CORRES CONTROL
OUTGOING LTR NO

DOE ORDER# 4700 1

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DIST	LTR	ENC
AMARAL, M E		
BURLINGAME, A H		
BUSBY, W S		
BRANCH, D B		
CARNIVAL, G J		
DAVIS, J G		
FERRERA, D W		
FRAY, R E		
GEIS, J A		
GLOVER W S		
GOLAN, P M		
HANNI, B J		
HARMAN L K		
HEALY, T J		
HEDAHL, T		
HILBIG J G		
HUTCHINS, N M		
JACKSON D T		
KELL, R E		
KUESTER, A W		
MARX, G E		
McDONALD, M M		
McKENNA, F G		
MONTROSE, J K		
MORGAN R V		
POTTER, G L		
PIZZUTO, V M		
RISING, T L		
SANDLIN, N B		
SCHWARTZ, J K		
SETLOCK, G H		
STEWART, D L		
TIGER, S G		
ROBIN P M		
VOORHEIS, G M		
WILSON, J M		
Broussard, M C	X	
Cirillo, J K	X	
Frost, L A	X	
Joliat, S A	X	
Primrose, A C	X	
RSS, MT	X	
RFO Project File	X	X
CORRES. CONTROL	X	X
COMN RECORD/080		
TRAFFIC		
STS/T130G		

CLASSIFICATION

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UNCLASSIFIED	X	
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
DOCUMENT CLASSIFICATION REVIEW WAIVER PER CLASSIFICATION OFFICE
TITLE

REPLY TO RFP CC NO

ACTION ITEM STATUS
PARTIAL/OPEN
X CLOSED
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EG&G ROCKY FLATS, INC
ROCKY FLATS PLANT P O BOX 464, GOLDEN COLORADO 80402 0464 • (303) 966-7000

June 5, 1995

95-RF-04857

B E Williamson
Environmental Restoration Division
DOE, RFFO

REVISED DRAFT PROPOSED ACTION MEMORANDUM FOR THE OPERATION OF THE SITEWIDE TREATMENT FACILITY – MBU-040-95

Action Please distribute to EPA and CDPHE for review

Enclosed is a copy of the revised draft, incorporating the May 19, 1995 comments of the Proposed Action Memorandum for the Sitewide Treatment Facility If you feel this draft is sufficient, please submit it to the EPA and CDPHE for their review and comment Public comment will be scheduled after regulatory agency comments are received and dispositioned

If you have any questions please contact Steven Joliat at extension 2534 or Ty Vess at extension 6540

MC Burmeister

M C Burmeister
Facility Management Manager
Environmental Restoration Program Division

SAJ alc

Enclosure
As stated

Orig and 1 cc - B E Williamson

cc
W Fitch - DOE, RFFO
D George - " "
T Reeves - " "

REVISED DRAFT
PROPOSED ACTION MEMORANDUM
SITEWIDE TREATMENT FACILITY

U S DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden Colorado

June 1995

REVISED DRAFT
PROPOSED ACTION MEMORANDUM
SITEWIDE TREATMENT FACILITY

U.S. DEPARTMENT OF ENERGY
Rocky Flats Environmental Technology Site
Golden, Colorado

June 1995

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LIST OF ACRONYMS

AEA	Atomic Energy Act
ARA	Accelerated Response Action
ARAR	Applicable or Relevant and Appropriate Requirements
AWQC	Ambient Water Quality Criteria
BDAT	Best Demonstrated Available Technology
Be	beryllium
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CHWA	Colorado Hazardous Waste Act
COCs	Contaminants of Concern
DOE	Department of Energy
EPA	Environmental Protection Agency
FTU	Field Treatability Unit
GAC	granular activated carbon
gpm	gallons per minute
HSP	Health and Safety Plan
IAG	Inter-Agency Agreement
IHSS	Individual Hazardous Substance Site
IM/IRA	Interim Measure/Interim Remedial Action
MCLs	Maximum Contaminant Level
MCLGs	Maximum Contaminant Level Goals
NEPA	National Environmental Policy Act
OU	Operable Unit
PAM	Proposed Action Memorandum
pCi/ℓ	picocuries per liter
RCRA	Resource Conservation and Recovery Act
RFETS	Rocky Flats Environmental Technology Site
SAP	Sampling and Analysis Plan
STF	Sitewide Treatment Facility
TDS	total dissolved solids
TBL	to be considered
TSD	treatment, storage, and disposal

LIST OF ACRONYMS (Continued)

U	uranium
$\mu g/\ell$	micrograms per liter
UV	ultraviolet
VOCs	volatile organic compounds
WAC	waste acceptance criteria

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Proposed Action Memorandum (PAM) is to request and document approval of the Department of Energy's (DOE's) proposed Accelerated Response Action (ARA) to construct and operate a Sitewide Treatment Facility (STF) at the Rocky Flats Environmental Technology Site (RFETS) This ARA involves consolidating contaminated water sources from Operable Unit (OU) numbers 1 and 2 for treatment at the existing OU1 treatment facility, modified for greater utility by incorporation of OU2 treatment system components and other miscellaneous units Other contaminated waters may be treated at the STF if their chemical quality meets the Waste Acceptance Criteria (WAC) for the facility No process water will be accepted at the STF unless a Resource Conservation and Recovery Act (RCRA) permit is obtained or other authorization is granted by the Colorado Department of Public Health and Environment (CDPHE) The purposes of this action are to reduce short-term and longer-term worker exposure risks from operation of multiple facilities and to realize capital and operating cost efficiencies by eliminating redundant treatment capacity This ARA is also consistent with future long-term cleanup plans for these OUs (and possibly others) because treatment capacity for all contaminants of concern (COCs) (metals, organics, and radionuclides) will be provided

The STF is an ARA as defined in the amendment to the current Inter-Agency Agreement (IAG), i e , a remedial response action that all parties (DOE, Environmental Protection Agency, Region VIII [EPA], and CDPHE) agree is necessary and appropriate to mitigate a threat or potential threat to public health or environment, and can be implemented in 6 months The PAM is the primary document used by DOE in making its decision to undertake the action and, therefore, substantiates the need for and the methodology for the action

1.2 JUSTIFICATION FOR THE PROPOSED ACTION

This proposed action is justified based on safety, environmental and cost considerations Principal arguments for proceeding with this action are summarized below

- The consolidation of contaminated water from multiple OUs for treatment at a centralized location will reduce overall short-term and long-term worker exposure risks by reducing or eliminating operator exposure to contaminants which would otherwise occur managing these contaminated waters at each of the OUs

- Construction at one physical location will reduce potential future environmental impacts at other OUs

- Obvious cost efficiencies are realized by eliminating redundant treatment capacity Costs will be reduced by eliminating future design, siting, capital and operating costs at other OUs

1.3 DOCUMENT ORGANIZATION

Section 2 of this document describes the proposed contaminated water sources initially to be collected and treated at the STF and summarizes their chemical characteristics Section 3 summarizes the WAC and the performance standards for the STF The performance standards address compliance with chemical- and action-specific regulatory requirements (Applicable or Relevant and Appropriate Requirements [ARARs]) for RFETS Section 4 describes the scope, schedule and cost of the proposed action and addresses National Environmental Policy Act (NEPA) considerations

2.0 SITE CHARACTERIZATION

2.1 PHYSICAL LOCATION AND LAND USE

RFETS is located in rural northern Jefferson County approximately 16 miles northwest of Denver Cities within a 10-mile radius from the center of RFETS include Boulder to the northwest, Broomfield, Lafayette, and Louisville to the northeast, Westminster to the east, Arvada to the southeast, and Golden to the south Approximately 50% of the area within 10 miles of RFETS is in Jefferson County, 40% in Boulder County, and 10% in Adams County

RFETS consists of approximately 6,500 acres of federally owned land in Township 2 South, Range 70 West, Sections 1 to 4 and 9 to 15, 6th Principal Meridian (T2S R70W 1-4, 9-15, 6PM) A secured area of approximately 400 acres is centrally located within RFETS The secured area is surrounded by a buffer zone of approximately 6,150 acres in area

RFETS is a government-owned, contractor-operated facility that is part of the nationwide nuclear weapons production complex Until January 1992, RFETS was operated as a nuclear weapons research, development, and production complex RFETS fabricated nuclear weapons components from plutonium, uranium, beryllium (Be), and stainless steel Support activities included chemical recovery, purification of recyclable transuranic radionuclides, and research

and development of metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics The RFETS is currently a RCRA hazardous waste treatment/storage facility RFETS has undergone a transition from a defense production facility to a facility that is used for such missions as environmental restoration, waste management, maintaining production contingency, and decontamination and decommissioning

