

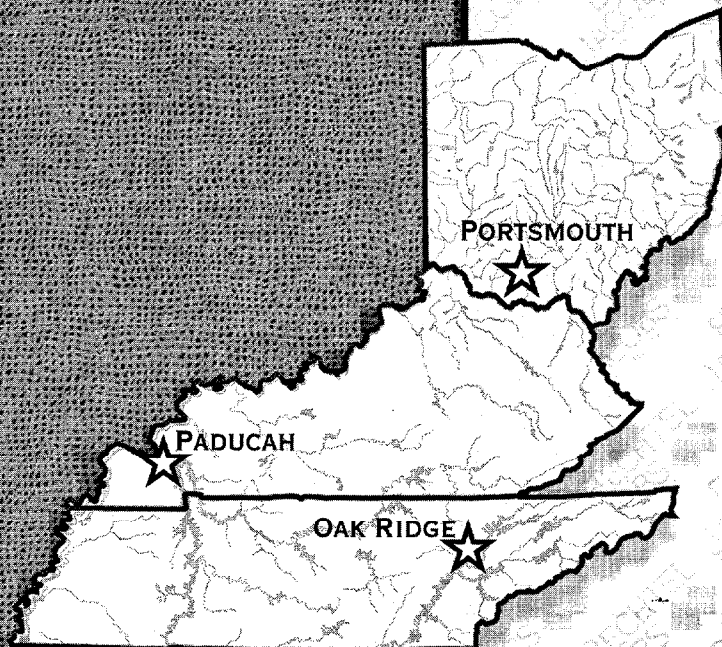


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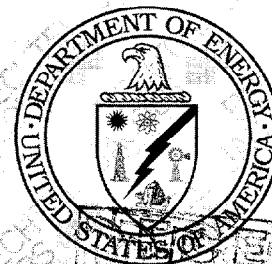
ENVIRONMENTAL MANAGEMENT
& ENRICHMENT FACILITIES
MANAGEMENT AND INTEGRATION CONTRACT

**The East Tennessee Technology
Park Progress Report for the
Tennessee Hazardous Waste
Reduction Act for
Calendar Year 1999**

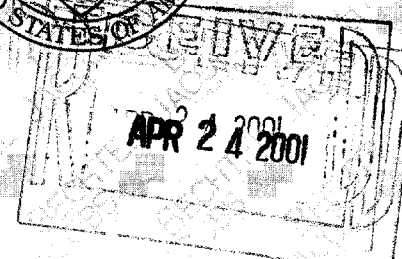


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BECHTEL JACOBS COMPANY LLC
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

DPRA, Inc. and IT Corporation

contributed to the preparation of this document and should not be considered an eligible contractor for its review.

**The East Tennessee Technology Park
Progress Report for the
Tennessee Hazardous Waste Reduction Act for
Calendar Year 1999**

Date Issued – March 2000

Prepared by
DPRA, Inc. and IT Corporation
Oak Ridge, Tennessee 37830
Under Subcontract 23900-SC-TO016-F

Prepared for the
U.S. Department of Energy
Office of Environmental Management

BECHTEL JACOBS COMPANY LLC
managing the
Environmental Management Activities at the
East Tennessee Technology Park
Oak Ridge Y-12 Plant Oak Ridge National Laboratory
Paducah Gaseous Diffusion Plant Portsmouth Gaseous Diffusion Plant
Under Contract DE-AC05-98OR22700
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ACRONYMS

ASO	Analytical Services Organization
CNF	Central Neutralization Facility
CY	calendar year
D&D	decontamination and decommissioning
DOE	U. S. Department of Energy
EMEF	Environmental Management and Enrichment Facilities
ETTP	East Tennessee Technology Park
FY	Fiscal Year
GR	goal year ratio
GSAF	Generator Set-Aside Fee
HQ	Headquarters
M&I	Management & Integration
MLLW	Mixed Low-Level Waste
NMRP	National Metals Recycling Program
NRMMA	Nonradioactive Materials Management Area
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORR	Oak Ridge Reservation
P2	pollution prevention
PCBs	polychlorinated biphenyls
PPOA	pollution prevention opportunity assessment
PWMP	Pond Waste Management Project
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
SPU	standard production unit
THWRA	Tennessee Hazardous Waste Reduction Act
TSCAI	Toxic Substances Control Act Incinerator
TVS	Transportable Vitrification System
WITS	Waste Information Tracking System
YR	year's actual ratio

EXECUTIVE SUMMARY

This report is prepared for the East Tennessee Technology Park (formerly the Oak Ridge K-25 Site) (ETTP) in compliance with the *Tennessee Hazardous Waste Reduction Act of 1990* (THWRA) (TDEC 1990), *Tennessee Code Annotated 68-212-306*. Annually, THWRA requires a review of the site waste reduction plan, completion of summary waste reduction information as part of the site's annual hazardous waste reporting, and completion of an annual progress report analyzing and quantifying progress toward THWRA-required waste stream-specific reduction goals. This THWRA-required progress report provides information about ETTP's hazardous waste streams regulated under THWRA and waste reduction progress made in calendar year (CY) 1999. This progress report also documents the annual review of the site plan, *Oak Ridge Operations Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention Program Plan*, BJC/OR-306 (Bechtel Jacobs Company 1999a).

