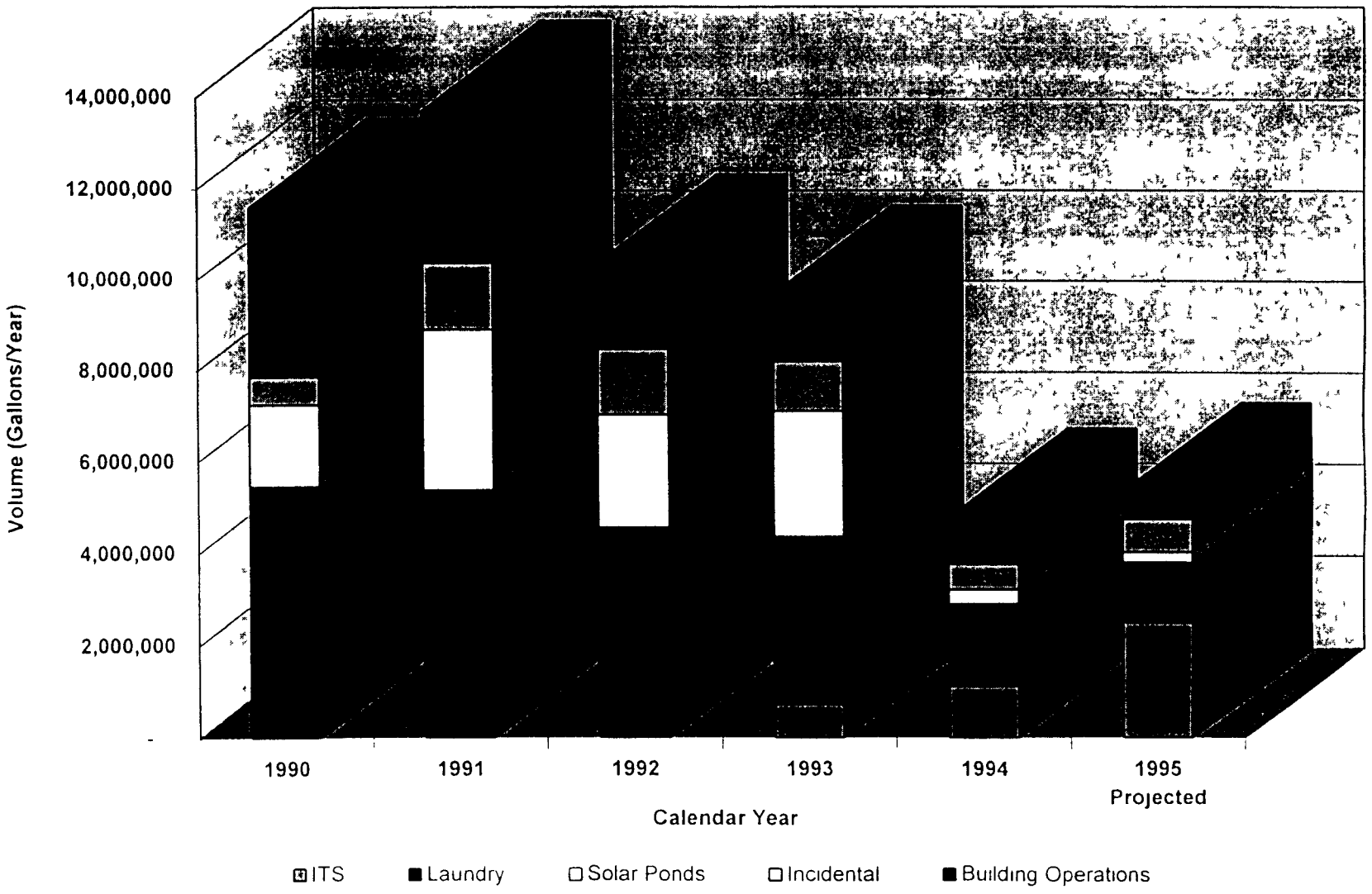


TABLE 3 1

BASELINE WASTEWATER CHARACTERISTICS

WASTEWATER SOURCE	CURRENT FLOW (GPY) a/	CONTAMINANTS OF CONCERN b/
Environmental Restoration	450 000 (OU 1) c/ 120 000 (OU 2) c/	Radionuclides Metals Volatile Organic Compounds
Interceptor Trench System	1 400 000 d/	Nitrate/Nitrite Radionuclides Volatile Organic Compounds
Laundry	1,300,000	Radionuclides Metals Biological Oxygen Demand
Sanitary	55,000,000	Biological Oxygen Demand Miscellaneous Inorganics
Building Operations	1,540,000	Metals Radionuclides Inorganics

Notes
a/ GPY = gallons per year
b/ Concentration data provided in Appendix B
c/ These are volumes of wastewater treated at the OU 1 and OU 2 treatment facilities
d/ 1995 flow is unusually high due to unusual precipitation in Spring 1995 This value is an equalized number based on historical data over the past three years

- Facility deactivation programs will be funded,

- Domestic activities (i e , use of restrooms, etc) and consequently wastewater production are closely correlated with the number of personnel at the Site,

- Ongoing industrial work is directly linked to historic water consumption for similar activities,

- The Site will operate in compliance with applicable regulations, DOE Orders, and agreements negotiated with state and/or federal agencies to protect the health and safety of employees, contractors, the general public, and the environment, even if such compliance results in an increase in wastewater production or recycling of the wastewater, and

- In the absence of changes to management activities, wastewater characteristics will remain unchanged from the baseline

3 2 2 Future Wastewater Projection and Treatment Needs

Table 3 2 summarizes each of the wastewater sources included in the projection as well as the duration each source is expected to be active The actual flowrates and final volumes depend upon whether a ten (Interim End State) or twenty year period is assumed The production of wastewater over both the ten and twenty year periods is also presented as Figures 3 2 and 3 3 Based on this data, the following conclusions have been reached with respect to each stream

TABLE 3 2
PROJECTED WASTEWATER CHARACTERISTICS

WASTEWATER SOURCE	PROJECTED FLOW (GPY) a/	PROJECTED TREATMENT CAPACITY (GPM) b/	DURATION c/	PROJECTED CONTAMINANTS OF CONCERN
Landfills				
New Sanitary Landfill	20 000 d/	0 15 0 21	2036	Organics, Metals
CAMU	1,500,000 e/	11 16	1999	Organics, Metals, Radionuclides
Environmental Restoration				
Groundwater	6 570 000 f/	51 72	2015	Organics, Metals Radionuclides
Interceptor Trench System	1,400,000 g/	11 15	2015	Nitrate/Nitrite, Radionuclides
Laundry	1,300,000	9 9 14	2015	Metals, Biological Oxygen Demand
Sanitary	55,000,000	420 - 590	2015	Biological Oxygen Demand, Inorganics
Building Deactivation				
Liquid Stabilization	8,800 h/	0 07 0 09	1999	Actinides, Metals
Residue Elimination	26,400 i/	0 2 - 0 3	2002	Actinides, Metals
Tank Management	885,000 j/	6 7 - 9 4	2005	Actinides, Metals
Bld 374/774 Sludge Treatment	34,000 k/	0 2 0 4	2015	Actinides, Metals
Decontamination and Decommissioning	100,000 l/	0 8 - 1 1	2015	Metals, Radionuclides
Building Operations	870,000 m/	5 3 7 4	2015	Metals, Radionuclides, Inorganics

WASTEWATER SOURCE	PROJECTED FLOW (GPY) a/	PROJECTED TREATMENT CAPACITY (GPM) b/	DURATION c/	PROJECTED CONTAMINANTS OF CONCERN
Incidental	3,100,000 n/	24 - 33	2015	Metals, Radionuclides, Organics

Notes

a/ GPY = gallons per year

b/ The range for treatment capacity required in GPM (gallons per minute) was calculated assuming an 8 hour per day treatment operation at 75% online efficiency for a range from 260 days per year to 365 days per year

c/ Interim End State achievement would reduce most durations to 2005 and would accelerate building deactivation end dates Environmental restoration end date is highly dependent on final negotiated cleanup standards Landfill closure is dependent on level of Site activities at final closure

d/ 20 000 GPY based on approximately fifty gallons per day Twenty five year precipitation event could result in as much as a 10 000 gallon per day rate This flow would exist as long as the landfill is in operation

e/ Yearly flow estimate of 1 500 000 gallons based on conversations with Mr Bob Campbell Flow is expected to range from 1 000 000 to 2 000 000 gallons The estimate is considered high as it does not take into account losses from evaporation absorption etc

f/ Estimated based on a total recovery rate of 12 5 gallons per minute This is the estimated plausible recovery rate for groundwater using a passive system as calculated by Environmental Restoration Division personnel Duration of flow will depend on when cleanup levels are met This volume may be reduced to zero by the use of reactive barrier walls

g/ 1995 flow is unusually high due to unusual precipitation in Spring 1995 This value is an equalized number based on historical data over the past three years

h/ This stream will begin to be produced in FY 1996 and will continue until approximately 1999 unless accelerated to achieve Interim End State Total volume should remain the same

i/ This stream produced until approximately 2002 unless accelerated to achieve Interim End State Total volume should remain the same

j/ This stream produced until approximately 2006 unless accelerated to achieve Interim End State Volume represents conservative estimate of flushing and closure of RCRA tanks Closure of other tanks not expected to be significant and will be included with general building operations and decontamination and decommissioning wastewater

k/ This stream produced from treatment of mixed low level and mixed transuranic sludges in Building 771 and is assumed to be produced until 2006 unless accelerated to achieve Interim End State Total volume should remain the same

l/ Overall estimated average annual production throughout peak of decontamination and decommissioning activities A gradual ramp up and ramp down to and from these levels would be expected

m/ Maximum estimated annual production throughout duration of activities leading up to building closures Volumes will gradually begin to decrease as buildings begin to be closed

n/ Includes outside pads and sumps decontamination pads and footing drains Approximately thirty to fifty percent of this wastewater is currently treated at the STP