There is little residential or commercial development within a 4-mile radius of the center of RFETS Approximately 9,100 people reside within a 5-mile radius Approximately 316,000 people reside within a 10-mile radius The population within a 50-mile radius is approximately 2 2 million

Generally, those areas closest to RFETS are zoned for industrial development and those farther away are zoned for residential development Since 1973, several new residential subdivisions have been developed to varying degrees within a few miles of the buffer zone, particularly to the east and southeast Additionally, several ranches are located within 10 miles of RFETS These ranches are associated with equestrian activities and produce crops, beef cattle, and milk Two small cattle herds of approximately 10 to 20 cattle each are located southeast and east of RFETS The predominant uses immediately southeast of RFETS appear to be open space, single family detached dwellings, and horse boarding operations In all, 70 parcels in Jefferson County surrounding RFETS to the east, south, and west have been identified and designated The land use data are summarized in Table 2-1 Land to the north is in Boulder County and has not been identified

Table 2-1

Jefferson County Land Use Surrounding RFETS

Number of Parcels	Land Use Type	Generalized Zoning
11	Single Family Detached	Agricultural, Planned Development, Residential
30	Industrial	Industrial, Planned Development, Mining-Conservation
4	Office/Retail	Restricted Commercial, Planned Development
1	Mining	Mining-Conservation
1	Farm/Ranching	Agricultural
5	Water/Utilities	Agricultural, Industrial, Mining-Conservation
18	Vacant or not designated	Agricultural, Industrial

Adapted from DOE, 1994a, App F, Table F4-1 Original Source Jefferson County Land Use Inventory

2.2 PHYSICAL ENVIRONMENT AND ECOLOGY

There are no floodplains, natural wetlands, or historical/archeological features at OU1 OU1 is not intended for development of any unique natural resource There is a constructed wetland located in the vicinity of OU1, which was built because of damage to wetlands during construction of the french drain, an Interim Measure/Interim Remedial Action (IM/IRA) implemented at OU1 Wetlands occur along Woman Creek and Pond C-2, which are south of OU1 The wetlands will not be affected by this proposed action

Preliminary studies conducted to date have not indicated the presence of unique ecosystems at the RFETS The bald eagle (endangered), black footed ferret (endangered), peregrine falcon (threatened), whooping crane (endangered), and Preble's meadow jumping mouse (candidate for listing) were identified by the U S Fish and Wildlife Service as potentially present at RFETS (Peregrine falcons nest on high cliff sides and river gorges, which are absent at RFETS Peregrine falcon nesting sites have been recorded 4 to 5 miles west of the site) However, the U S Fish and Wildlife Service found no adverse affects on endangered species resulting from current activities at OU1

2.3 SITE DESCRIPTIONS/CONTAMINATED WATER SOURCES

The waters initially proposed for treatment at the STF are from OUs 1 and 2, as well as from miscellaneous decontamination and remediation activities occurring plant-wide Water from additional sources that meets the WAC may be accepted in the future The location of these OUs within the RFETs plant boundaries is illustrated in Figure 2-1 Table 2-2 summarizes the contaminated water sources and flows to be initially treated at the STF Subsections 2 3 1 through 2 3 3 describe these sources in more detail and provide a summary of the analytical data Analytical data were reported to the Rocky Flats Environmental Database System (RFEDS) from 1 January 1994 to 31 March 1995, for all of the water sources Non-detect samples were not included when calculating average concentrations All data and statistics are from ORNL, 1995 This results in a conservatively high value for the average

2.3.1 Operable Unit Number 1

Previous actions at OU1 included implementation of an IM/IRA to collect and treat contaminated groundwater, which began operation in April 1992 Figure 2-2 illustrates the plot plan for the OU1 IM/IRA Groundwater is collected by a downgradient french drain as well as from an extraction well, and is treated by a system consisting of ultraviolet (UV)/peroxide oxidation for destruction of organics, and ion exchange for removal of total dissolved solids (TDS), trace

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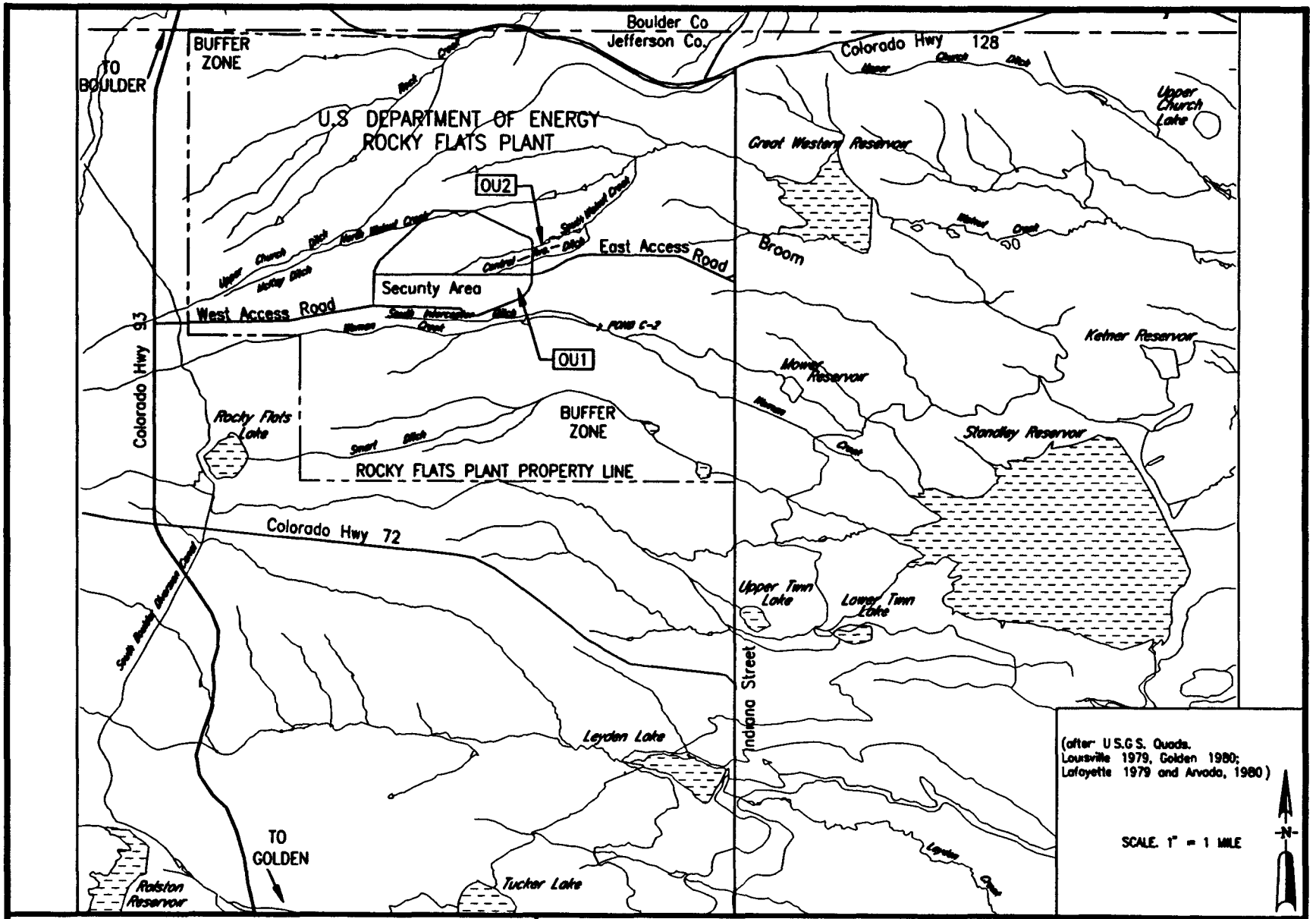

U.S. DEPARTMENT OF ENERGY Rocky Flats Environmental Technology Site Golden, Colorado	OU1 AND OU2 LOCATION MAP PROPOSED ACTION MEMORANDUM SITEWIDE TREATMENT FACILITY	FIGURE 2-1