In 1996, ETTP established new goal year ratios that extended the goal year to CY 1999 and targeted 50 percent waste stream-specific reduction goals. In CY 1999, these CY 1999 goals were extended to CY 2000 for all waste streams that generated waste in 1999. Of the 70 ETTP RCRA waste streams tracked in this report from base years as early as CY 1991, 51 waste streams met or exceeded their reduction goal based on the CY 1999 data.

1. INTRODUCTION

The East Tennessee Technology Park (ETTP) has been used for many purposes during the past several decades. ETTP was formerly known as the Oak Ridge Gaseous Diffusion Plant and then as the Oak Ridge K-25 Site. On-site operations began in 1945 as part of the World War II Manhattan Project. The original mission was to separate U²³⁵ for use in atomic weapons. In December 1987, DOE shut down gaseous diffusion operations, and the DOE facilities currently are being decontaminated and decommissioned so they can be privatized/reindustrialized or demolished. The Community Reuse Organization of East Tennessee (CROET) is working to transform the ETTP into an industrial park operated in partnership with the private sector. Consequently, the numbers, types, and generation rates of ETTP waste streams have varied greatly during the past decade.

This report has been prepared in compliance with the *Tennessee Hazardous Waste Reduction Act of 1990* (THWRA) (TDEC 1990), Tennessee Code Annotated 68-212-306. The scope of THWRA is summarized in Appendix A. A more detailed description of THWRA is included ETTP's THWRA-required site plan, which is addressed in the *Oak Ridge Operations Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention Program Plan, BJC/OR-306 (EMEF P2 Program Plan)* (Bechtel Jacobs Company 1999a).

ETTP, which is a large quantity generator, is the only generator managed by ETTP personnel; therefore, no small quantity generators or conditionally exempt small quantity generators are currently managed by ETTP. If this situation changes in the future, the appropriate THWRA requirements for small quantity generators would be met, and any conditionally exempt small quantity generators would simply be mentioned in this ETTP progress report.

2. ETTP PROGRAM PLAN REVISION AND PROGRESS TOWARD GOALS

2.1 SITE PROGRAM PLAN

ETTP's site plan, EMEF P2 Program Plan, was modified and updated in May 1999. Limited portions of this plan recently have been updated. The revised portions of this plan are appended to this progress report in Appendix B.

2.2 ETTP THWRA-REQUIRED GOALS

Based on the prioritization and characterization of ETTP waste streams, specific baseline data and goals for each individual THWRA-regulated waste stream were established using 1991 as a baseline year. Goals have also been established for waste streams that had zero generation in 1991 but have since generated waste. All of these goals are listed in Tables 1 and 2. Total THWRA-regulated hazardous and mixed waste generation data were also examined. In 1991, ETTP activities generated 54,822,534 kilograms (kg) of hazardous and mixed waste that were deemed regulated under THWRA. A comparison of the generation in 1999 of 80,729,363 kg to the 1991 generation rate results in a 47 percent increase in total hazardous waste generated. Comparing the 1998 amount generated (44,807,583 kg) to the THWRA-regulated generation

Table 1. East Tennessee Technology Park (ETTP) hazardous waste baseline generation rates, 1999 generation rates, SPUs, and ratios