FIGURE 3 2
PROJECTED WASTEWATER VOLUMES, TEN YEARS

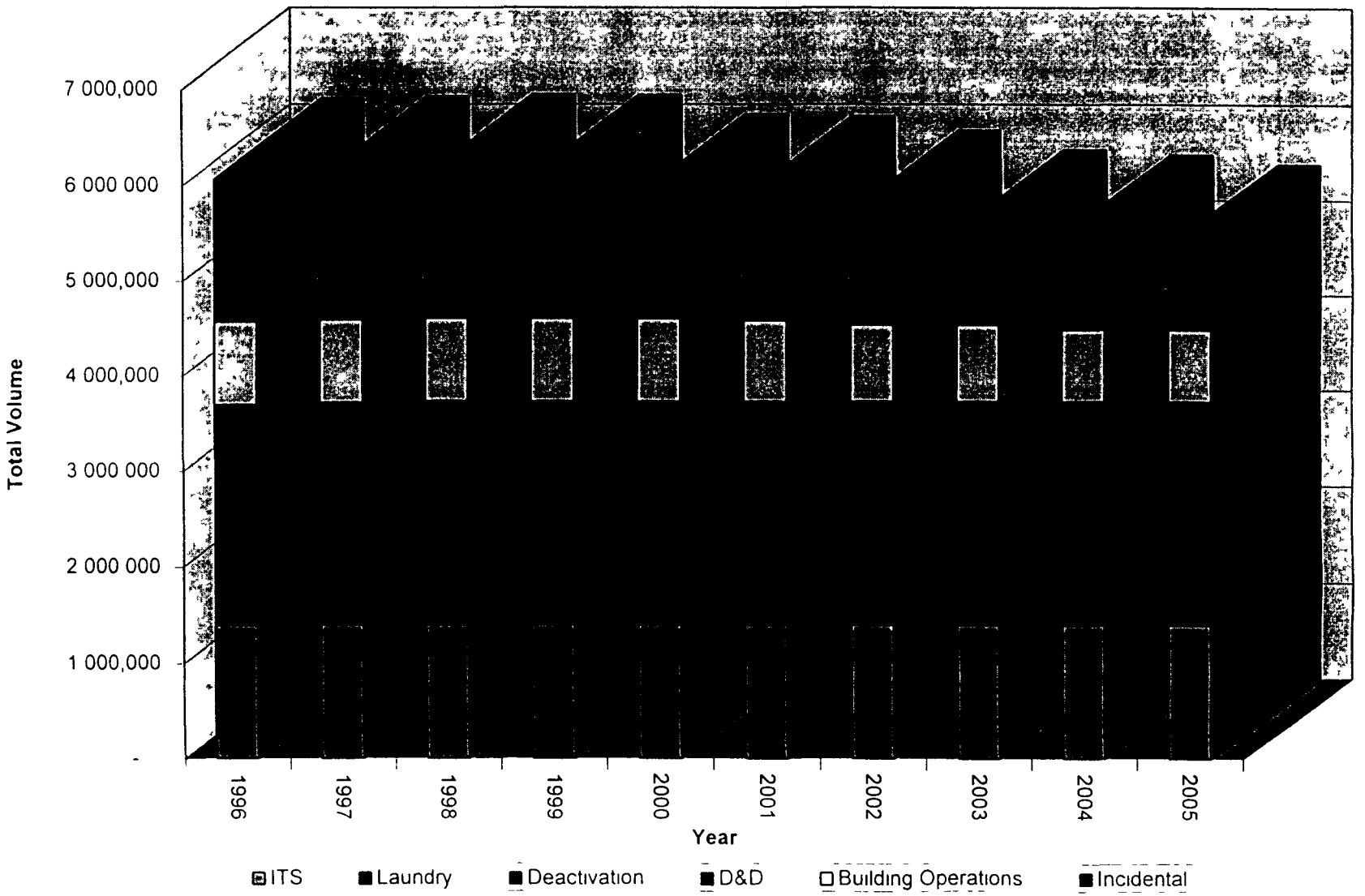
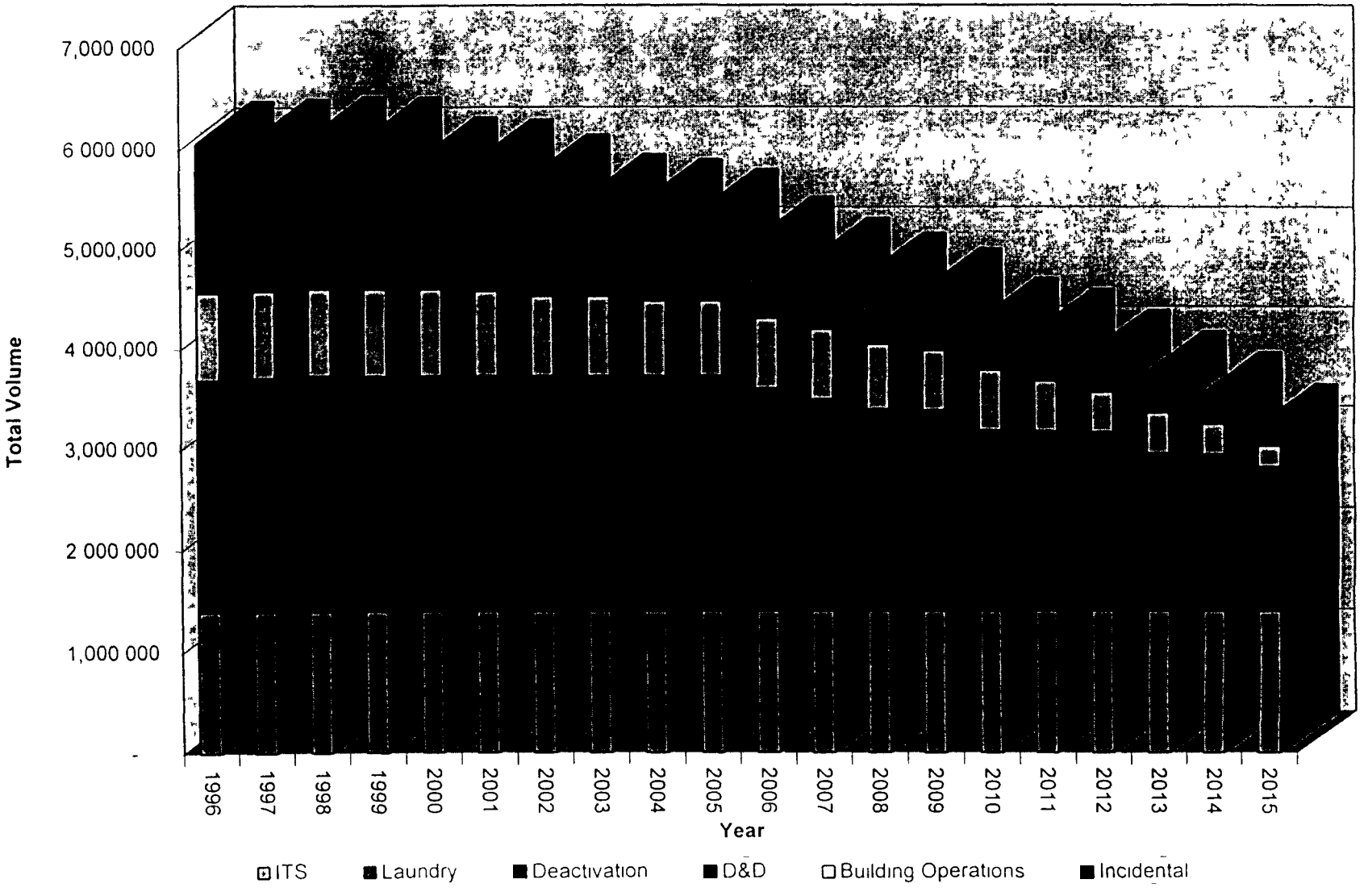


FIGURE 3 3
PROJECTED WASTEWATER VOLUMES, TWENTY YEARS



3 2 2 1 **Environmental Restoration** Duration of the generation of wastewater from environmental restoration is highly dependent on the time required to attain cleanup goals These goals are not completely defined at this time The projected volume of contaminated groundwater from environmental restoration activities is based on the assumption that contaminated groundwater will be collected by interceptor trenches and treated in a combined OU1/OU2 treatment facility The existing OU1/OU2 treatment facility has a maximum design capacity of thirty gallons per minute (OU1) and sixty gallons per minute (OU-2), and are capable of removing a variety of radionuclides, metals, and organic compounds to existing discharge limits

3 2 2 2 **Interceptor Trench System** There is a long-term need for treatment of ITS wastewater at a capacity of approximately ten to fifteen gallons per minute if regulatory relief is not obtained The Interceptor Trench System (ITS) is technically a separate stream under environmental restoration, and has been separated due to the presence of a nitrate Based on the current regulatory situation, nitrate and uranium must be removed However, reclassification of the receiving stream and compliance with DOE DCGs could eliminate this need

3 2 2 3 **Laundry** Laundry operations generate approximately 1,300,000 gallons per year and have historically accounted for approximately one third of the volume treated in Building 374 The recent change in philosophy to laundering of only non-radiologically contaminated protective clothing in Building 566 will yield an effluent resembling commercial industrial laundries Direct discharge to the Sanitary Treatment Plant (STP) should now be possible Therefore, direct discharge of Building 566 to the STP has been included as part of the Strategy If required, local pretreatment at Building 566 can be provided

3 2 2 4 **Sanitary** Sanitary wastewater will continue to be generated throughout the life of the Site Treatment of this wastewater will continue at the STP This facility with currently planned upgrades will have sufficient capacity to handle expected sanitary wastewater volumes Other options are also being considered for the STP such as privatization

3 2 2 5 **Deactivation** Plutonium facilities deactivation and mixed low-level and transuranic waste treatment will produce the contaminated wastewater sources over the next ten to twenty years The overall required capacity to treat deactivation wastewater is estimated to be less than 1,000,000 gallons per year This wastewater will be produced annually over the next three to four years Achievement of the Interim End State should not affect the total volumes, although these volumes would be produced at a faster rate

3 2 2 6 **Decontamination and Decommissioning, September 29, 1995** Of all the streams potentially requiring treatment, this is the most difficult to project While complete elimination of wastewater requiring some amount of treatment is not possible, careful planning and implementation will minimize volumes The capability to treat some amount of wastewater from decontamination and decommissioning is required This amount is estimated at an overall average of 100,000 gallons per year, and treatment should be provided for metals and radionuclides A gradual ramp up and ramp down to and from these levels would be expected

3 2 2 7 **Building Operations** Many of the Site buildings will continue to produce wastewater even in the absence of production operations The majority of this will be domestic wastewater readily handled in the STP Wastewater potentially containing hazardous and radiological constituents will continue to be generated at an estimated maximum rate of 870,000 gallons per year This volume will decrease over

time as buildings are deactivated and decontamination and decommissioning proceed An undetermined fraction of this wastewater currently and potentially discharged to Building 374 as "contaminated" may be dischargeable directly, or with minimal pretreatment, to the sanitary drain system and the STP Several studies have already suggested how to eliminate discharge of F-listed wastes to Building 374 (EG&G, 1994b, Leck, 1994) The actual amounts of wastewater that can be segregated for treatment in the STP will be identified through a sampling and analysis program planned to be initiated in FY 1996

3 2 2 8 Incidental Wastewater An estimated 3,100,000 gallons per year of wastewater is produced from miscellaneous outdoor pads and sumps, decontamination pads, and building roof and footing drains Approximately thirty percent to fifty percent of this wastewater is currently treated in the STP Similar to the building process operations discussed above, additional incidental water may be dischargeable directly to the STP This will be evaluated in a sampling and analysis program planned to be initiated in FY 1996 Throughout the rest of this document, incidental wastewater will be combined with building process operations wastewater for evaluation purposes

4 0 SELECTION OF WASTEWATER MANAGEMENT ALTERNATIVES

Six alternatives were developed and evaluated The details of developing these alternatives is provided as Appendix C to this document A summary of the evaluations and selection of the recommended alternative is provided below

4 1 SUMMARY OF ALTERNATIVES

Of the six alternatives developed for overall wastewater management Alternatives 1, 2, 3, and 4 were designed to support the Interim End State over the next ten years and Alternatives 5 and 6 were designed to support a twenty year mission These alternatives were developed after considering the following factors and constraints

- Existing facility and infrastructure should be used to the extent practical and cost effective,
- Waste minimization and segregation should be maximized,
- Compliance with NPDES permit requirements is necessary,
- The Wastewater Treatment Unit (WWTU) exclusion should be maintained for Building 374,
- Environmental restoration wastewater should be managed separate from general facility wastewater as long as it is cost effective,

- Use of Building 910 to support alternatives development has not been considered because of the high costs associated with refurbishment and restart of this facility, and

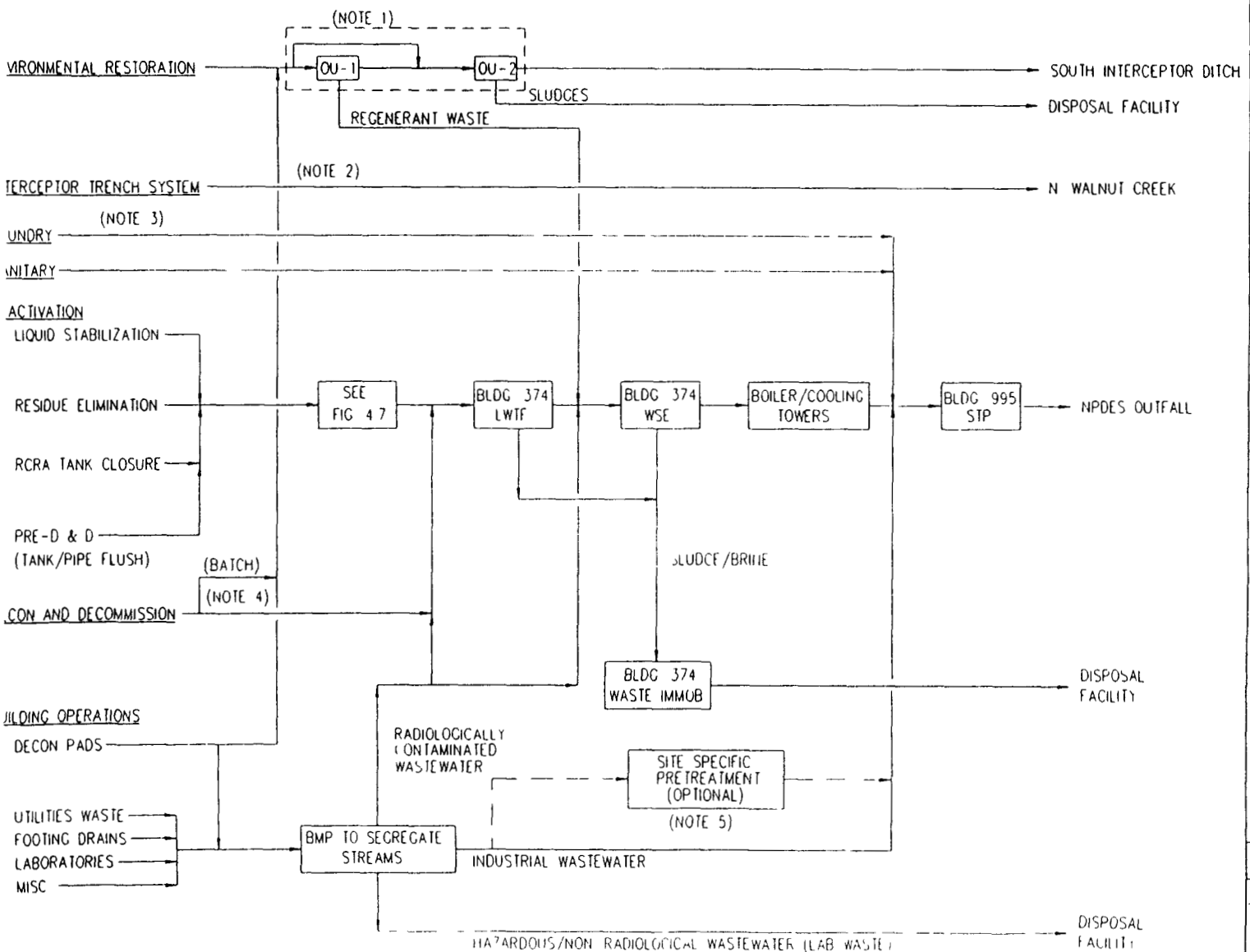
- Alternatives should allow for completion of deactivation by the year 2000

Each of the alternatives is shown schematically in Figures 4 1 through 4 6 In addition, a schematic of deactivation waste treatment common to all alternatives is provided as Figure 4 7 Full descriptions of each alternative may be found in Appendix C to this document, and brief descriptions are provided in the following sections

4 1 1 Alternative 1 - Minimum Building 374 Upgrades

This alternative utilizes existing facilities at the Site to treat wastewater This includes the combined OU-1/OU-2 treatment facility for environmental restoration wastewater, the STP for sanitary wastewater, and Building 374 for all other wastewater including deactivation, decontamination and decommissioning, and general building operations Some preliminary decontamination of the most highly contaminated solutions from initial deactivation will also take place in Buildings 371, 771, and 774

It is assumed that general building operation wastewater will be segregated so that a minimum of wastewater is sent to Building 374 with the balance treated at the STP