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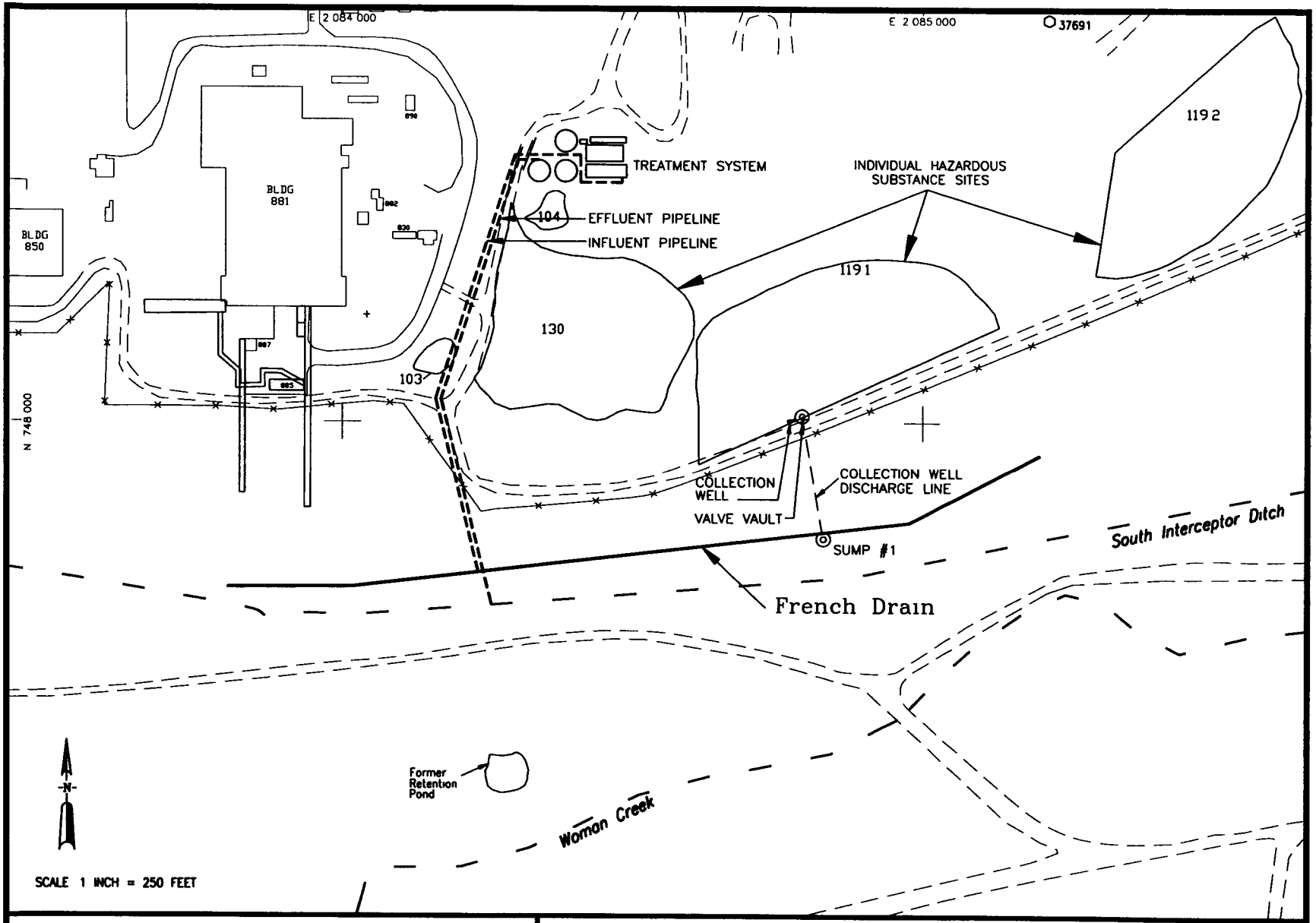

U.S. DEPARTMENT OF ENERGY Rocky Flats Environmental Technology Site Golden, Colorado	OU1 IM/IRA PLOT PLAN PROPOSED ACTION MEMORANDUM SITEWIDE TREATMENT FACILITY	FIGURE 2-2

Table 2-2

Summary of Initially Proposed STF Contaminated Water Sources and Corresponding Flow Estimates

OU Number	Description of Source	Flow Estimates (gpm)
1	Groundwater from IM/IRA	0 2 — 0 25
2	Surface Water Station SW-59	0 07
	Miscellaneous water from decontamination and remediation activities plant-wide	0 13 — 0 19

Source ORNL, 1995

metals, uranium and salts Treated groundwater is discharged to surface water after it has been treated to meet ARARs established for OU1 The current treatment system capacity is 30 gallons per minute (gpm) The current flow rate from the IM/IRA is 2,000 to 2,500 gallons per week (0 2 to 0 25 gpm) Tables 2-3 and 2-4 present statistical summaries of the available analytical data for the french drain and collection well, respectively

Radionuclides

Water from the OU1 french drain exhibits mean gross beta activity (7 36 picoCuries per liter [pCi/ℓ]) slightly elevated over the ARAR of 5 pCi/ℓ Mean activities for other radionuclides are below their respective ARARs Mean gross alpha and gross beta activities (12 33 and 8 23 pCi/ℓ, respectively) for water from the OU1 collection well exceed their ARARs Americium, plutonium, tritium and uranium activities in OU1 collection well water do not exceed their respective ARARs

Organics

Methylene chloride, tetrachloroethene, and trichloroethene were detected infrequently (1 in 17, 3 in 17, and 1 in 17 samples, respectively) for the french drain water, however, the maximum detected concentrations of these compounds exceed their respective ARARs In contrast, 1,1-dichloroethene, carbon tetrachloride, and tetrachloroethene were detected frequently in water from the OU1 collection well Mean concentrations for these compounds exceed their respective

Table 2-3

Summary of OU1 Wastewater Characteristics Station 891COLGAL — FRENCH DRAIN

Analyte	Number of Samples	Number of Detects > or = CRQL	Minimum	Maximum	Mean	ARAR
Radiochemistry (pCi/ℓ)						
AMERICIUM-241	12	2	0 01	0 04	0 01	30
GROSS ALPHA	18	16	2 9	8 66	5 03	7
GROSS BETA	18	15	2	38	7 36	5
PLUTONIUM-239/240	16	1	0 01	0 01	0 01	30
TRITIUM	17	2	200	300	270 55	1000
URANIUM-233,234	16	16	3 9	6 5	5 04	500
Organics (µg/ℓ)						
METHYLENE CHLORIDE	17	1	5	73	10 18	4 7
TETRACHLOROETHENE	17	3	5	10	6 53	0 8
TRICHLOROETHENE	17	1	5	28	7 24	2 7
Metals (µg/ℓ)						
ARSENIC	20	5	2	17 8	9 59	50
SELENIUM	20	10	5	45 6	13 4	10
ZINC	20	15	11 9	370	163 03	50
Water Quality Parameters (mg/ℓ)						
CHLORIDE	22	22	76	130	101 85	250
NITRATE/NITRITE	24	24	1 31	1480	66 16	10
SULFATE	23	23	42	108 36	67 86	250
TOTAL DISSOLVED SOLIDS	19	19	440	623	532 68	400
pH	11	11	7 21	8 29	7 85	6 5—9 0

Table 2-4

Summary of OU2 Wastewater Characteristics
Station 891COLWELL — COLLECTION WELL

Analyte	Number of Samples	Number of Detects > or = CRQL	Minimum	Maximum	Mean	ARAR
Radiochemistry (pCi/ℓ)						
AMERICIUM-241	13	2	0 01	0 02	0 01	30
GROSS ALPHA	12	8	5	18	12 33	7
GROSS BETA	12	8	3	11 58	8 23	5
PLUTONIUM-239/240	11	1	0 01	0 02	0 01	30
TRITIUM	13	3	256 59	300	292 73	1000
URANIUM-233,234	12	11	10	15	12 98	500
Organics (μg/ℓ)						
1,1-DICHLOROETHENE	25	12	8	100	30 08	1
ACETONE	25	1	10	100	39 08	50
CARBON TETRACHLORIDE	25	10	5	100	28 04	1
TETRACHLOROETHENE	25	13	61	140	91 96	0 8
TRICHLOROETHENE	25	1	410	1400	694	2 7
Metals (μg/ℓ)						
IRON	16	5	32 52	364	96 29	300
MANGANESE	16	5	1	34 61	14 38	50
NICKEL	16	5	12	188	53 28	40
SELENIUM	16	14	381	729	635 6	10
ZINC	16	4	7 7	246	38 14	50
Water Quality Parameters (mg/ℓ)						
CHLORIDE	14	14	164 42	220	196 53	250
NITRATE/NITRITE	16	16	1 51	7050	446 1	10
SULFATE	14	14	170	320	244 85	250
TOTAL DISSOLVED SOLIDS	17	17	890	1100	1055 12	400
pH	16	16	7 48	8 03	7 81	6 5 — 9 0

ARARs Trichloroethene was detected only once in 25 samples but at a concentration of 1,400 micrograms per liter ($\mu g/\ell$), which is well above the ARAR value of 2 7 $\mu g/\ell$

Metals

With respect to the metals, the french drain water exhibits mean selenium (13 4 $\mu g/\ell$) and zinc (163 $\mu g/\ell$) concentrations above their respective ARARs of 10 and 50 $\mu g/\ell$, respectively Collection well water exhibits mean nickel (53 3 $\mu g/\ell$) and selenium (635 6 $\mu g/\ell$) concentrations above ARARs