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Reporting Year (1999) Generation (kg)	Reporting Year (1999) Ratio	Reporting Year (1999) SPU	Range Factor
12	K-1501 Hydrogen Softener Blowdown	1991	8,420,000	125.4415	6.71E+06	2,901,531	84.2	3.44E+06	1.E+02
18	Sodium Hydroxide Solution	1991	0	10.4	6.71xE+06	0	N/A	N/A	1.E+06
35	Flammable Liquids (Lab Packs)	1991	428	63.76363	6.71E+06	458	133.0	3.44E+06	1.E+06
36	Corrosive Liquids (Lab Packs)	1991	166	24.73075	6.71E+06	68	19.7	3.44E+06	1.E+06
37	Corrosive Solids (Lab Packs)	1991	161	23.98585	6.71E+06	0	0	N/A	1.E+06
38	Poisonous Liquids (Lab Packs)	1991	5	74.49022	6.71E+06	0	0	N/A	1.E+08
39	Poisonous Solids (Lab Packs)	1991	4	59.59218	6.71E+06	1	29	3.44E+06	1.E+08
40	Oxidizing Liquids (Lab Packs)	1991	19	28.3	6.71E+06	0	0	N/A	1.E+07
41	Haz. Waste Liquid (Lab Packs)	1991	53	78.95964	6.71E+06	0	0	N/A	1.E+07
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	1991	377,760	56.27885	6.71E+06	442	0.1	3.44E+06	1.E+03
44	Paint Waste	1991	14,253	21.23418	6.71E+06	227	0.6	3.44E+06	1.E+04
60	Hazardous Waste Liquid	1991	47,168	70.2711	6.71E+06	159,179	460.5	3.44E+06	1.E+04
64	CNF Centrifuged Sludge	1992	112,355	27.6	4.07E+07	71	0.2	3.44E+06	1.E+04
70	Laboratory Acids (BMP)	1991	39,083	58.22603	6.71E+06	103	0.3	3.44E+06	1.E+04
71	Laboratory Bases (BMP)	1991	6,896	102.7369	6.71E+06	0	0	N/A	1.E+05
72	Laboratory Organics (BMP)	1991	12,256	18.25904	6.71E+06	0	0	N/A	1.E+04
73	Laboratory Sludges (BMP)	1991	598	89.09031	6.71E+06	0	0	N/A	1.E+06
74	Silver Recovery	1991	7,628	113.6423	6.71E+06	0	0	N/A	1.E+05
75	Organic Peroxides	1991	1	125.1436	7.99E+06	0	0	N/A	1.E+09
77	Hydrogen Peroxide	1991	--	25.1777	6.71xE+06	295	N/A	N/A	1.E+06
82	Mercury/Mercury Products	1991	627	93.41074	6.71E+06	0	0	N/A	1.E+06
84	Rags Contaminated With Solvents	1991	3,739	55.70379	6.71E+06	0	0	N/A	1.E+05
85	TSCA Incinerator Ash	1992	3,488	148.5	2.35E+06	63,940	161.9	3.95E+07	1.E+05
93	Lead and Lead Products	1991	27,813	41.43593	6.71E+06	0	0	N/A	1.E+04
122	Hazardous Waste Solid (Bulk)	1991	26,651	39.70478	6.71E+06	310,584	717.9	3.44E+06	1.E+04
123	Water Reactives (Solids)	1991	1	14.89804	6.71E+06	0	0	N/A	1.E+08
125	Cylinders	1991	61	90.87807	6.71E+06	958	2782.7	3.44E+06	1.E+07
126	Waste Sludge From Closure of B/C Pond	1991	0	0	--	0	0	N/A	1.E+00
128	Flammable Solids (Lab Pack)	1991	20	29.79609	6.71E+06	0	0	N/A	1.E+07
129	Flammable Solids	1991	53	78.95964	6.71E+06	0	0	N/A	1.E+07
130	Flammable Corrosive Liquids (Lab Pack)	1991	3	44.69413	6.71E+06	0	0	N/A	1.E+08
131	Oxidizing Solids (Lab Pack)	1991	11	16.38785	6.71E+06	4	11.6	3.44E+06	1.E+07
133	TSCA and IWS Sludge	1992	94,474	402.1	2.35E+06	23,920	6.1	3.95E+07	1.E+04
137	Waste ORM-A (Lab Pack)	1991	33	49.16355	6.71E+06	0	0	N/A	1.E+07
138	Flammable Liquids (Bulk)	1991	10,486	15.62209	6.71E+06	462	1.3	3.44E+06	1.E+04
139	Combustible Liquids (Bulk)	1991	3,513	52.33683	6.71E+06	0	0	N/A	1.E+05
140	Hazardous Waste Solid (Lab Pack)	1991	108	16.08989	6.71E+06	1	0.3	3.44E+06	1.E+06
141	Waste ORM-A (Bulk)	1991	8,966	13.35759	6.71E+06	0	0	N/A	1.E+04
142	Corrosive Liquids (Bulk)	1991	7,944	118.3501	6.71E+06	10,278	298.5	3.44E+06	1.E+05

Table 1 (continued)