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX

2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE

3 ONLY MODESTY CLOTHING CLEANED ONSITE ALL OTHER LAUNDRY SHIPPED OFF-SITE LOCAL PRETREATMENT MAY BE REQUIRED

4 SOME BATCHES OF DECONTAMINATION AND DECOMMISSIONING WASTE MAY CONTAIN ORGANICS OR OTHER CONSTITUENTS MORE APPROPRIATE FOR TREATMENT AT OU 1 OR OU-2 THESE BATCHES WILL TO BE TRANSPORTED VIA TANKER TRUCK OR PORTABLE TANK

5 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

DEFINITIONS

OU-1 = EXISTING OPERABLE UNIT-1 TREATMENT SYSTEM

OU-2 = EXISTING OPERABLE UNIT 2 TREATMENT SYSTEM

LWTF = BUILDING 374 LIQUID WASTE TREATMENT FACILITY KNOWN AS THE HOT SIDE AND TREATS RADIOACTIVELY CONTAMINATED WASTEWATER

WSE = BUILDING 374 WASTE SYSTEM EVAPORATOR KNOWN AS THE COLD SIDE AND TREATS DECONTAMINATED AND OTHER SLIGHTLY CONTAMINATED WASTEWATER

BMP = BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION

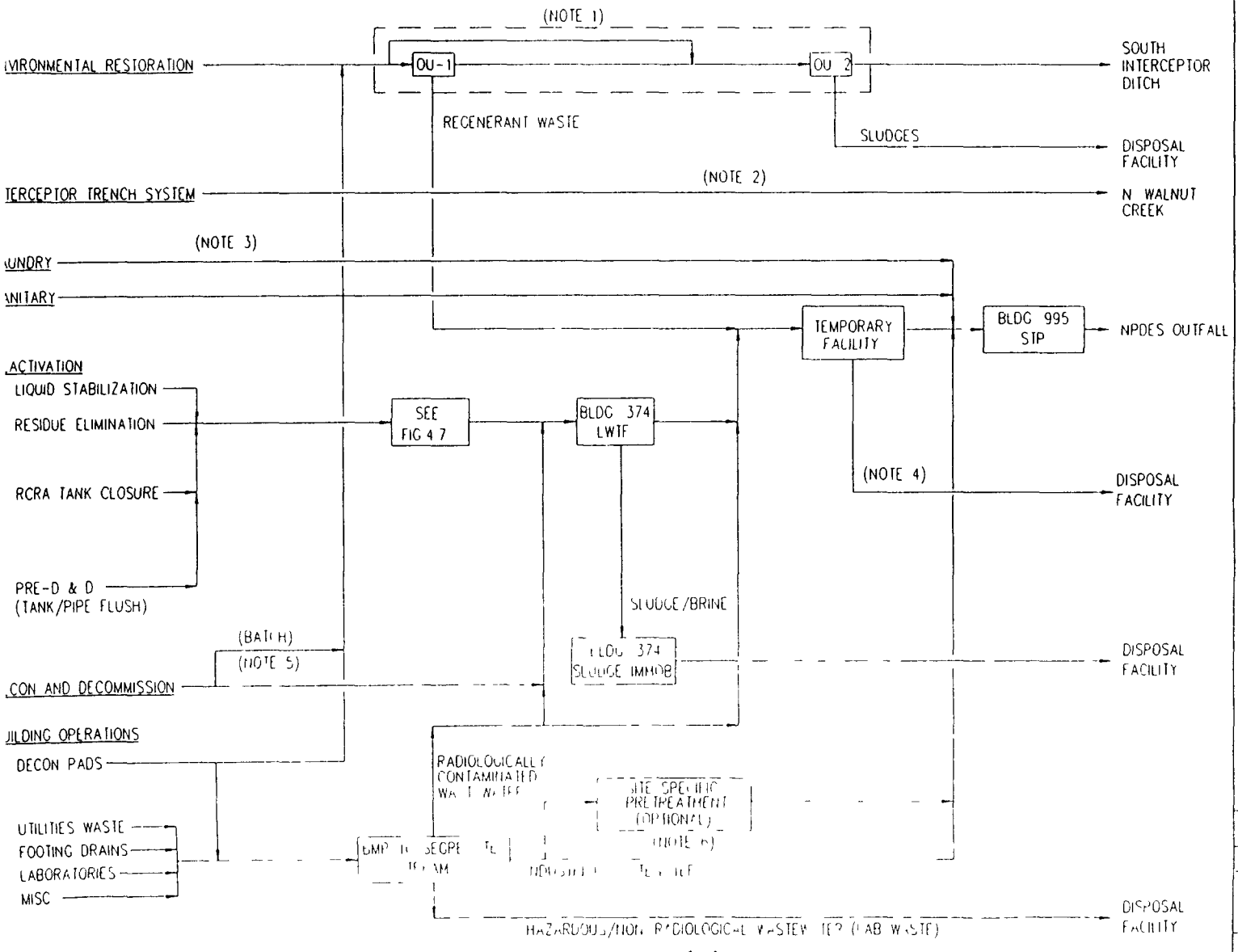
STP = SANITARY TREATMENT PLANT

FIGURE 4 1

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 1

MINIMUM BUILDING 374 UPGRADES



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX
2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE FAILURE TO OBTAIN RELIEF WOULD REQUIRE DESIGN AND CONSTRUCTION OF A DEDICATED TREATMENT FACILITY FOR THIS STREAM
3 ONLY MODESTY CLOTHING CLEANED ONSITE ALL OTHER LAUNDRY SHIPPED OFF-SITE LOCAL PRETREATMENT MAY BE REQUIRED
4 DEPENDING ON FINAL FACILITY CONFIGURATION FINAL WASTE IMMOBILIZATION IN BUILDING 374 FACILITY MAY BE POSSIBLE
5 SOME BATCHES OF DECONTAMINATION AND DECOMMISSIONING WASTE MAY CONTAIN ORGANICS OR OTHER CONSTITUENTS MORE APPROPRIATE FOR TREATMENT AT OU-1 OR OU-2 THESE BATCHES WILL BE TRANSPORTED VIA TANKER TRUCK OR PORTABLE TANK
6 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

DEFINITIONS

OU-1 = EXISTING OPERABLE UNIT-1 TREATMENT SYSTEM
OU-2 = EXISTING OPERABLE UNIT-2 TREATMENT SYSTEM
LWTF BUILDING 374 LIQUID WASTE TREATMENT FACILITY KNOWN AS THE HOT SIDE AND TREATS RADIOACTIVELY CONTAMINATED WASTEWATER
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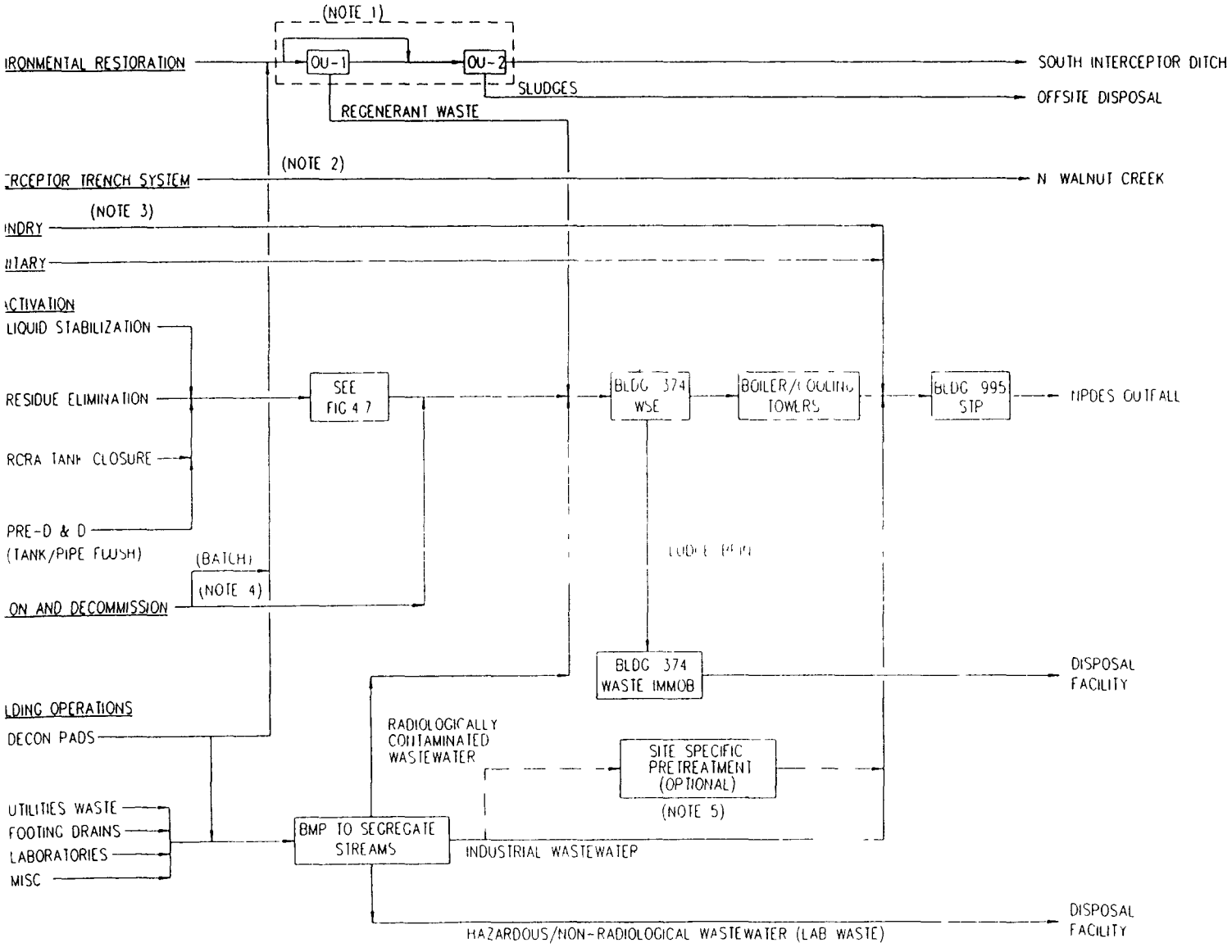
BMP - BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION
STP SANITARY TREATMENT PLANT

FIGURE 4 2

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 2
BUILDING 374 LWTF UPGRADES



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX

2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE

3 ONLY MODESTY CLOTHING CLEANED ONSITE ALL OTHER LAUNDRY SHIPPED OFF-SITE LOCAL PRETREATMENT MAY BE REQUIRED

4 SOME BATCHES OF DECONTAMINATION AND DECOMMISSIONING WASTE MAY CONTAIN ORGANICS OR OTHER CONSTITUENTS MORE APPROPRIATE FOR TREATMENT AT OU 1 OR OU 2 THESE BATCHES WILL BE TRANSPORTED VIA TANKER TRUCK OR PORTABLE TANK

5 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

DEFINITIONS

OU 1 EXISTING OPERABLE UNIT-1 TREATMENT SYSTEM

OU-2 = EXISTING OPERABLE UNIT TREATMENT SYSTEM

LWTF BUILDING 374 LIQUID WASTE TREATMENT FACILITY KNOWN AS THE HOT SIDE AND TREATS RADIOACTIVELY CONTAMINATED WASTEWATER

WSE BUILDING 374 WASTE SYSTEM EVAPORATOR KNOWN AS THE COLD SIDE AND TREATS DECONTAMINATED AND OTHER SLIGHTLY CONTAMINATED WASTEWATER

BMP = BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION

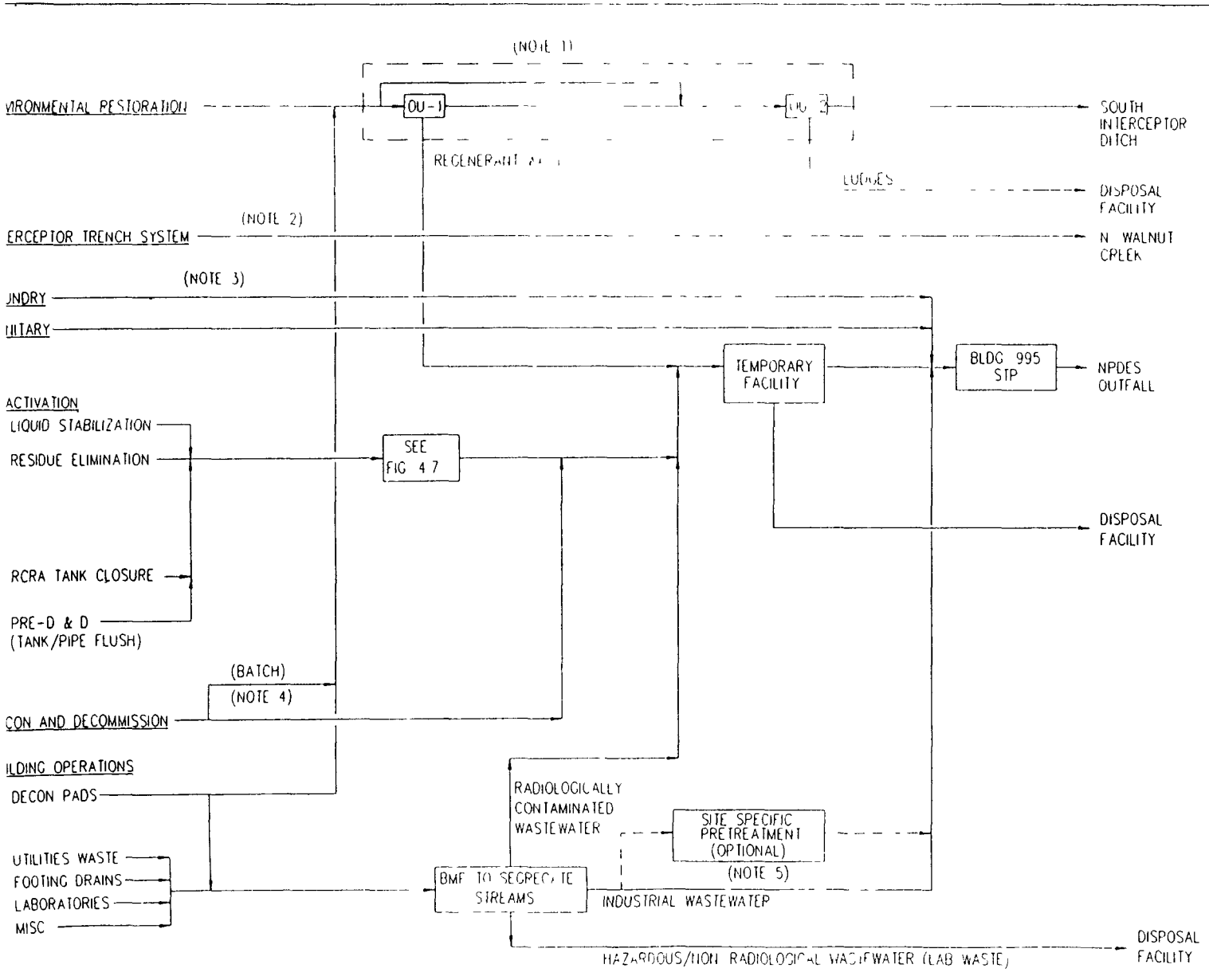
STP = SANITARY TREATMENT PLANT

FIGURE 4 3

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 3

BUILDING 374 WSE UPGRADES



NOTES

1 THE OU-1 AND OU 2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX

2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE FAILURE TO OBTAIN RELIEF WOULD REQUIRE DESIGN AND CONSTRUCTION OF A DEDICATED TREATMENT FACILITY FOR THIS STREAM