Water Quality Parameters

Both the french drain and collection well water are characterized by nitrate/nitrite and TDS concentrations above ARAR

2.3.2 Operable Unit Number 2

An IM/IRA is also in progress at OU2 for the treatment of surface water identified as seep SW-59 Treatability studies were conducted in two phases during 1992 and 1993 with the objectives of evaluating the chemical characteristics of water at SW-59 as well as at nearby surface water stations SW-61 and SW-132 The effectiveness of a field treatability unit (FTU) in achieving the ARARs identified for OU2 was also evaluated Figure 2-3 illustrates the plot plan for the OU2 FTU The treatment units employed by the FTU consisted of microfiltration for the removal of metals and radionuclides, and granular activated carbon (GAC) for the removal of organics The results of the treatability studies indicated that it was not necessary to continue to collect and treat SW-61 and SW-132 The conclusion was drawn because stations SW-61 and SW-132 only occasionally exceeded OU2 ARARs, and the cost of treatment and waste management for these sources was prohibitive Collection of these two sources was discontinued on 6 May 1994 with the concurrence of EPA and the CDPHE Surface water station SW-59 continues to be collected and treated using the OU2 FTU The average flow from SW-59 is 100 gallons per day (0 07 gpm)

Table 2-5 presents summary statistics for the available analytical data from Station SW-59

Radionuclides

The gross beta ARAR of 5 pCi/ℓ is exceeded on average at Station SW-59 Other radionuclides exhibit mean activities below ARARs

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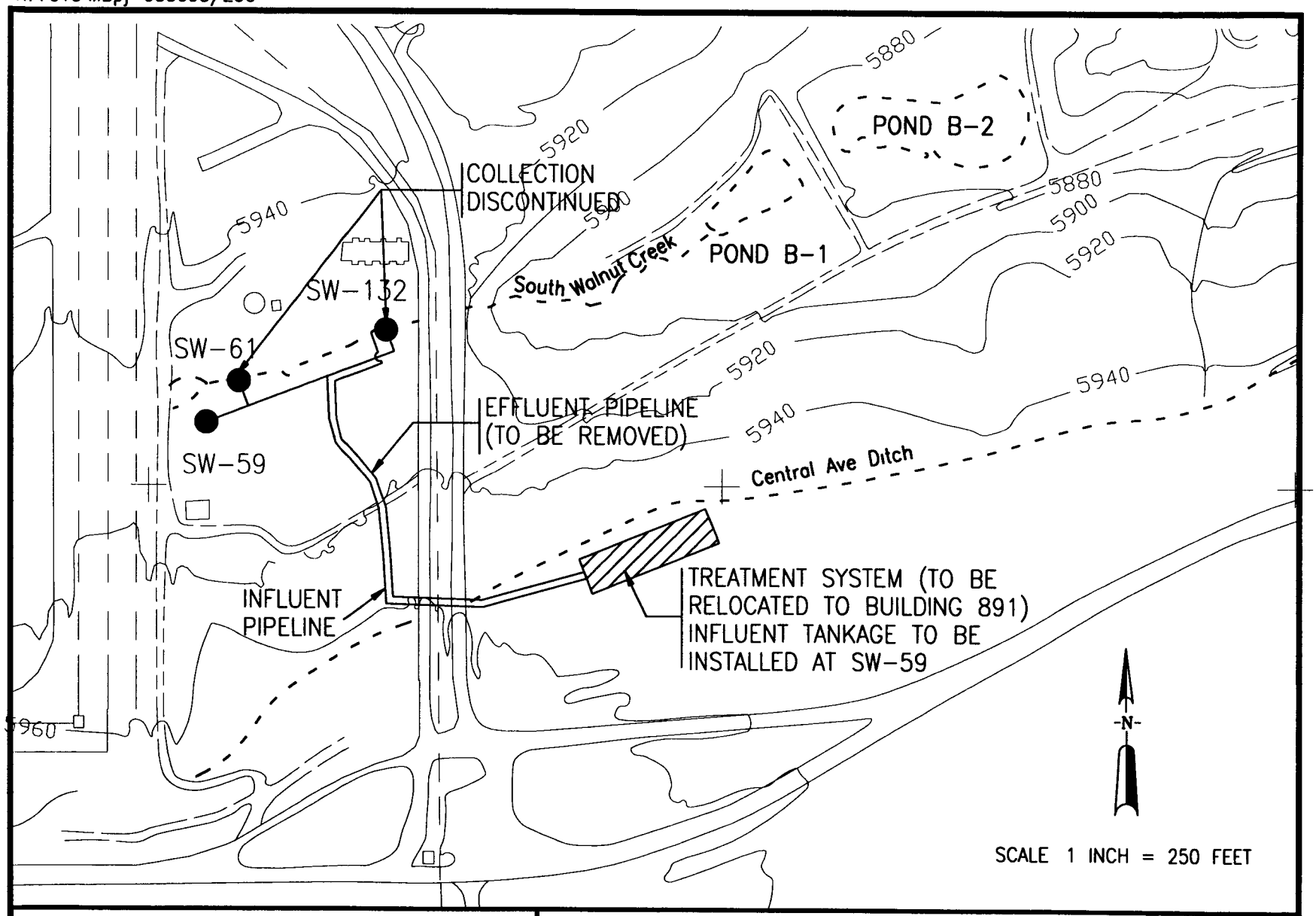

U.S. DEPARTMENT OF ENERGY Rocky Flats Environmental Technology Site Golden, Colorado	OU2 IM/IRA PLOT PLAN PROPOSED ACTION MEMORANDUM SITEWIDE TREATMENT FACILITY	FIGURE 2-3

Table 2-5

Summary of OU2 Wastewater Characteristics Station SW-059

Analyte	Number of Samples	Number of Detects > or = CRQL	Minimum	Maximum	Mean	ARAR
Radiochemistry (pCi/ℓ)						
AMERICIUM-241	31	8	0 01	0 04	0 01	30
GROSS ALPHA	60	58	1 5	31	6 39	7
GROSS BETA	60	44	2	43	7 1	5
PLUTONIUM-239/240	58	21	0 01	0 14	0 02	30
Organics (μg/ℓ)						
1,1,1-TRICHLOROETHANE	65	58	0 2	13	5 02	200
1,1-DICHLOROETHANE	65	55	0 4	3	1 18	5
1,1-DICHLOROETHENE	65	55	0 2	4	1 98	1
1,2-DICHLOROETHANE	65	1	0 4	2	1 06	1
CARBON TETRACHLORIDE	65	53	3	180	73 42	1
CHLOROFORM	65	59	2	32	14 72	1
METHYLENE CHLORIDE	65	10	0 1	14	0 82	4 7
TETRACHLOROETHENE	65	57	1	72	30 97	0 8
TOLUENE	65	2	0 1	3	0 58	1000
TRICHLOROETHENE	65	56	1	86	34 02	2 7
VINYL CHLORIDE	65	6	0 2	8	1 13	2
Metals (μg/ℓ)						
ALUMINUM	119	21	11	21000	565 51	87
BARIUM	119	4	139 18	363	186 75	1000
IRON	119	35	2 2	12900	390 52	300
LEAD	119	7	0 9	31 6	2 86	6 5
MANGANESE	119	67	15	2100	168 3	50
MERCURY	119	1	0 2	0 24	0 2	0 01
ZINC	119	92	20	1020	187 25	50
Water Quality Parameters (mg/ℓ)						
CHLORIDE	76	76	49	170	66 66	250
SULFATE	74	74	19	55	34 29	250
TOTAL DISSOLVED SOLIDS	75	75	370	710	508 08	400

Organics

Although all of the volatile organic compounds (VOCs) with ARARs were detected at least once (with the exception of 1,1,2 trichloroethane), the concentrations of carbon tetrachloride, chloroform, tetrachloroethene, and trichloroethene consistently and significantly exceed their respective ARARs

Metals

Aluminum, iron, manganese and zinc are the only metals detected frequently in concentrations exceeding their respective ARARs However, the sampling point is located immediately downstream of a galvanized steel culvert, which may be contributing to these metal concentrations

Water Quality Parameters

Mean TDS (508 mg/ℓ) exceeds the ARAR of 400 mg/ℓ based on 75 samples Data on pH and nitrate/nitrite are unavailable

2.3.3 Miscellaneous Contaminated Water Sources

The primary source of non-specific contaminated water proposed for treatment at the STF includes decontamination water from the main decontamination facility (Building 903A) The estimated flow of decontamination water ranges from 70,000 to 100,000 gallons per year (0 13 to 0 19 gpm) Other investigation-derived decontamination and purge water from remediation activities throughout the plant site is proposed for treatment at the STF where it meets WAC

Table 2-6 presents a summary of the available analytical data for miscellaneous waters received at the OU1 decontamination facility

Radionuclides

No samples have been analyzed for radionuclides

Table 2-6

Summary of Miscellaneous Wastewater Characteristics Decontamination Pad — Station Number DP00192

Analyte	Number of Samples	Number of Detects > or = CRQL	Minimum	Maximum	Mean	ARAR
Organics (µg/ℓ)						
1,1-DICHLOROETHENE	9	0	50 00	50 00	50 00	0 057
1,2-DICHLOROETHANE	9	0	50 00	50 00	50 00	0 4
CARBON TETRACHLORIDE	9	0	50 00	50 00	50 00	0 25
CHLOROFORM	9	0	50 00	50 00	50 00	1 00
TETRACHLOROETHENE	9	0	12 00	50 00	45 78	0 80
TRICHLOROETHENE	9	0	17 00	50 00	46 33	2 7
VINYL CHLORIDE	9	0	100 00	100 00	100 00	2 00
Metals (µg/ℓ)						
ARSENIC	14	0	152 00	500 00	265 43	50
BARIUM	14	3	158 00	2790 00	874 71	1000
CADMIUM	14	0	1 30	15 20	10 83	1 5
CHROMIUM	14	3	11 60	89 40	25 29	10
LEAD	14	0	100 00	213 00	132 14	6 5
MERCURY	14	2	0 10	7 20	1 76	0 01
SELENIUM	14	0	147 00	399 00	251 64	10
SILVER	14	0	2 70	15 20	12 30	3 8

Organics

Nine samples have been collected for a subset of organic compounds with ARARs Detection limits for these analyses were established at 50 $\mu g/\ell$ No organics have been detected at concentrations above this detection limit

Metals

In analysis of this water, detection limits for metals were somewhat high Metals detected over detection limits include barium, chromium, and mercury

Water Quality Parameters

Water quality parameters have not been measured at this station

3.0 COMPLIANCE WITH ARARs AND WAC

In accordance with the IAG, a performance objective of remedial actions at the RFETS is achieving compliance with ARARs and To Be Considered (TBC) criteria However, as stated in the amendment to the IAG, ARAs "may not be intended to, nor be able to, fully address the threat posed by a release or achieve final required performance standards and objectives at a contaminated site, and that further response action may be required " ARARs are divided into three types chemical-specific, location-specific, and action-specific ARARs. Chemical-specific ARARs are those that set concentration limits for soil, groundwater or surface water for specific pollutants Section 3 1 identifies the chemical-specific ARARs/TBCs for this action Action-specific ARARs set controls or restrictions on particular kinds of activities related to management of hazardous substances or pollutants Action-specific ARARs/TBCs are identified in Section 3 2 Location-specific ARARs are regulations that set restrictions on activities or contaminant levels based on unique characteristics of the site Location-specific ARARs for this action have not been identified because the action is not expected to result in any adverse impacts to wetlands, floodplains, threatened or endangered species or their habitats, and historic and cultural resources

3.1 CHEMICAL-SPECIFIC REQUIREMENTS

The chemical-specific ARARs and TBCs for the STF are shown in Tables 3-1 through 3-4 The ARARs/TBCs represent water quality goals that are protective of human health and the

Table 3-1

Chemical-Specific ARARs/TBCs Principal Performance Criteria For STF — Metals

Metal	Sitewide Treatment Facility ($\mu g/\ell$)	Source
Aluminum	chronic = 87 (d) acute = 750 (d)	1
Antimony	6 0 (TR) (30 day average)	3
Arsenic	50 (TR) (daily maximum)	3
Barium	1,000 (TR) (daily maximum)	3
Beryllium	4 (TR) (30 day average)	3
Cadmium	chronic = 1 5 (d) acute = 14 8 (d)	3
Chromium	10 00	1
Chromium III	50 (TR) (daily maximum)	3
Chromium VI	chronic = 11 (d) acute = 16 (d)	3
Copper	chronic = 16 (d) acute = 24 8 (d)	3
Iron	300 (d) (30 day average)	3
Lead	chronic = 6 5 (d) acute = 170 8 (d)	1,3
Lithium	2,500	5
Manganese	50 (d) (30 day average)	3

Table 3-1 (Continued)

Chemical-Specific ARARs/TBCs Principal Performance Criteria For STF — Metals

Metal	Sitewide Treatment Facility ($\mu g/\ell$)	Source
Mercury	chronic = 0 1 (d) acute = 2 4 (d) fish = 0 01 (total)	1
Molybdenum	100	5
Nickel	40 00	6
Selenium	chronic = 10 (TR) acute = 135(d)	1
Silver	acute = 3 8 (d)	1
Thallium	0 5 (TR) (30 day average)	3
Vanadium	100	5
Zinc	50 00	6

d = dissolved
TR = Total Recoverable

Sources

1 = Statewide aquatic life standard
2 = Statewide agricultural standard
3 = Statewide drinking water standard
4 = Statewide human health based water and fish standard applicable to aquatic life segments
5 = OU1 IM/IRA
6 = OU2 IM/IRA

Table 3-2

Chemical-Specific ARARs/TBCs Principal Performance Criteria for STF — Organics

Organic	STF Standard ($\mu g/\ell$)	Source
Acetone	50	1
Carbon disulfide	5	1
Carbon tetrachloride	1 00	6
Chloroform	1 00	6
Dichloroethane 1,1	5	1
Dichloroethane 1,2	1 00	6
Dichloroethylene 1,1	1 00	6
Methylene chloride	4 7	3
Tetrachloroethene (PCE)	0 80	3, 4
Toluene	1,000	4, 5
Trichloroethane 1,1,1	200	4, 5
Trichloroethane 1,1,2	1 00	6
Trichloroethene (TCE)	2 70	4
Vinyl chloride	2 00	5

Sources

1 = OU1 IM/IRA
2 = OU2 IM/IRA
3 = RFETS site-specific standard
4 = Statewide human health based water and fish standard applicable to aquatic life segments
5 = Statewide water supply standard
6 = Practical Quantification Limit (PQL) Where the standard is more stringent than the PQL, the PQL is taken as the compliance level PQLs are from Section 6 9 2(13) of the Regulations for the State Discharge Permit System

Table 3-3

Chemical-Specific ARARs/TBCs Principal Performance Criteria for STF — Physical, Biological, and Inorganic Parameters

PHYSICAL AND BIOLOGICAL

Parameter	STF Standard ($\mu g/\ell$)	Source
Minimum dissolved oxygen (mg/ℓ)	5 0	1
pH (s u)	6 5—9 0	1

INORGANIC

Parameter	STF Standard ($\mu g/\ell$)	Source
Chloride	250,000	1
Nitrate	10,000	1
Nitrite	300	1
Sulfate	250,000	1
Total dissolved solids (TDS)	400,000	2

Sources

1 = RFETS site-specific standard
2 = OU1 IM/IRA

Table 3-4

Chemical-Specific ARARs Principal Performance Criteria for STF — Radionuclides

Parameter	SWTF Standard (pCi/ℓ)	Source
Americium (241)	30	1
Plutonium (239/240)	30	1
Tritium	1,000	1
Uranium (233/234)	500	1
Uranium (238)	600	1

Sources

1 = Derived Concentration Guidelines per DOE Order 5400 5, Chapter III, based on 100 mrem radiation dose
2 = An analysis will be performed to assure mixture of the radionuclides does not exceed 100 mrem radiation dose

environment, and were selected through the evaluation of COCs, Maximum Contaminant Levels (MCLs), Maximum Contaminant Level Goals (MCLGs), Ambient Water Quality Criteria (AWQC) and Segments 4 and 5 standards of the Colorado Water Quality Control Commission The potential ARARs are representative of best available technologies with regard to detection of selected contaminants

3.2 ACTION-SPECIFIC REQUIREMENTS

Federal action-specific ARARs/TBCs for this response action include RCRA standards for generators of hazardous waste, for interim status container storage, and for storage and treatment of hazardous waste in tanks (42 U S C Section 6901 et seq , and 40 CFR Parts 262 and 265), and Atomic Energy Act (AEA) standards for protecting workers in the handling of radioactive material and standards for storage of radioactive material (42 U S C Section 2201 and 10 CFR Parts 820, 830, 835 and all applicable DOE Orders pursuant to the AEA)

State action-specific ARARs for the ARA include

1) Colorado Hazardous Waste Act (CHWA) standards for hazardous waste generators and for storage and treatment in tanks (CRS Section 25-15-101 to 25-15-313 and 6 CCR Section 1007-3 Parts 262 and 265) The CHWA regulations directly applicable to this ARA are identical to the federal RCRA standards,however, there are several CHWA standards that are more stringent These standards are for hazardous waste generators as well as for treatment, storage, and disposal (TSD) facilities Because the RFETS is both a hazardous waste generator and TSD facility permitted with the State of Colorado, DOE is aware of, and compliant with, these more stringent CHWA regulations