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5 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

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BMP BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION

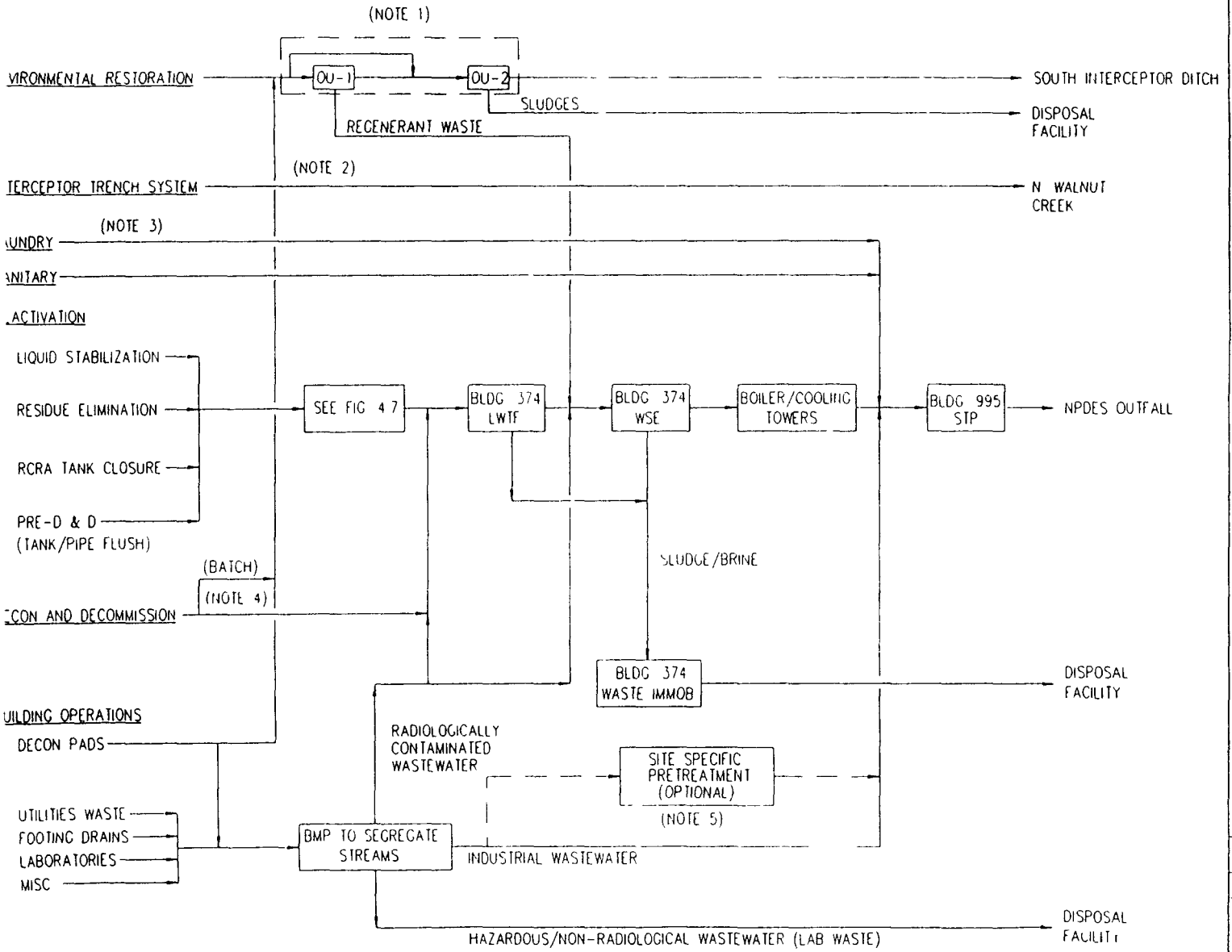
STP - SANITARY TREATMENT PLANT

FIGURE 4 4

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 4

BUILDING 374 ELIMINATION



NOTES

1 THE OU 1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX

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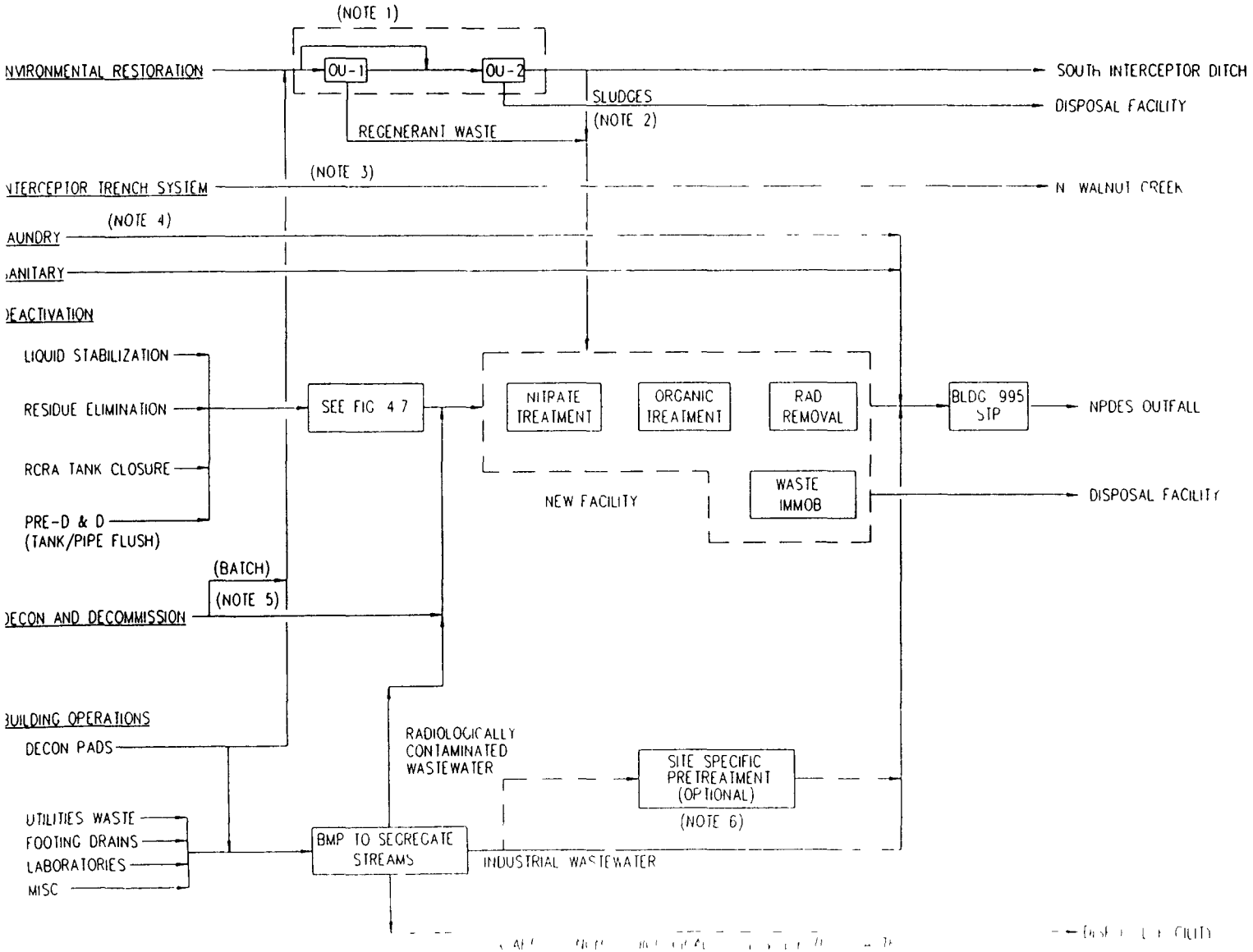
STP = SANITARY TREATMENT PLANT

FIGURE 4 5

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 5

PRUDENT BUILDING 374 UPGRADES



NOTES

1 THE OU-1 AND OU-2 FACILITIES HAVE BEEN COMBINED INTO A SINGLE COMPLEX
2 ENVIROMENTAL RESTORATION WATER WOULD BE DIRECTED TO NEW FACILITY AFTER END OF OU-1 AND OU-2 USEFUL LIFE
2 REGULATORY RELIEF TO ALLOW DIRECT DISCHARGE OF INTERCEPTOR TRENCH WASTEWATER TO N WALNUT CREEK INTERIM DISCHARGE UNTIL RELIEF OBTAINED WOULD BE TO BUILDING 374 WSE FAILURE TO OBTAIN RELIEF WOULD REQUIRE DESIGN AND CONSTRUCTION OF A DEDICATED TREATMENT FACILITY FOR THIS STREAM
4 ONLY MODESTY CLOTHING CLEANED ONSITE ALL OTHER LAUNDRY SHIPPED OFF-SITE LOCAL PRETREATMENT MAY BE REQUIRED
5 SOME BATCHES OF DECONTAMINATION AND DECOMMISSIONING WASTE MAY CONTAIN ORGANICS OR OTHER CONSTITUENTS MORE APPROPRIATE FOR TREATMENT AT OU-1 OR OU-2 THESE BATCHES WILL BE TRANSPORTED VIA TANKER TRUCK OR PORTABLE TANK
6 INDIVIDUAL BUILDINGS MAY NEED TO PRETREAT TO MEET STP WASTE ACCEPTANCE CRITERIA

DEFINITIONS

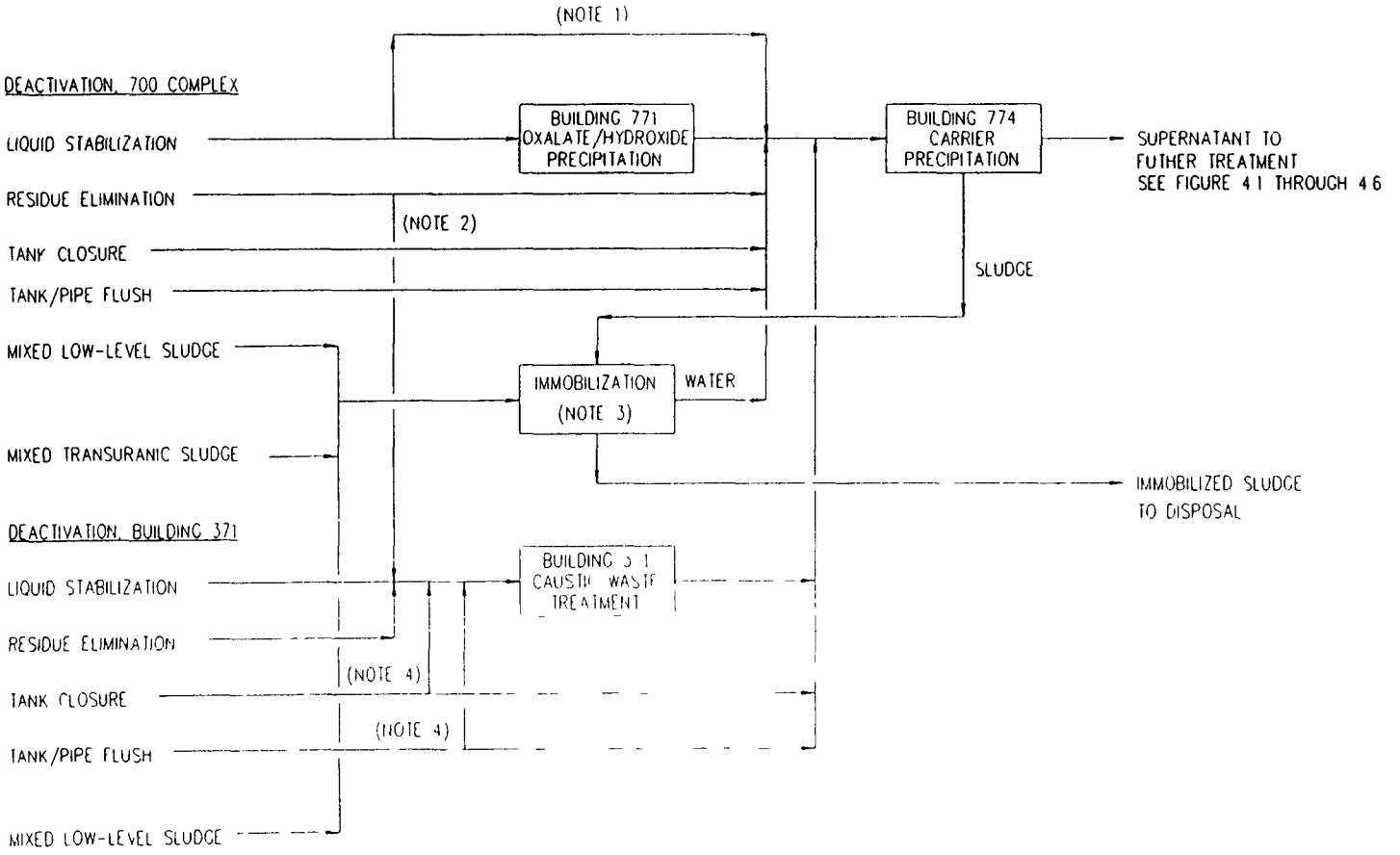
OU-1 = EXISTING OPERABLE UNIT-1 TREATMENT SYSTEM
OU-2 = EXISTING OPERABLE UNIT-2 TREATMENT SYSTEM
LWTF = BUILDING 374 LIQUID WASTE TREATMENT FACILITY KNOWN AS THE HOT SIDE AND TREATS RADIOACTIVELY CONTAMINATED WASTEWATER
WSE = BUILDING 374 WASTE SYSTEM EVAPORATOR KNOWN AS THE COLD SIDE AND TREATS DECONTAMINATED AND OTHER SLIGHTLY CONTAMINATED WASTEWATER
BMP = BEST MANAGEMENT PRACTICES REFERS TO ADMINISTRATIVE AND ENGINEERING CONTROLS TO MINIMIZE CONTAMINATED WASTEWATER PRODUCTION
STP = SANITARY TREATMENT PLANT