2) Colorado Air Pollution Prevention and Control Act standards for air emissions (CRS Section 25-7-101 to 25-7-609 and 5 CCR Section 1001)

3.3 WASTE ACCEPTANCE CRITERIA

Waste Acceptance Criteria (WAC) are chemical-specific influent concentration limits developed to ensure that the STF performance achieves the treatment objective of meeting discharge limitations (ARARs/TBCs) WAC have been calculated based on the removal efficiencies of the various unit processes in the STF (ORNL, 1995) WAC for each of the chemical parameters with established ARARs/TBCs (metals, water quality parameters, radionuclides, and volatile organics) are presented in Table 3-5

Table 3-5

STF Waste Acceptance Criteria

Metals

Chemical	Units	Performance Goals	WAC[a] RSS+IX	WAC[b] IX	OU-1	OU-2	Decon Water
Aluminum	µg/ℓ	87	See[a]	See[b]		**565.51**	**311.92**
Antimony	µg/ℓ	6	See[a]	See[b]			**29.76**
Arsenic	µg/ℓ	50	See[a]	See[b]	9 59		7 17
Barium	µg/ℓ	1000	See[a]	See[b]		186 75	880 64
Beryllium	µg/ℓ	4	See[a]	See[b]			
Cadmium	µg/ℓ	1 5	<20000	See[b]			**3.35**
Chromium	µg/ℓ	10	See[a]	See[b]			**30.59**
Copper	µg/ℓ	16	<20000	See[b]			**21.07**
Iron	µg/ℓ	300	<20000	5000	96 29	**390.52**	267 78
Lead	µg/ℓ	6 5	See[a]	See[b]		2 86	4 06
Lithium	µg/ℓ	2500	2500	2500			67 53
Manganese	µg/ℓ	50	See[a]	See[b]	14 38	**168.3**	**103.83**
Mercury	µg/ℓ	0 01	See[a]	See[b]		**0.2**	1 78
Molybdenum	µg/ℓ	100	See[a]	See[b]			50 33
Nickel	µg/ℓ	40	<20000	See[b]	**53.28**		20 34
Selenium	µg/ℓ	10	1000	1000	**635.6**		5 33
Silver	µg/ℓ	3 8	76	76			
Thallium	µg/ℓ	0 5	10	10			
Vanadium	µg/ℓ	100	See[a]	See[b]			35 02
Zinc	µg/ℓ	50	<20000	See[b]	**163.03**	**187.25**	**128.47**

Table 3-5 (continued)

STF Waste Acceptance Criteria

Water Quality Parameters

Chemical	Units	Performance Goals	WAC	OU-1	OU-2	Decon Water
Chloride	mg/ℓ	250	TOTAL ANIONS[c]	196 53	66 66	30 62
Nitrate	mg/ℓ	10	312 mg/ℓ as $CaCO_3$	**446.1**[d]		5 85
Nitrite	mg/ℓ	0 30				
Sulfate	mg/ℓ	250		244 85	34 29	62 16
Total Dissolved Solids	mg/ℓ	400	1060 mg/ℓ as $CaCO_3$	**1055.12**	**508.08**	**506.18**
pH	mg/ℓ	6 5-9 0		7 85		**6.98-11.1**

Table 3-5 (continued)

STF Waste Acceptance Criteria

Radionuclides

Chemical	Units	Performance Goals	WAC RRS	WAS No RRS	OU-1	OU-2	Decon Water
Americium-241	pCi/ℓ	30	0 5	0 05	0 01	0 01	
Gross Alpha	pCi/ℓ	7	730	730	12.33	6 39	26.66
Gross Beta	pCi/ℓ	5	545	5	8.23	7.1	26.53
Plutonium-239/240	pCi/ℓ	30	3 3	0 05	0 01	0 02	0 04
Tritium	pCi/ℓ	1,000	500	500	292 73		
Uranium[233,234,238]	pCi/ℓ	1,100	15[f]	12-1200[g]	12.98		

Table 3-5 (continued)

STF Waste Acceptance Criteria

Volatile Organic Compounds

Chemical	Units	Performance Goals	WAC[h] UV/H_2O_2+GAC	WAC[h] UV/H_2O_2	OU-1	OU-2	Decon Water
1,1,1-Trichloroethane	µg/ℓ	200	10000	10000	26 6	5 02	
1,1-Dichloroethane	µg/ℓ	5	20	20		1 18	0 8
1,1-Dichloroethene	µg/ℓ	1 00	10000	10000	**30.08**	**1.98**	
1,2-Dichloroethane	µg/ℓ	1 00	2	2		**1.06**	
Acetone	µg/ℓ	50	1000	1000	39 08		
Carbon Disulfide	µg/ℓ	5	2000	2000			
Carbon Tetrachloride[i]	µg/ℓ	1 00	580	1	**28.04**	**73.42**	**13.04**
Chloroform[i]	µg/ℓ	1	425	5		**14.72**	**3.65**
Methylene Chloride	µg/ℓ	4 7	420	420	**10.18**	0 82	0 81
Tetrachloroethene	µg/ℓ	0 8	10000	10000	**91.96**	**30.97**	**3.18**
Toluene	µg/ℓ	1000	10000	10000		0 58	0 72
Trichloroethene	µg/ℓ	2 7	10000	10000	**694**	**34.02**	15 81
Vinyl Chloride	µg/ℓ	2	10000	10000		**1.13**	

Table 3-5 (continued)

STF Waste Acceptance Criteria

[a] Total metals must be less than or equal to 20000 $\mu g/\ell$ Metals with limit shown as <20000 are treated by the RRS For all other metals, which are treated in the IX unit, the total concentration must be less than or equal to 10000 $\mu g/\ell$
[b] Total metals must be less than or equal to 10000 $\mu g/\ell$ Specific limits are indicated for certain metals, as discussed in the text
[c] Can be removed by processing in the RRS at a rate less than 30 gpm to avoid overloading filter press
[d] Can meet performance goal if regeneration frequency is increased
[e] Total anions include chloride, nitrate, nitrite, and sulfate and reported as CaCO,
[f] This value of 15 pCi/ℓ assumes removal by the RRS only
[g] Removal of uranium is accomplished by changing out ion exchange column number 1 according to uranium changeout schedule
[h] Total VOCs must be less than or equal to 10000 $\mu g/\ell$
[i] By increasing the residence time in the UV/peroxide unit, higher destruction efficiencies of the refractory VOCs can be attained

NOTES

1 Bold values indicate that the input exceeds its respective performance goal ("discharge standard")
2 Shaded values indicate contaminants that exceed WAC
3 Empty cells represent a non detection of analyte
4 The source and sub-sources are referenced by RFEDS recognition codes
5 DECON WATER consists of groundwater purge tank numbers and the decontamination pad water
6 OU-1 water consists of 891 COLGAL and 891 COLWEL
7 OU-2 water consists of SW059

4.0 PROPOSED ACTIONS AND ESTIMATED COSTS

4.1 PROPOSED ACTIONS

4.1.1 Proposed Action Description

The proposed ARA will consist of relocating existing OU2 treatment units (Trailers 900A and 900B) and influent tankage (existing Tank T-200) to a location south of Building 891 at OU1 The purpose of this relocation is to supplement existing Building 891 treatment capability with process units for metals and radionuclides removal Consolidating these treatment units at one physical location will provide the treatment capability necessary to address most all potential contaminants from OUs 1, 2, decontamination pad water, monitoring well purge water, and incidental waters from environmental remediation activities

Three new tanks will be procured and installed Each tank will be provided with level detection, freeze protection, and insulation Tank TK-20 will be a 1,325-gallon cross-linked polyethylene tank which will function as a bulk acid storage tank Two 200-gallon cross-linked polyethylene tanks, TK-21 and TK-22, will be utilized as sulfuric acid and sodium hydroxide mixing tanks, respectively New ancillary equipment and electrical service will be installed to support the new treatment installations This equipment will include metering pumps, mixers in Tanks TK-21 and TK-22, and double-walled piping for sulfuric acid, hydrogen peroxide, and sodium hydroxide feed lines New double-walled piping will be installed for process water All new piping will be installed with leak detection capability

Additional site improvements at Building 891 will be necessary to accommodate the new and relocated OU2 equipment. A new concrete containment berm with sump will be constructed, as will containment access ramps and a concrete pad for the foundation for Tank T-200 Building 893 will be constructed adjacent to Building 891 and will house a pre-filtration system and GAC vessels

Figures 4-1 and 4-2 present the process flow diagram and operational decision tree for the STF, respectively Influent to the facility will be stored in Tanks T-200 and T-201 If performance standards for radionuclides and metals are exceeded, flow will be routed to the rad removal system (chemical precipitation/microfiltration) and stored in Tank T-202 for subsequent organics destruction If performance standards for radionuclides and metals are not exceeded, flow will either be prefiltered (if suspended solids, iron or slime are present), or routed directly to ultraviolet/peroxide treatment (UV/peroxide) for organics destruction UV/peroxide effluent will be stored in Tank D-3000 if further VOC treatment seems appropriate If further VOC

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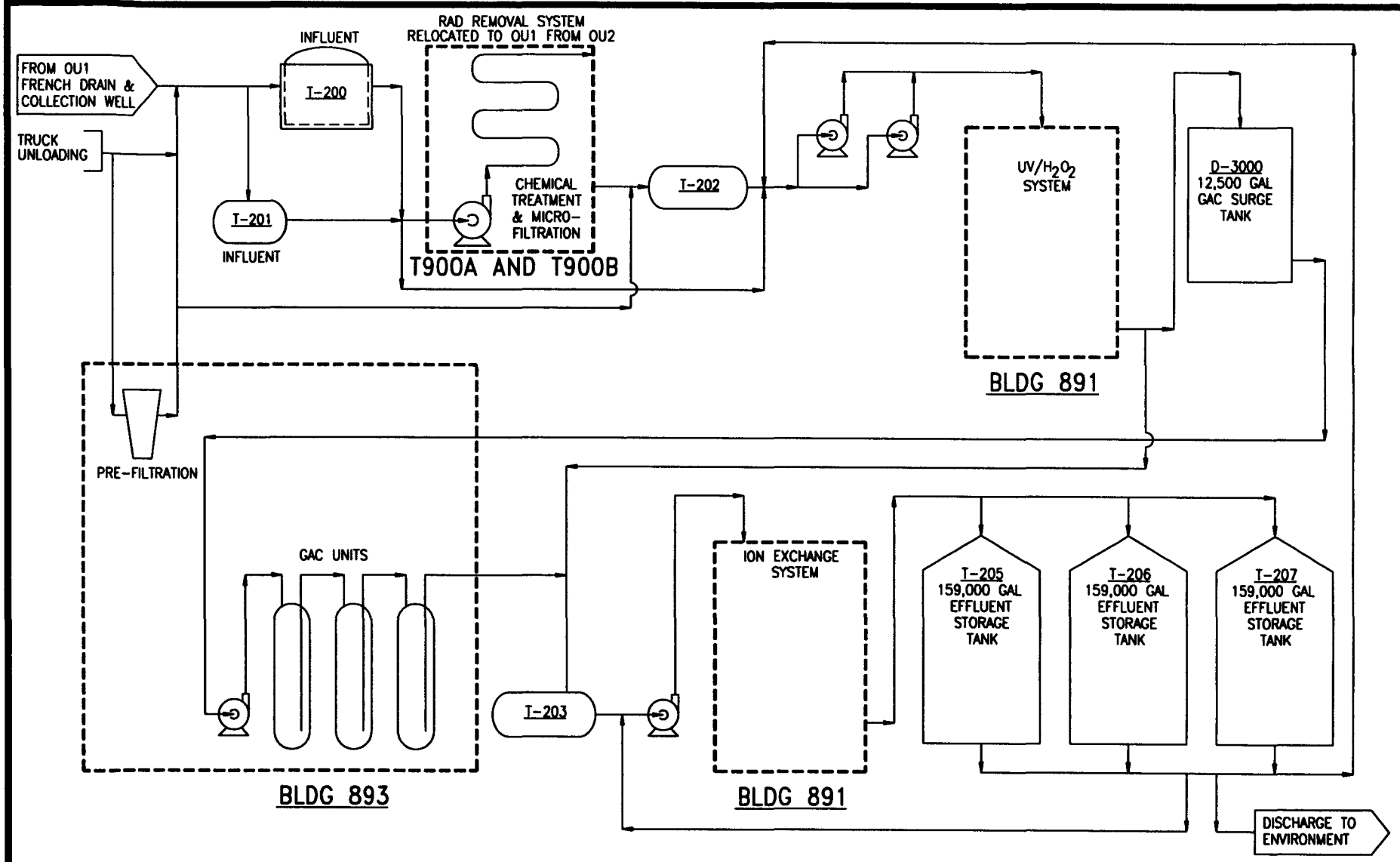

Adapted from Sitewide Treatment Facility, Process Flow Diagram, Drawing Number 51288-0002 A.

U.S. DEPARTMENT OF ENERGY Rocky Flats Environmental Technology Site Golden, Colorado	PROCESS FLOW DIAGRAM SITEWIDE TREATMENT FACILITY	FIGURE 4-1

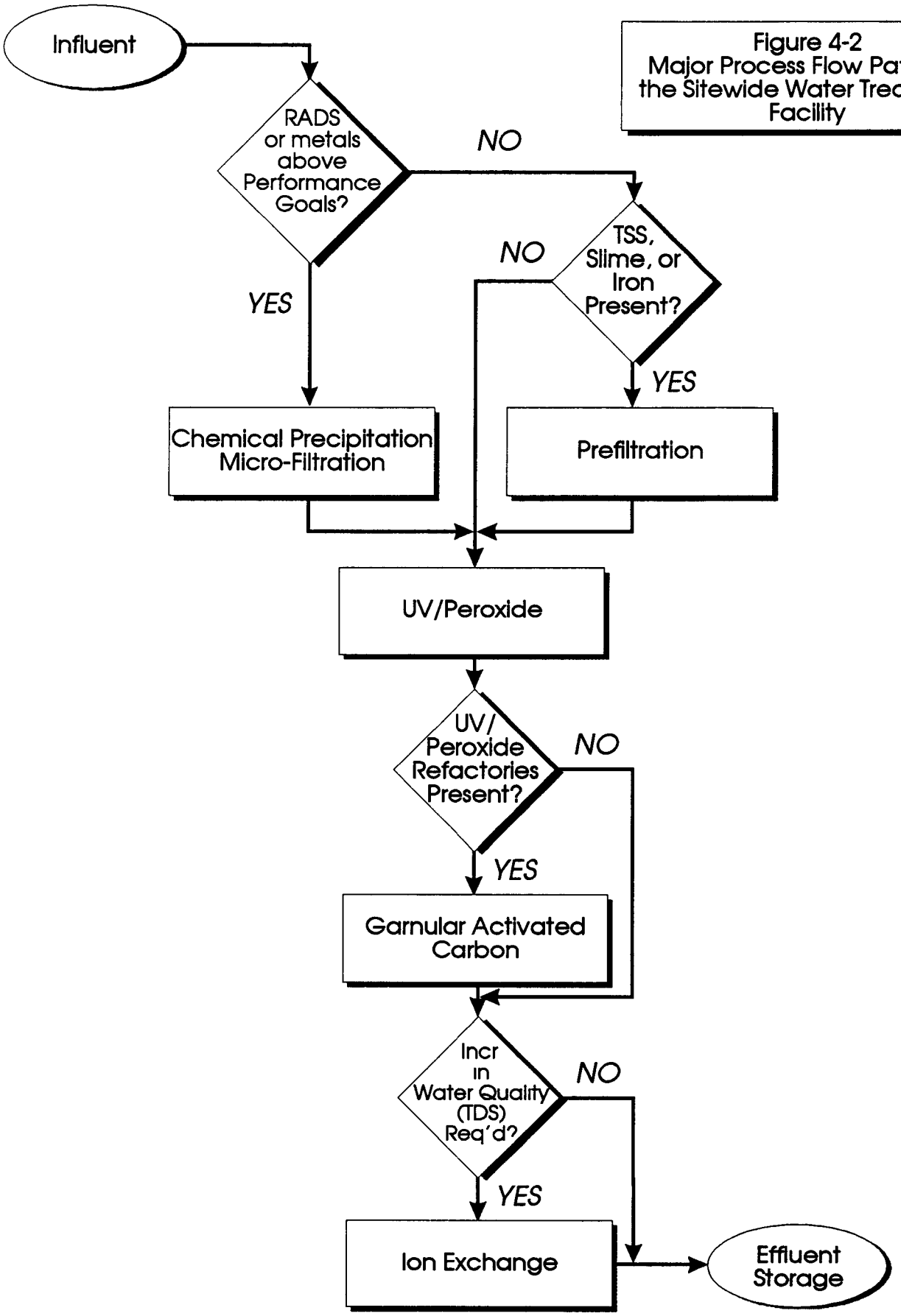

Figure 4-2
Major Process Flow Paths for the Sitewide Water Treatment Facility

treatment is necessary, water from Tank D-3000 will be routed to GAC treatment in Building 893 Ion exchange will be used to treat excess TDS, uranium, anions, and remaining metals as necessary Treated effluent will be stored in three 159,000-gallon storage tanks and tested for compliance with performance standards before being discharged at the existing OU1 discharge point