FIGURE 4 6

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

ALTERNATIVE 6

NEW FACILITIES



NOTES

1 DEPENDING ON ACTIVITY LEVELS SOME LIQUID STABILIZATION WASTEWATER WILL NOT REQUIRE OXALATE /HYDROXIDE PRECIPITATION

2 SOME RESIDUE ELIMINATION WASTEWATER MAY BE TRANSPORTED TO BUILDING 371 FOR TREATMENT

3 FINAL IMMOBLIZATION SYSTEM PLANNING FOR THESE SLUDGES ARE IN DEVELOPMENT

4 DEPENDING ON ACTIVITY LEVELS SOME TANK CLOSURE AND TANK/PIPE FLUSH WASTEWATER MAY BE PRETREATED IN THE BUILDING 371 CAUSTIC WASTE TREATMENT SYSTEM

NOTE
DEACTIVATION IN THE 700 COMPLEX AND BUILDING 371 IS ASSUMED TO BE COMPLETE IN FOUR YEARS

FIGURE 4 7

RFETS SWTS STUDY CONCEPTUAL FLOW DIAGRAM

FACILITY DEACTIVATION SCHEMATIC

This alternative includes upgrades to the Building 374 Liquid Waste Treatment Facility (LWTF) and the Building 374 Waste System Evaporator (WSE) necessary to keep these systems functional for ten years The LWTF would primarily pretreat solutions expected from facility deactivation Pretreated solutions and those with lower levels of contamination would be processed through the WSE

4 1 2 Alternative 2 - Building 374 LWTF Upgrades

This alternative is the same as Alternative 1 in that the combined OU-1/OU-2 treatment facility and the STP are used for treatment of environmental restoration wastewater and domestic wastewater, respectively Environmental restoration wastewater can also be treated at the other facilities, if appropriate due to expected types and concentrations of contaminants present, and segregation of general building operation wastewater will be maximized

The primary feature of this alternative is that upgrades will only be completed for the Building 374 LWTF These upgrades will allow the LWTF to remove the majority of the radionuclides from all wastewater sent to the facility Additional treatment for further reduction of metals and radionuclides will take place in a new temporary facility located near Building 374 A value engineering study must be completed in order to determine the most cost effective approach for the new facility It is expected that the temporary facility would be housed in a simple pre-engineered metal building Skid mounted modular equipment would be procured to allow for ease of installation It may also be possible to lease this equipment rather than purchasing it, thereby decreasing capital funding needs

4 1 3 Alternative 3 - Building 374 WSE Upgrades

This alternative uses the combined OU-1/OU-2 treatment facility and the STP for treatment of environmental restoration wastewater and domestic wastewater, respectively Segregation of general building operation wastewater will also be maximized

The primary feature of this alternative is that upgrades will only be completed for the Building 374 WSE Wastewater normally pretreated in the Building 374 LWTF will be processed to the extent possible in Building 774 This will require some upgrades and some additional equipment in Building 774 This alternative will result in a higher concentration of radionuclides in the feed to the WSE than if the LWTF were available

4 1 4 Alternative 4 - Building 374 Elimination

This alternative uses the combined OU-1/OU-2 treatment facility and the STP for treatment of environmental restoration wastewater and domestic wastewater, respectively Segregation of general building operation wastewater will also maximized

This alternative eliminates the long-term use of Building 374, although minimal replacement of sludge removal systems will be necessary to support cleanout of sludges currently held in Building 374 tanks and equipment Wastewater normally pretreated in the Building 374 LWTF will be processed to the extent possible in Building 774 This will require some upgrades and some additional equipment in Building 774 Additional treatment for further reduction in concentrations of metals and radionuclides will take place in a new temporary facility as discussed for Alternative 2

4 1 5 Alternative 5 - Prudent Building 374 Upgrades

This alternative is designed for a twenty year operational life, and uses all existing facilities This includes the combined OU-1/OU-2 treatment facility for environmental restoration wastewater, the STP for sanitary wastewater, and Building 374 for all other wastewater Some preliminary decontamination of initial deactivation wastewater would take place in Building 774 Environmental restoration wastewater could also be treated in Building 374 or Building 995, if appropriate In addition, general building operation wastewater will be segregated to the extent practical

Upgrades to both the Building 374 LWTF and WSE will be required to maintain facility function for twenty years Only those prudent upgrades were included

4 1 6 Alternative 6 - New Facilities

This alternative is also designed for twenty years, and includes the use of the combined OU-1/OU-2 facility for environmental restoration wastewater, and the STP for domestic wastewater Segregation of general building operation wastewater will also be maximized

This alternative eliminates the long-term use of Building 374, although minimal upgrades will be necessary to allow for cleanout of accumulated sludges The new facility would be capable of treating all wastewater currently processed in Building 374 The combined OU-1/OU-2 treatment facility may not be capable of operating for twenty years without upgrades or high maintenance cost Therefore, the new facility would also be designed to handle this wastestream as well

4 2 SELECTION OF RECOMMENDED ALTERNATIVE

A detailed technical and cost evaluation was completed in order to select a recommended alternative Details on these evaluations are provided in Appendix C of this document and summaries are provided in the following sections In addition, a sensitivity analysis was performed using the following factors

- Interceptor Trench System,
- Environmental restoration approach,
- Interim End State achievement, and
- Closure of Building 374 and 771/774

The following sections summarize the evaluation of each alternative with respect to these scenarios and identifies the final preferred alternative

4 2 1 Technical Evaluation

The basic methodology used follows general guidance provided in DOE Order 5400 5 (DOE, 1990) Among other things, this Order addresses the steps to be followed in identifying liquid waste treatment processes for implementation at DOE sites A supporting document to this Order is DOE/EH 263T, *Implementation Manual for Application of Best-Available Technology Processes for Radionuclides in Liquid Effluents (DOE, 1992c)*

The technical evaluation considered twelve criteria The criteria were weighted according to relative importance, and each alternative scored from zero to ten for each criterion A baseline alternative of no-action was used as the basis of comparison A score of less than five indicates that the alternative is less desirable than the baseline alternative for that criterion with the opposite being true for scores greater than five Raw scores are multiplied by the weighing factor, and summed for an overall score The alternative with the highest score is the preferred alternative

Table 4 1 summarizes the results of the technical evaluation for each of the six alternatives A detailed rationale for scoring is provided in Appendix C to this document

4 2 2 Cost Effectiveness Evaluation

Relative cost effectiveness has been measured by determining the capital cost, the annual average operations and maintenance cost, the net present value and the real annualized cost of each alternative A summary of this evaluation is as follows

Cost Element	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Total Capital Investment	$10 600	$13 600	$3 800	$6 800	$31 500	$24 600
Total Unescalated O&M Cost a/	$133 200	$115 600	$110 600	$81 000	$266 300	$186 100
Average Annual O&M Cost	$13 300	$11 600	$11 100	$8 100	$13 300	$9 300
Net Present Value b/	$114 800	$105 000	$92 700	$74 300	$192 900	$144 000
Real Annualized Cost c/	$18 700	$17 000	$15 100	$12 100	$22 700	$16 900

NOTES
a/ This is total O&M cost throughout lifetime of facilities based on 1996 dollars
b/ Net Present Value assuming an escalation of annual costsd of four percent and a discount rate of ten percent
c/ Annual equivalent of Net Present Value assuming a discount rate of ten percent

TABLE 4 1
SUMMARY COMPARISON MATRIX FOR THE CANDIDATE ALTERNATIVES

Technology Issues Matrix		Existing No-Action Alternative		Ten Year Alternatives								Twenty Year Alternatives			
				Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
	WF	VF	WVF	VF	WVF	VF	WVF	VF	WVF	VF	WVF	VF	WVF	VF	WVF
1 Environmental Issues															
lexibility for Maintaining Compliance	10	5	50	8	80	8	80	8	80	8	80	8	80	8	80
Risk to Human Health and the Environment	15	5	75	8	120	8	120	7	105	7	105	8	120	8	120
Permitting Complexity	5	5	25	5	25	4	20	5	25	4	20	5	25	4	20
Water Resource Management	2	5	10	4	8	3	6	4	8	3	6	4	8	3	6
Waste Generation and Disposal	10	5	50	7	70	9	90	7	70	9	90	7	70	9	90
Public Acceptance	10	5	50	9	90	8	80	8	80	9	90	6	60	7	70
2 Operational Issues Performance															
Existing Physical Facility Constraints	5	5	25	5	25	4	20	5	25	4	20	5	25	4	20
Worker Safety	10	5	50	9	90	9	90	7	70	7	70	7	70	8	80
Process Capabilities	15	5	75	7	105	8	120	7	105	8	120	7	105	8	120
Resources Required for Operation	5	5	25	5	25	4	20	5	25	4	20	6	30	8	40
3 Operational Issues Long Term Technology Effectiveness															
Flexibility to Adapt to Changing Mission	10	5	50	7	70	7	70	7	70	7	70	8	80	8	80
Flexibility to Address Technology Advances	3	5	15	6	18	8	24	6	18	8	24	5	15	7	21
Total Weighted Value Factor (TWVF) for each option = Σ(WVF)	100		500		726		740		681		725		688		747

4 2 3 Sensitivity Analysis

For the twenty year alternatives, Alternative 6 is preferred using both the technical and cost criteria Since this alternative provides a new centralized facility capable of treating all wastewater, a sensitivity analysis is not required Therefore the following sections only address the ten year alternatives (Alternatives 1, 2, 3 and 4)

4 2 3 1 Interceptor Trench System This strategy assumes that deregulation of the ITS wastewater will occur Alternatives 1 and 3 provide the capability to treat this wastewater regardless of the regulatory status of the ITS wastewater Therefore, little cost impact would be realized for these alternatives if the ITS wastewater was deregulated because Building 374 is still required for other streams

Alternatives 2 and 4 would both have a considerable cost impact if the ITS wastewater could not be deregulated These alternatives do not include unit operations capable of treating ITS wastewater for nitrate removal, and design and construction of new facilities would be required If the decision on regulatory relief is delayed or appears uncertain, ITS wastewater could be treated on an interim basis in the Building 374 WSE However, both of these alternatives only include operations of the Building 374 WSE until the new radionuclide/metals removal facility would be available Continuing Building 374 operations beyond the availability of the new facility would increase Building 374 operating costs

4 2 3 2 Environmental Restoration Approach The approach for environmental restoration includes multiple collection and treatment scenarios Depending upon the specific scenario, required treatment capacity can vary by as much as a factor of three or more All the ten year alternatives assume the use of the combined OU-1/OU-2 treatment facility This facility has adequate capacity for most foreseeable

environmental restoration scenarios, and the selection of the recommended alternative is not sensitive to this factor

4 2 3 3 Interim End-State Achievement This factor addresses the ability of the alternatives to function beyond ten years should technical, regulatory, or funding issues preclude completion on schedule Alternatives 1, 2, and 3 are those felt to be absolutely necessary to maintain Building 374 function over the ten year period Beyond ten years it would be expected that operations and maintenance problems could start to increase and could impact operations

Alternative 4 replaces Building 374 with new equipment It would be expected that the Alternative 4 systems would be capable of providing service beyond ten years without serious difficulties

4 2 3 4 Building 374 and Building 771/774 Closure Current planning activities have identified that closure of Building 374 and Building 771/774 would result in cost savings This scenario has the greatest impact on Alternatives 1, 2, and 3, all of which assume the partial or complete use of Building 374 Selection of any of these alternatives would preclude the early closure of Building 374 Only Alternative 4 can support this scenario as qualified below

The major constraint on Building 374 closure is the continued production of wastewater and the need to treat that wastewater prior to discharge Ongoing treatment of this wastewater will be required while the new temporary facility is designed and constructed The scope and estimated duration of Building 374 operations for Alternative 4 is as follows

- Wastewater storage tanks throughout the Site are reaching capacity Continued operations of Building 374 between October 1995 and March 1996 is required to process existing wastewater inventory and ensure adequate capacity for storage of increased flows expected from Spring 1996 runoff Additional operations in Building 374 will be required through at least the end of summer 1996 to process this water

- One of most significant sources of wastewater to Building 374 will continue to be the ITS Estimates for deregulation to be complete are one to two years Because the new facility in Alternative 4 would not be designed for nitrate removal, treatment in the Building 374 WSE would be required or a specialty subcontractor engaged to provide temporary treatment services until a dedicated facility could be provided

- A second significant source of wastewater to Building 374 is the Building 566 laundry The Strategy assumes that this wastewater can be discharged directly to the STP Additionally, a characterization program to verify this assumption is required In the best case, characterization and diversion of Building 566 could be completed by mid-FY 1996 If pretreatment was identified as being required, approximately an additional six to eight months could be required to complete the design and installation of pretreatment equipment

- Approximately 1,000,000 to 2,000,000 gallons of wastewater from general building operations will continue to be produced irrespective of the after diversions of the ITS and Building 566 This volume is likely to decrease over FY 1996 and 1997 as Best Management Practices are implemented

Based on the factors discussed above, the earliest that Building 374 operations could be discontinued is approximately the the middle of FY 1997 In order to support continued building operations and deactivation programs, the temporary facility to replace Building 374 must be operational by this time as well With accelerated procurement activities, this facility could be in place by early FY 1997 and Building 374 could be closed sooner

There are no constraints on the closure of Building 771/774 in terms of Alternative 4 Estimates by SafeSites of Colorado are that liquid stabilization activities in Building 771 can be completed by approximately the end of FY 1997 This would allow the closure and initiation of decontamination and decommissioning activities in this building as well as in Building 774 Major deactivation activities in Building 771 will include liquid stabilization and immobilization of mixed low-level and transuranic sludges Immobilization systems for these sludges are in the development stage at this time All liquids produced from these activities will be treated in the Building 774 oxalate precipitation and carrier precipitation processes prior to transfer to Building 374 or facilities replacing Building 374

There are also liquid stabilization activities required in Building 371 These liquids will initially be pretreated in a planned caustic waste treatment system to be installed in Building 371 Since Alternative 4 does not include the Building 374 LWTF, additional treatment of the effluent from the caustic waste treatment system would be required to minimize radiological problems with the temporary treatment facility This additional treatment could take place as follows

- Installation of temporary storage tanks in Building 374 with a second pass through the caustic waste treatment system,

- Transfer of effluent from Building 371 caustic waste treatment system through existing valve vaults and process waste system piping to Building 774 for treatment in the carrier precipitation process

An engineering analysis is required to select the most cost-effective method to allow completion of Building 371 liquid stabilization activities

A final consideration on the closure of Building 374 and Building 771/774 concerns immobilization systems Alternative 4 includes the sludge immobilization systems to allow for processing of accumulated sludges within building equipment Additional immobilization systems are planned in Building 774 and Building 776 for treatment of mixed low-level and mixed transuranic waste An engineering analysis is required to determine if any of these operations can be combined

4 2 4 Recommended Alternative Identification

The selection of a recommended ten and twenty year alternative has been made on the basis of the technical evaluation, cost effectiveness evaluation and sensitivity analysis discussed in the previous sections These recommended alternatives, and the primary factors leading to their selection, are summarized in the following sections

4 2 4 1 Ten-Year Alternative A summary of the evaluation of ten year alternatives follows

Technical Evaluation

Alternatives 1, 2 and 4 were all ranked very closely in the technical evaluation, and no critical discriminators were identified that would prefer one alternative over

another Therefore, from a technical perspective, any of these three alternatives are acceptable

Cost Effectiveness Evaluation

Alternative 4 was determined to have the overall lowest net present value and real annualized cost The primary factor in the lower cost of Alternative 4 in relation to other alternatives is decreased operations and maintenance cost due to the early elimination of costly Building 374 operations and a reduction in waste disposal cost due to elimination of saltcrete production from WSE operations Reductions in capital cost by not having to complete many of the Building 374 upgrades are partially offset by capital costs for the new temporary facility and the modifications to Buildings 371, 771 and 774

Sensitivity Analysis

Each of the alternatives are equivalent with respect to sensitivity to laundry wastewater treatment and the approach to environmental restoration Alternative 2 and 4 have the potential for a positive benefit (cost savings) from the deregulation of the ITS wastewater However, Alternative 2 would be more costly than Alternative 4 if the Interim End-State were not achieved due to increased operations and maintenance cost for continued Building 374 operations Alternative 4 replaces Building 374 with a temporary facility that could operate beyond ten years with a lesser operations and maintenance cost impact

Only Alternative 4 has the ability to support accelerated closure of Building 374 This closure can occur in approximately early to mid-FY 1997 at the earliest Each of the other alternatives requires that Building 374 remain operational throughout the ten

year period Alternative 4 also has no constraints with respect to early closure of Building 771/774

Final Selection

Alternative 4 is recommended as the ten year alternative for the following reasons

- It is ranked high technically,
- It is one of the two most overall cost effective alternatives, and is the only alternative with the potential for future cost savings due to other Site activities,
- It is the best alternative to support a delay in achievement of the Interim End-State, and
- It is the only alternative capable of supporting an early closure of Building 371/374 and can also support an early closure of building 771/774

4 2 4 2 Twenty-Year Alternative A summary of the evaluation of twenty-year alternatives follows

Technical Evaluation

Alternative 6 is ranked technically superior to Alternative 5 primarily due to decreased waste disposal, public acceptance, process capabilities, and resources required for operation

Cost Evaluation

Alternative 6 has a lower net present value and real annualized cost than Alternative 5 Alternative 6 also provides for additional cost savings in that Building 374 can be closed early

Sensitivity Analysis

Each of the alternatives are equivalent with respect to sensitivity to laundry wastewater treatment and the approach to environmental restoration Only Alternative 6 has the ability to support accelerated closure of Building 374 Alternative 5 requires that Building 374 remain operational throughout the twenty year period Alternative 6 also has no constraints with respect to early closure of Building 771/774

Final Selection

Alternative 6 is recommended as the twenty year alternative for the following reasons

- It is ranked highest technically,
- It is the overall most cost effective alternative, and is the only alternative with the potential for future cost savings due to other Site activities,
- It is the only alternative capable of supporting an early closure of Building 374 and can also support an early closure of building 771/774

4 3 DEVELOPMENT OF SHORT-TERM ACTIVITIES

The recommended Strategy will provide for wastewater management over the next ten to twenty years However, there are short-term activities which must take place over the next several years to support implementation of recommended Strategy These activities are summarized in the following sections

4 3 1 Update of Strategy

Several of the supporting documents to this Strategy are being prepared on schedules concurrent with this Strategy Therefore, the final drafts of these documents should be reviewed to ensure consistency with the Strategy These documents include the following

- *Comprehensive Water and Wastewater Evaluation*, (RTG, 1995),
- *Decontamination and Decommission Plan*, (RMRS, 1995),
- *Facilities Management Plan*, (DynCorp, 1995), and
- *Facilities Deactivation Plan*, (SSOC, 1995a)

4 3 2 Existing Treatment Facility Activities

Implementation of Alternative 4 will require that Building 374 continue to operate while planning, design, and construction of the new temporary facility to replace Building 374 is completed This short-term use of Building 374 will require that minimum upgrades be made to WSE instrumentation systems In addition a chemical

berm is required around outside storage tanks, and modifications to piping around tanks containing sludges are necessary to allow for cleanout

4 3 3 Technical Studies

Several technical studies and evaluations are needed to ensure optimum implementation of the Strategy The primary studies include the following

- Characterization of laundry wastewater to confirm whether pretreatment is required prior to discharge to the STP,
- Development of Best Management Practices for general building operations,
- Engineering evaluation to identify required modifications to Building 371,771/774 to support deactivation,
- Engineering analysis of the final configuration of waste immobilization systems for Building 374/774/776,
- Development of recommended processes for new facilities, and
- Siting evaluation for new facilities

4 4 4 Engineering Design

Design of the sludge removal systems for Building 374 can begin as soon as funding is available In addition, the following design activities will need to be completed after engineering evaluations have been performed

- Building 566 pretreatment system (if required),
- Modifications to building 371/771/774 piping and tankage systems to allow for completion of deactivation, and
- Valve vault tie-in to new temporary treatment facility

4 4 5 Regulatory Activities

Ongoing pursuit of the new NPDES permit and the WWTU exclusion for Building 374 will continue over the short term In addition, efforts to modify radionuclide standards and stream segment classification will be pursued immediately Meetings will be scheduled with the City of Broomfield and the Colorado Water Quality Control Commission The IM/IRA for the ITS will also be revised and submitted to the Agencies for approval

5 0 IMPLEMENTATION OF STRATEGY

Preceding sections have provided the development a Strategy for wastewater treatment The following sections provide plans to implement both the short and long-term elements of that Strategy Funding needs and a schedule are also provided Finally, an analysis of risks and barriers to successful implementation are discussed

5 1 IMPLEMENTATION PLAN ELEMENTS

A listing of specific actions to implement the Strategy and the responsible party for each action is provided on Table 5 1 These actions are independent on whether the ten- or twenty- year alternative is considered

5 2 SCHEDULE

Figures 5 1 and 5 2 present an approximate schedule for overall strategy implementation over the next two to three years for Alternative 4 and Alternative 6 respectively At that time, all new facilities should be in place

5 3 BARRIERS TO IMPLEMENTATION

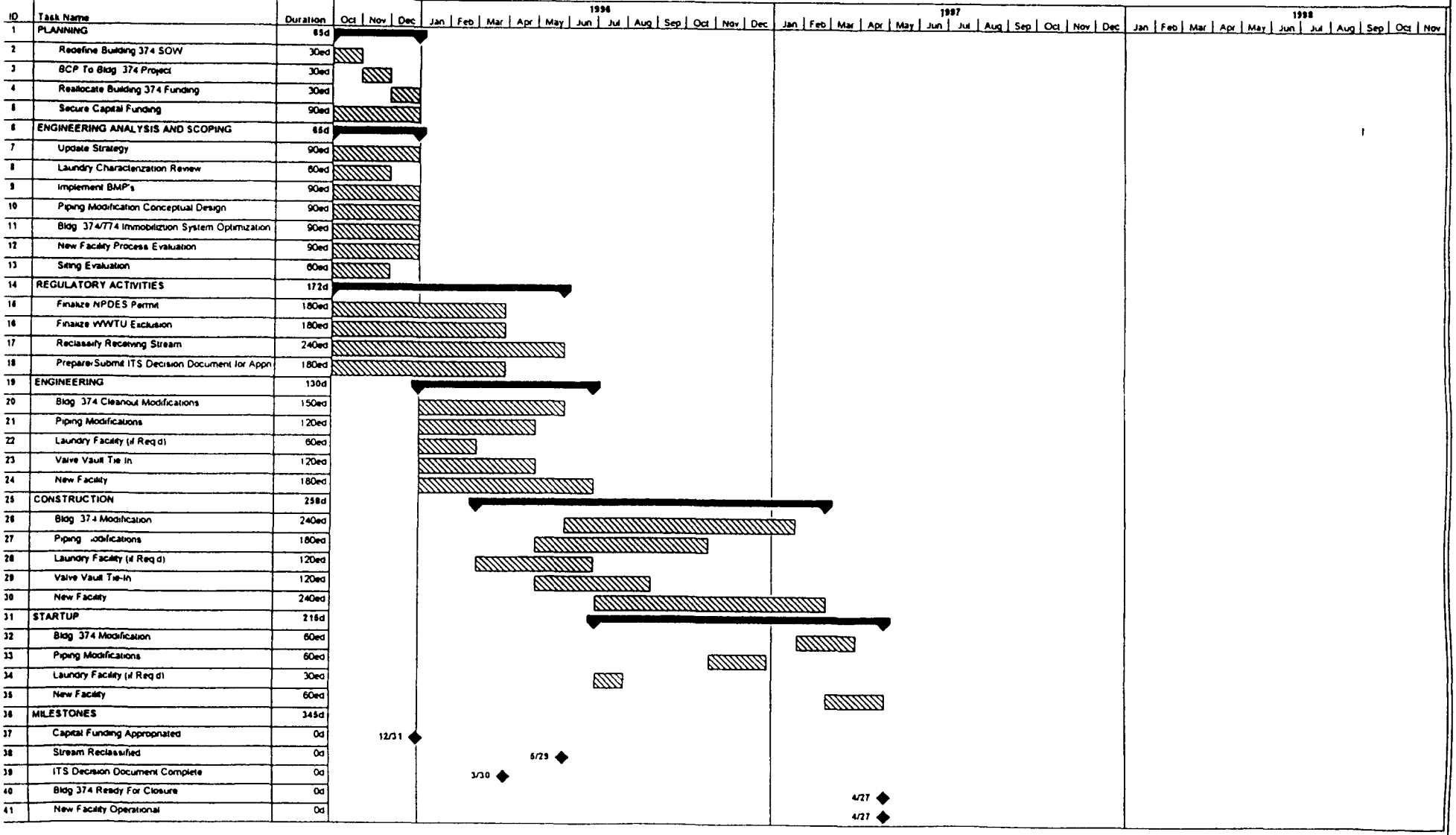
Potential barriers to the successful implementation of the strategy were identified in the following areas