These actions will be conducted in accordance with a site-specific Health and Safety Plan (HSP) and Sampling and Analysis Plan (SAP) by trained RFETS staff The HSP addresses the physical and chemical hazards associated with the work and the SAP includes the details of the field and laboratory analyses that will be employed to address process and compliance monitoring The facility is designed to meet RCRA standards and could be converted to a permitted treatment facility if necessary

4.1.2 Contribution to Remedial Performance

The proposed ARA will achieve a high degree of performance, reliability, implementability, and safety In terms of performance, it will employ Best Demonstrated Available Technology (BDAT) in a centralized facility and will be capable of treating most all of the potential contaminants from sources previously described in Section 2 3 The facility will minimize waste relative to multiple treatment facilities Substantial monitoring data collected during OU1 and OU2 IM/IRA operations demonstrates the effectiveness of individual treatment processes in achieving ARARs It is noted that redundant organic treatment capacity is provided by UV/peroxide and GAC in the planned process flow This "2-stage" organic treatment provides a high level of performance and reliability in reducing organic compound concentrations to levels below ARARs

This action reduces the potential risk to on-site workers associated with remote contaminated water handling and treatment Although the long-term cleanup plans for OUs 1 and 2 have not been formulated, the objectives of permanently reducing health risks and each OU should be consistent with future long-term cleanup plans It is noted that this action is not intended to be a final action for the specific OUs Any remaining contamination will be addressed in the OU Corrective Measures Studies/Feasibility Studies This response action will be performed in less than 6 months

4.1.3 Project Schedule

Figure 4-3 presents the schedule of the major tasks and milestones for the STF project System design commenced in January 1995 and was completed in early February 1995 Development

ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH	DURATION (days)
DESIGN PROCESS			
Begin Design	1/12/95	2/13/95	23
Design Complete	---	3/3/95	0
ACCEPTANCE CRITERIA			
Develop Draft Acceptance Criteria	1/11/95	5/24/95	95
Final Acceptance Criteria	5/25/95	7/31/95	48
PROCESS EQUIPMENT BID PROCESS			
Advertise Bid	3/15/95	3/27/95	9
Receive Bids	4/10/95	4/10/95	1
Evaluate Bids	4/11/95	4/28/95	14
Award Construction Subcontract	---	5/12/95	0
PROPOSED ACTION MEMORANDUM			
Draft PAM to DOE	5/10/95	5/10/95	1
DOE First Review	5/11/95	5/19/95	7
EG&G Incorporates Comments	5/19/95	6/5/95	12
DOE Submit to State - Prep for Public	6/5/95	6/12/95	6
Public Comment	6/12/95	7/24/95	31
Correct Comments, Submit to State	7/25/95	8/14/95	15
PAM Complete	---	8/14/95	0
INSTALLATION OF PROCESS EQUIPMENT			
Construction	5/12/95	7/21/95	51
Sitewide Treatment Facility Operational	---	8/16/95	0

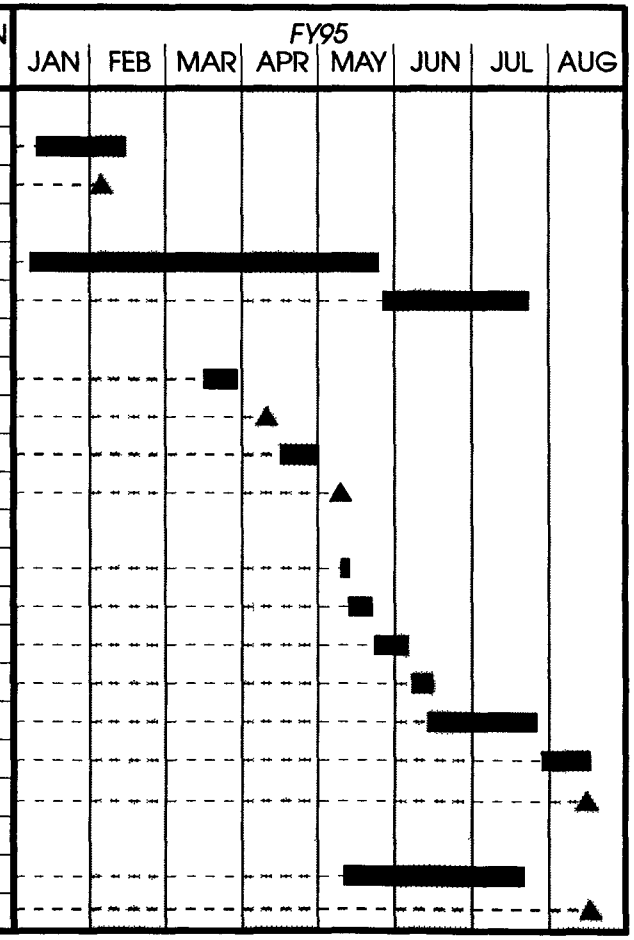

Figure 4-3 Schedule for Design/Construction of the Sitewide Treatment Facility

■ Activity
▲ Milestone Activity

of WAC and system performance standards also commenced in January 1995 These activities are ongoing as of June 1995 The bid process commenced in March 1995 and was completed on 12 May 1995 with the award of the construction subcontract This PAM is scheduled to be finalized including public comment by 14 August 1995 The finalization of the PAM is scheduled to run concurrently with the STF construction With the concurrence of Region VIII EPA and the CDPHE, the STF is scheduled to be operational on 16 August 1995

4.1.4 National Environmental Policy Act Considerations

The NEPA requires that actions at RFETS be evaluated for potential impacts to the environment Impacts to the natural environment resulting from this action will be minimal and are not expected to result in any adverse impacts to wetlands, floodplains, threatened or endangered species or their habitats, and historic or cultural resources. There will be minor releases of air pollutants from heavy equipment during excavations and a very minor increase in particulates (dust) associated with the operation of trucks loading and unloading The potential exists for chemical exposure to the worker and the environment during excavation, sampling, transportation, and decontamination activities, however, worker exposure will be mitigated with the use of appropriate protective equipment and relevant procedures

The two alternatives to the proposed action are 1) maintaining the current operations at OUs 1 and 2, and 2) constructing the STF using entirely new equipment

The current operations involve separate source collection and treatment systems for OUs 1 and 2 OU1 water would continue to consist of the combined flow of the existing french drain and collection well (refer to Figure 2-2) plus miscellaneous decontamination, purge and incidental waters from plant-wide remediation activities These waters would continue to be treated by the existing OU1 treatment system OU2 water would continue to consist of surface water collected from SW-59, which would be treated using the existing OU2 treatment system NEPA documentation that exists for the respective facilities indicates that no adverse environmental impacts are expected However, there would be greater occupational exposure to hazardous materials in the operation of two separate treatment facilities than one centralized facility (the proposed STF)

With regard to the construction of an STF using entirely new equipment, additional environmental impacts would be expected relative to the proposed STF These include impacts resulting from transportation of new equipment to the site (accidents and air emissions) as well as miscellaneous near-term impacts resulting from decontamination and decommissioning of the existing facilities

4.2 COST

The total estimated capital cost for the STF is $1,331,200 The cost estimate considers the cost of project management, planning (including the development of WAC and the preparation of the PAM), design, and construction The estimate does not include STF operation and maintenance costs, nor costs for sampling and analysis or treatment or disposal of residual wastes generated by the STF

5.0 REFERENCES

DOE (U S Department of Energy) 1992 Final Background Geochemical Characterization Plan Department of Energy, Rocky Flats Plant, Golden, Colorado, September 1992

DOE (U S Department of Energy) 1994a Final Phase III RFI/RI Report 881 Hillside Area (Operable Unit No 1) Department of Energy, Rocky Flats Plant, Golden, Colorado, June 1994

DOE (U S Department of Energy) 1994b Final Summary and Analysis of Results, Field Treatability Study, Phase II South Walnut Creek Basin Surface Water Interim Measure/Interim Remedial Action Operable Unit No 2 Department of Energy, Rocky Flats Plant, Golden, Colorado, March 1994

DOE (U S Department of Energy) 1994c Final Proposed Action Memorandum, Hot Spot Removal, Revision 1, Rocky Flats Environmental Technology Site (Operable Unit No 1) Department of Energy, Rocky Flats Environmental Technology Site, Golden, Colorado, September 1994

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DOE (U S Department of Energy) 1995b Rocky Flats Plant Sitewide Treatment Facility, Engineering and Technology, Golden, Colorado, Drawings

ORNL (Oak Ridge National Laboratory) 1995 Waste Acceptance Criteria for the Consolidated Sitewide Water Treatment Facility at the Rocky Flats Environmental Technology Site DOE Contract No DE-AC05-840R21400 Draft Report