- Regulatory,
- Technical, and

TABLE 5 1
IMPLEMENTATION PLAN ELEMENTS

Element Description	Responsible Party
PLANNING	
Redefine Building 374 SOW	RMRS Liquid Waste Operations
BCP to Building 374 Project	RMRS Liquid Waste Operations
Reallocate Building 374 Funding	KH/DOE
Secure Additional Capital Funding	KH/DOE
ENGINEERING ANALYSIS AND TECHNICAL SCOPING	
Strategy Update	RMRS Strategic Planning and Integration
Laundry Characterization Review	RMRS Liquid Waste Operations
Develop and Implement Best Management Practices	RMRS Liquid Waste Operations
Building 371/771/774 Modification Identification	RMRS Liquid Waste Operations
Building 374/774 Immobilization System Optimization	RMRS Liquid Waste Operations
New Facility Process Evaluation	RMRS Liquid Waste Operations
New Facility Siting Evaluation	RMRS Liquid Waste Operations
REGULATORY ACTIVITIES	
Finalize NPDES Permit	RMRS Permitting
Finalize WWTU Exclusion	RMRS Permitting
Reclassify Receiving Stream	RMRS Permitting
Prepare ITS Decision Document	RMRS Environmental Restoration Group
ENGINEERING	
Building 374 Cleanout Modifications	RMRS Liquid Waste Operations
Building 371/771/774 Modifications	RMRS Liquid Waste Operations
Laundry Facility (if required)	RMRS Liquid Waste Operations
Valve Vault Tie-In	RMRS Liquid Waste Operations
New Facility	RMRS Liquid Waste Operations
OTHER ACTIVITIES	
Obtain DOE 6430 1A Variance for New Facilities	KH
Define Final Protected Area	KH

Figure 5 1
Ten Year Alternative Schedule



ID	Task Name	Duration
1	PLANNING	65d
2	Redefine Building 374 SOW	30ed
3	BCP To Bldg 374 Project	30ed
4	Reallocate Building 374 Funding	30ed
5	Secure Capital Funding	90ed
6	ENGINEERING ANALYSIS AND SCOPING	65d
7	Update Strategy	90ed
8	Laundry Characterization Review	60ed
9	Implement BMP's	90ed
10	Piping Modification Conceptual Design	90ed
11	Bldg 374/774 Immobilization System Optimization	90ed
12	New Facility Process Evaluation	90ed
13	Siting Evaluation	60ed
14	REGULATORY ACTIVITIES	172d
15	Finalize NPDES Permit	180ed
16	Finalize WWTU Exclusion	180ed
17	Reclassify Receiving Stream	240ed
18	Prepare/Submit ITS Decision Document for Appr	180ed
19	ENGINEERING	130d
20	Bldg 374 Cleanout Modifications	150ed
21	Piping Modifications	120ed
22	Laundry Facility (if Req'd)	60ed
23	Valve Vault Tie In	120ed
24	New Facility	180ed
25	CONSTRUCTION	258d
26	Bldg 374 Modification	240ed
27	Piping Modifications	180ed
28	Laundry Facility (if Req'd)	120ed
29	Valve Vault Tie-In	120ed
30	New Facility	240ed
31	STARTUP	216d
32	Bldg 374 Modification	60ed
33	Piping Modifications	60ed
34	Laundry Facility (if Req'd)	30ed
35	New Facility	60ed
36	MILESTONES	345d
37	Capital Funding Appropriated	0d
38	Stream Reclassified	0d
39	ITS Decision Document Complete	0d
40	Bldg 374 Ready For Closure	0d
41	New Facility Operational	0d

Figure 5 2
Twenty Year Alternative Schedule

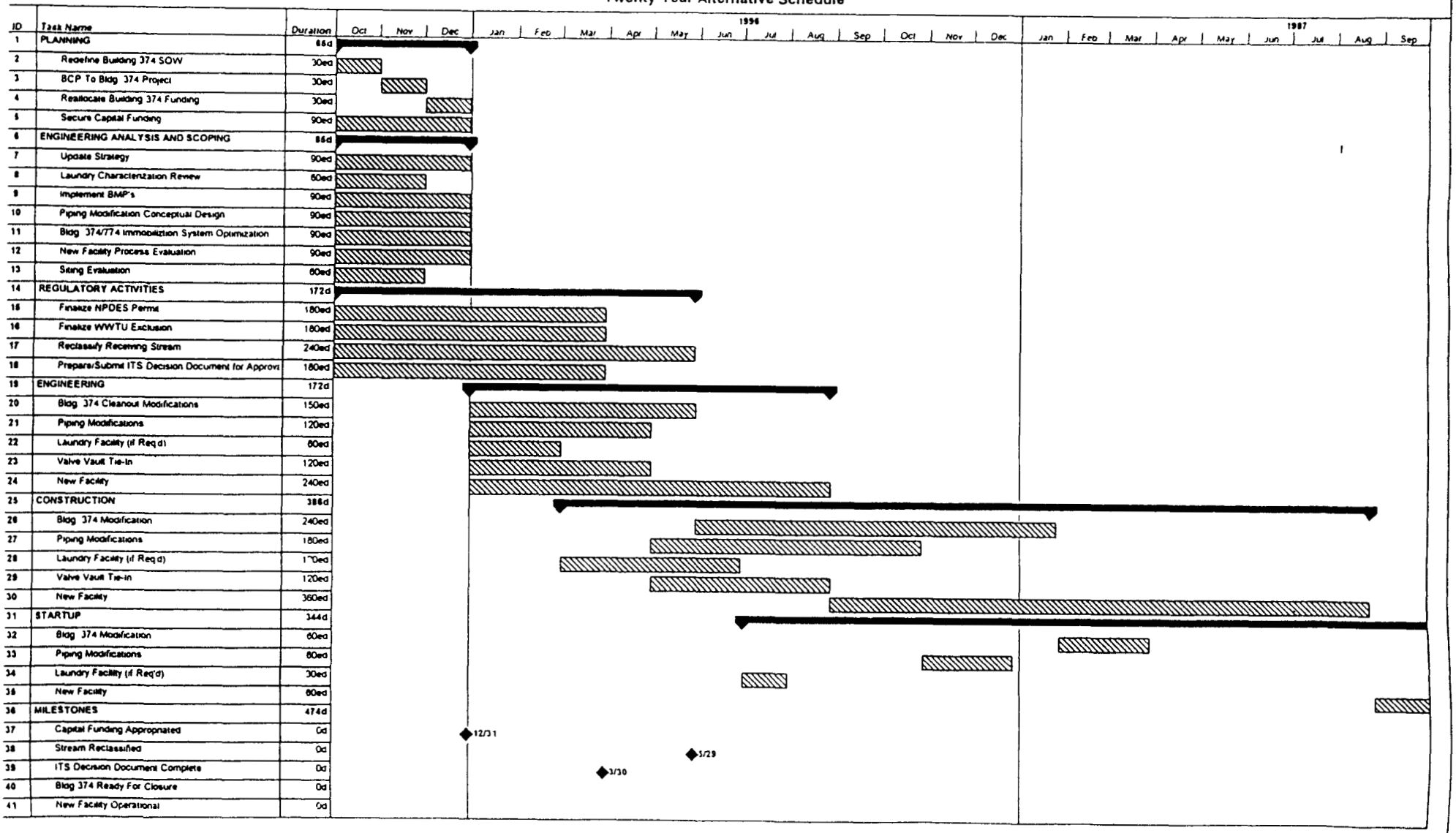


Figure 5 2
Twenty-Year Alternative Schedule

	Task Name	Duration
	PLANNING	88d
	Redefine Building 374 SOW	30ed
	BCP To Bldg 374 Project	30ed
	Reallocate Building 374 Funding	30ed
	Secure Capital Funding	90ed
	ENGINEERING ANALYSIS AND SCOPING	66d
	Update Strategy	90ed
	Laundry Characterization Review	60ed
	Implement BMP's	90ed
	Piping Modification Conceptual Design	90ed
	Bldg 374/774 Immobilization System Optimization	90ed
	New Facility Process Evaluation	90ed
	Siting Evaluation	60ed
	REGULATORY ACTIVITIES	172d
	Finalize NPDES Permit	180ed
	Finalize WWTU Exclusion	180ed
	Reclassify Receiving Stream	240ed
	Prepare/Submit ITS Decision Document for Approv	180ed
	ENGINEERING	172d
	Bldg 374 Cleanout Modifications	150ed
	Piping Modifications	120ed
	Laundry Facility (if Req'd)	80ed
	Valve Vault Tie-In	120ed
	New Facility	240ed
	CONSTRUCTION	386d
	Bldg 374 Modification	240ed
	Piping Modifications	180ed
	Laundry Facility (if Req'd)	120ed
	Valve Vault Tie-In	120ed
	New Facility	360ed
	STARTUP	344d
	Bldg 374 Modification	60ed
	Piping Modifications	60ed
	Laundry Facility (if Req'd)	30ed
	New Facility	60ed
	MILESTONES	474d
	Capital Funding Appropriated	0d
	Stream Reclassified	0d
	ITS Decision Document Complete	0d
	Bldg 374 Ready For Closure	0d
	New Facility Operational	0d

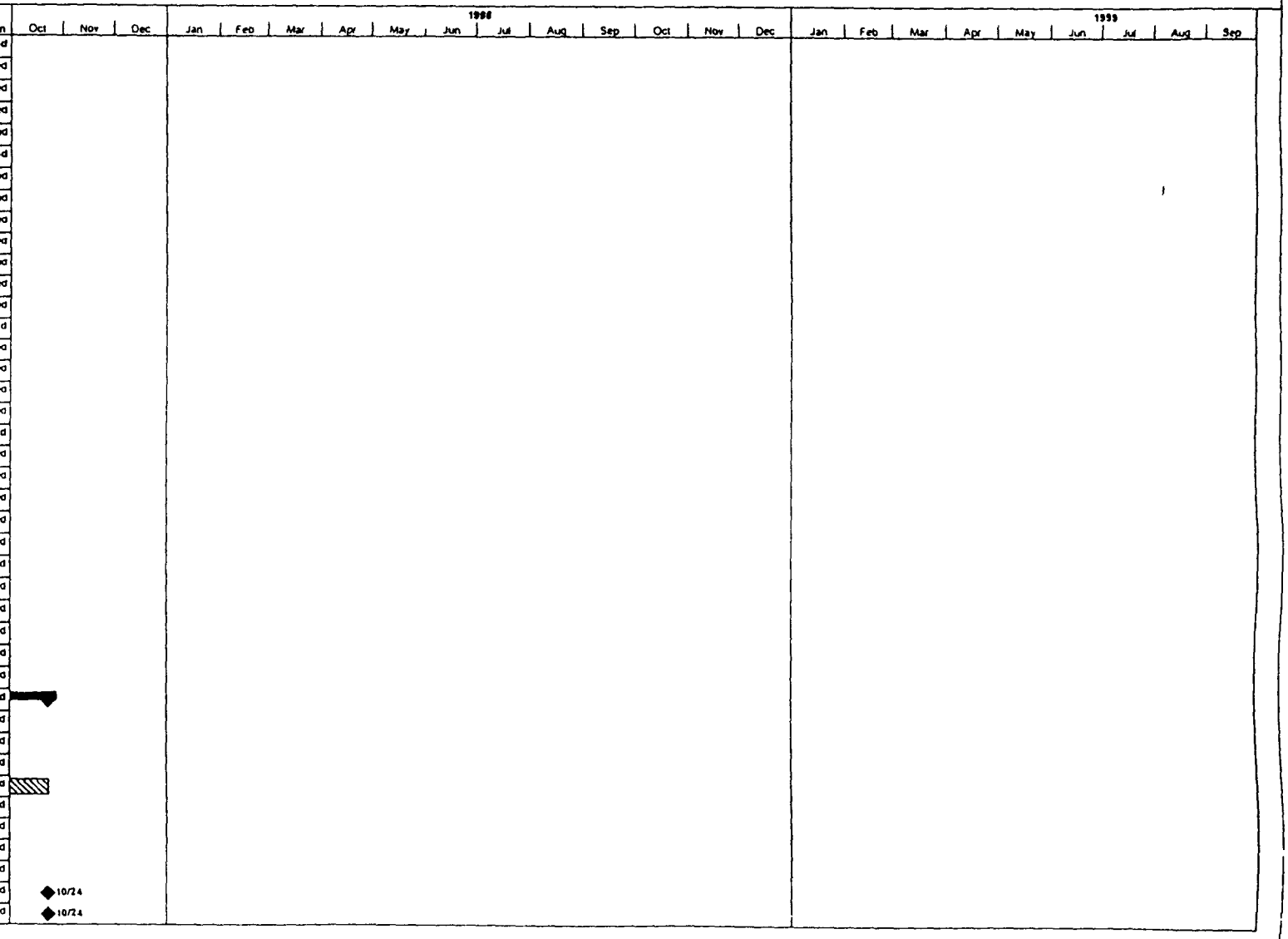
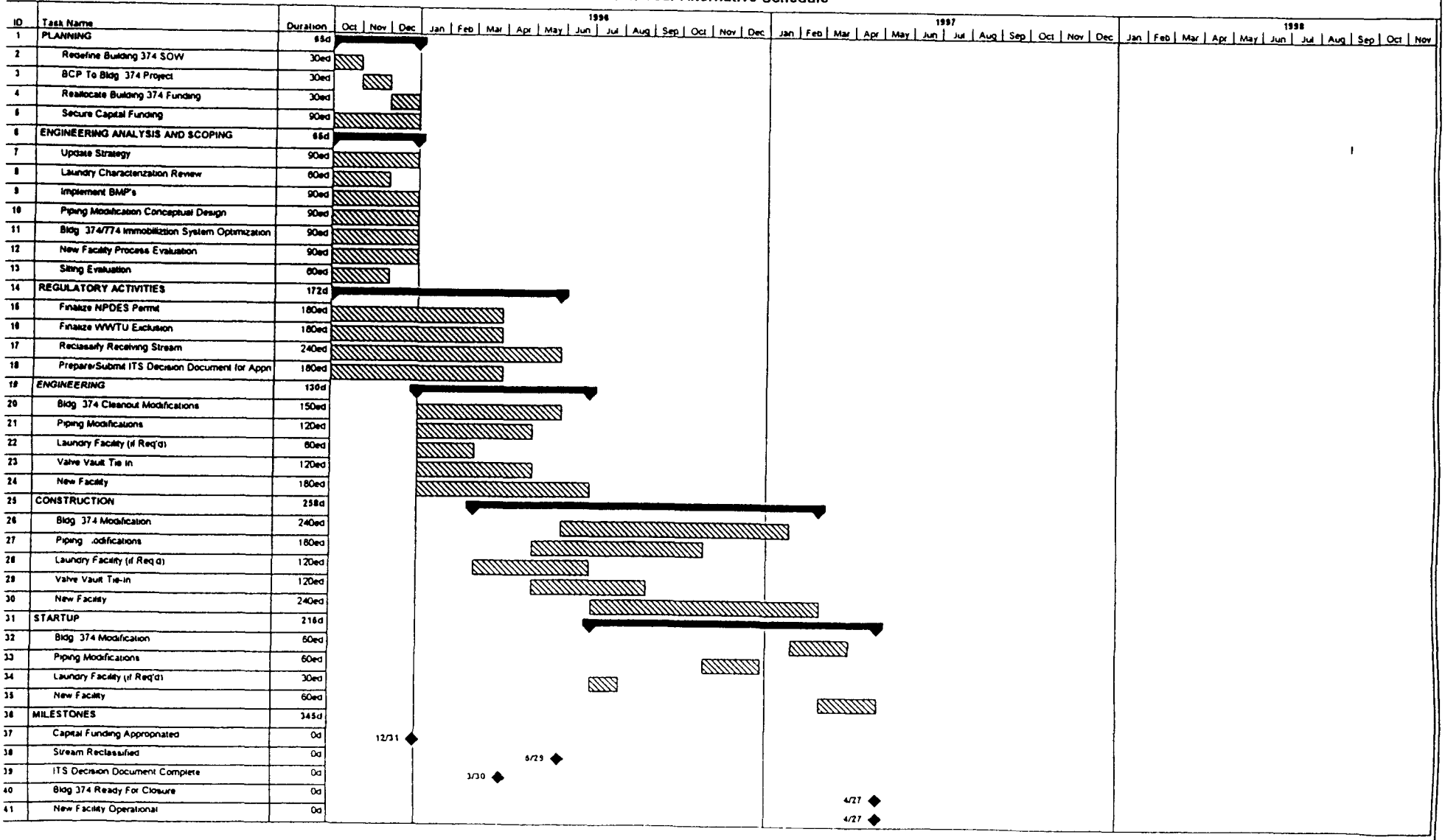


Figure 5 1
Ten Year Alternative Schedule



ID	Task Name	Duration
1	PLANNING	65d
2	Redefine Building 374 SOW	30ed
3	BCP To Bldg 374 Project	30ed
4	Reallocate Building 374 Funding	30ed
5	Secure Capital Funding	90ed
6	ENGINEERING ANALYSIS AND SCOPING	65d
7	Update Strategy	90ed
8	Laundry Characterization Review	60ed
9	Implement BMP's	90ed
10	Piping Modification Conceptual Design	90ed
11	Bldg 374/774 Immobilization System Optimization	90ed
12	New Facility Process Evaluation	90ed
13	Siting Evaluation	60ed
14	REGULATORY ACTIVITIES	172d
15	Finalize NPDES Permit	180ed
16	Finalize WWTU Exclusion	180ed
17	Reclassify Receiving Stream	240ed
18	Prepare/Submit ITS Decision Document for Appn	180ed
19	*ENGINEERING*	130d
20	Bldg 374 Cleanout Modifications	150ed
21	Piping Modifications	120ed
22	Laundry Facility (if Req'd)	60ed
23	Valve Vault Tie In	120ed
24	New Facility	180ed
25	CONSTRUCTION	258d
26	Bldg 374 Modification	240ed
27	Piping .odifications	180ed
28	Laundry Facility (if Req'd)	120ed
29	Valve Vault Tie-In	120ed
30	New Facility	240ed
31	STARTUP	216d
32	Bldg 374 Modification	60ed
33	Piping Modifications	60ed
34	Laundry Facility (if Req'd)	30ed
35	New Facility	60ed
36	MILESTONES	345d
37	Capital Funding Appropriated	0d
38	Stream Reclassified	0d
39	ITS Decision Document Complete	0d
40	Bldg 374 Ready For Closure	0d
41	New Facility Operational	0d

Figure 5 2
Twenty Year Alternative Schedule

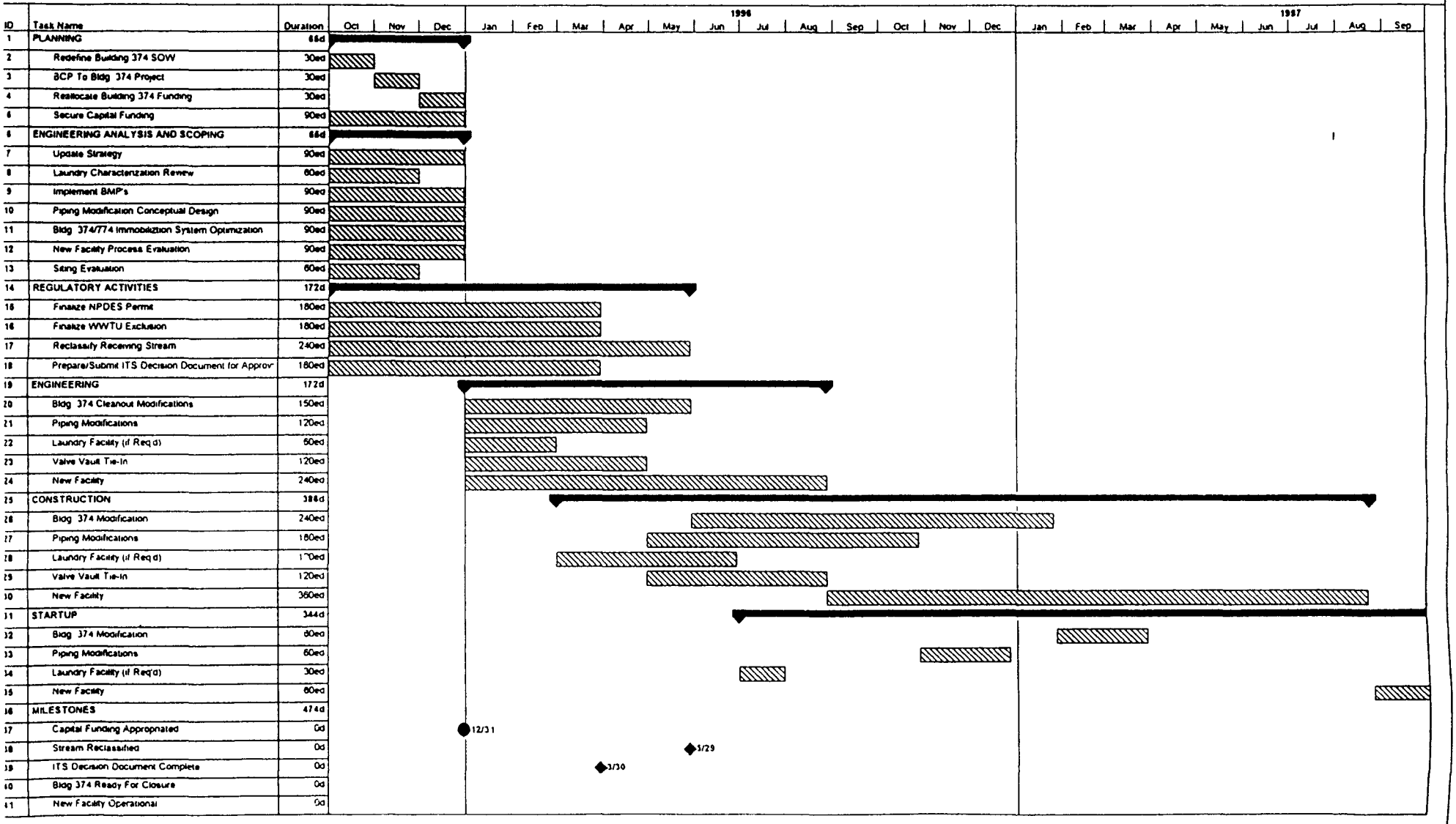


Figure 5 2
Twenty Year Alternative Schedule

)	Task Name	Duration	Oct	Nov	Dec	1998 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1999 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	PLANNING	66d																								
	Redefine Building 374 SOW	30ed																								
	BCP To Bldg 374 Project	30ed																								
	Reallocate Building 374 Funding	30ed																								
	Secure Capital Funding	90ed																								
	ENGINEERING ANALYSIS AND SCOPING	66d																								
	Update Strategy	90ed																								
	Laundry Characterization Review	60ed																								
	Implement BMPs	90ed																								
	Piping Modification Conceptual Design	90ed																								
	Bldg 374/774 Immobilztion System Optimization	90ed																								
	New Facilty Process Evaluation	90ed																								
	Sizing Evaluation	60ed																								
	REGULATORY ACTIVITIES	172d																								
	Finalize NPDES Permit	180ed																								
	Finalize WWTU Exclusion	180ed																								
	Reclassify Receiving Stream	240ed																								
	Prepare/Submit ITS Decision Document for Approv	180ed																								
	ENGINEERING	172d																								
	Bldg 374 Cleanout Modifications	150ed																								
	Piping Modifications	120ed																								
	Laundry Facilty (if Req'd)	60ed																								
	Valve Vault Tie-In	120ed																								
	New Facilty	240ed																								
	CONSTRUCTION	386d																								
	Bldg 374 Modification	240ed																								
	Piping Modifications	180ed																								
	Laundry Facilty (if Req'd)	120ed																								
	Valve Vault Tie-In	120ed																								
	New Facilty	360ed																								
	STARTUP	344d																								
	Bldg 374 Modification	60ed																								
	Piping Modifications	60ed																								
	Laundry Facilty (if Req'd)	30ed																								
	New Facilty	60ed																								
	MILESTONES	474d																								
	Capital Funding Appropriated	0d																								
	Stream Reclassified	0d																								
	ITS Decision Document Complete	0d																								
	Bldg 374 Ready For Closure	0d			10/24																					
	New Facility Operational	0d			10/24																					

- Management

The following sections discuss the types of barriers that may exist, and the actions required to surmount them

5 3 1 Regulatory

The following regulatory activities are necessary for the full implementation of this strategy

New NPDES Permit

This Strategy assumes the new NPDES permit will not have any substantive changes over the draft permit reviewed as part of this study It is likely that changes would not affect the conclusions of the study A delay past approximately the middle of FY 1996 in finalization of the new permit could affect some of the engineering evaluations required to implement the Strategy

WWTU Exclusion

Failure to obtain the WWTU exclusion will not have direct impact on the Strategy or its implementation in terms of schedule or activities Delay in the WWTU exclusion would have an impact on Building 374 operations as saltcrete would continue to be a listed hazardous waste until such time that all hazardous waste codes could be eliminated and that none of the hazardous waste characteristics were shown to be present

Stream Classification and Standards

Stream classification and nitrate standards have an impact on the ITS This Strategy assume that regulatory relief will be obtained However, if deregulation of the stream cannot take place in a timely fashion, or if relief is not obtained at all, a cost impact will be realized Failure to resolve this issue could result in a negative cost impact estimated at approximately $20 million over the next ten years when combined with the applicability of radionuclide standards discussed below

Radionuclide Standards

ITS and potentially other environmental restoration wastewater treatment alternatives are affected by the radionuclide standards that are imposed by the State of Colorado in final decision documents This strategy assumes that DCGs will apply, and that a cost savings can be realized Failure to adopt these standards could result in a cost impact estimated at approximately $20 million for the ITS over the next ten years when combined with the issue of stream standards discussed above Additional cost savings may also be realized for other groundwater sources

5 3 2 Technical

One technical barrier has been identified which could impact the design features of new or modified treatment facilities

DOE Order 6430 1A

Cost estimates for new facilities assume that the Special Facilities criteria or Non-Reactor Nuclear Facility criteria of DOE Order 6430 1A would not apply Failure to overcome this barrier would increase facility cost

5 3 3 Management

Two management barriers have been identified as discussed below

Funding

Implementation of Alternative 4 assumes that funding will be available to support the Interim End State Failure to secure this funding will require that treatment facilities approach or exceed design life This may result in an increase in operations and maintenance costs

Procurement Approach

The only management barrier identified is the current procurement approach at many DOE facilities This approach includes the following general steps

- Prepare Conceptual Design Report/Design Criteria,
- Procure architect/engineering services,
- Prepare Title I package,

- Internal Site review,
- Prepare Title II package,
- Internal review,
- Procure construction services, and
- Complete construction

This strategy assumes that a fast-track approach would be adopted The fastest approach to new facility construction would be design-build in which a single firm completes both the design and construction of the facility to a performance criteria This approach was successfully implemented at the Site for the OU-2 treatment facility and the Soil Vapor Extraction pilot unit Failure to overcome this barrier would result in a delay in the closure of Building 374 due to delays in availability of the facilities intended to replace Building 374

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