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Reporting Year (1999) Generation (kg)	Reporting Year (1999) Ratio	Reporting Year (1999) SPU	Range Factor
145	Oily Rags & Solids	1991	17,075	25.43841	6.71E+06	0	0	N/A	1.E+04
146	Laboratory Trash	1991	8,839	131.6838	6.71E+06	0	0	N/A	1.E+05
148	K-1453 TSCA Incinerator Wastewaters	1992	64,963,223	27.7	2.35E+06	57,915,297	1.5	3.95E+07	1.E+00
149	Aerosol cans	1991	1,033	15.38968	6.71E+06	30	0.8	3.44E+06	1.E+05
151	Oxidizing Corrosive Liquids {bulk}	1991	1,422	21.18502	6.71E+06	0	0	N/A	1.E+05
153	Oxidizing Solids {bulk}	1991	45	67.0412	6.71E+06	0	0	N/A	1.E+07
155	TSCA Trash	1992	12,042	51.3	2.35E+06	7,813	2	3.95E+07	1.E+04
156	TSCA Secondary Wastes	1992	46,922	1997.3	2.35E+06	0	0	N/A	1.E+05
157	Respirator Cartridges	1991	3,650	54.37786	6.71E+06	119	3.4	3.44E+06	1.E+05
158	Batteries	1991	492	73.30	6.71E+05	11	0.3	3.44E+06	1.E+05
159	TSCA Solids	1992	93,708	398.9	2.35E+06	93,075	23.6	3.95E+07	1.E+04
160	Combustible Liquid (Lab Pack)	1991	2,435	36.27674	6.71E+06	0	0	N/A	1.E+05
161	Corrosive solids (Bulk)	1991	12,672	18.8788	6.71E+06	0	0	N/A	1.E+04
163	Solvents	1992	2,980	38.40494	7.76E+06	377	7.3	3.44E+06	1.E+05
164	Fluorescent Bulbs	1992	18,819	24.2531	7.76E+06	52	0.1	3.44E+06	1.E+04
165	Incandescent Bulbs	1992	2,539	32.72152	7.76E+06	0	0	N/A	1.E+05
166	Decant Water PWMP	1992	121	15.59395	7.76E+06	28,481	8272.9	3.44E+06	1.E+06
167	Decant Solids PWMP	1992	67	8.634667	7.76E+06	22,475	6528.4	3.44E+06	1.E+06
168	Secondary/Tertiary Waste PWMP	1992	1,096	14.12477	7.76E+06	0	0	N/A	1.E+05
169	Sodium & Mercury Vapor Bulbs	1993	43	51.2	8.40E+06	0	0	N/A	1.E+07
170	Lab Solids (other than sludges)	1993	115	136.887	8.40E+06	0	0	N/A	1.E+07
171	TSCA Rinse Residues	1993	69,083	152.2184	4.54E+06	229	0.6	3.44E+06	1.E+04
172	Sodium Vapor-Filled Bulbs	1993	5	59.51607	8.40E+06	0	0	N/A	1.E+08
174	SW-31 Seep Water	1994	6,386,543	77.3	8.26E+06	7,151,520	207.7	3.44E+06	1.E+02
175	Poison B (Bulk)	1994	816	98.8	8.26E+06	0	0	N/A	1.E+06
176	Treatability Study Returns	1994	50	60.5	8.26E+06	0	0	N/A	1.E+07
177	PWM Hazardous Waste Liquids	1994	7	84.8	8.25E+06	0	0	N/A	1.E+08
178	Fire Water Sludge	N/A	N/A	N/A	N/A	0	0	N/A	N/A
179	K-1232 Sludges	N/A	N/A	N/A	N/A	0	0	N/A	N/A
181	Vitrified Waste	N/A	N/A	N/A	N/A	0	0	N/A	N/A
182	Mitchell Branch Seep	N/A	N/A	N/A	N/A	12,037,362	349.6	3.44E+06	1.E+02

BMP - best management practice
 CNF - Central Neutralization Facility
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 SPU - Standard Production Unit
 TSCA - Toxic Substances Control Act

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETTP in the future.

The waste stream number listed in this table is the number listed on the Hazardous Waste Stream and Annual Report waste stream pages submitted by ETTP to the Tennessee Department of Environment and Conservation.

Table 2. East Tennessee Technology Park (ETTP) hazardous waste reduction goals, goal years, goal-year ratios, and impediments

Waste Stream Number	Waste Stream Description	Percent Reduction Using Base Year Data (%)	Goal Year	Goal Year Ratio	Waste Reduction Activities
12	K-1501 Hydrogen Softener Blowdown	50	2000	62.7	c, e, f
18	Sodium Hydroxide Solution	N/A	N/A	N/A	N/A
35	Flammable Liquids (Lab Packs)	50	2000	31.9	f, h (Swap Shop Available)
36	Corrosive Liquids (Lab Packs)	50	2000	12.4	f, h (Swap Shop Available)
37	Corrosive Solids (Lab Packs)	50	1999	12.0	N/A
38	Poisonous Liquids (Lab Packs)	50	1999	37.2	N/A
39	Poisonous Solids (Lab Packs)	50	2000	29.8	f, h (Swap Shop Available)
40	Oxidizing Liquids (Lab Packs)	50	1999	14.2	N/A
41	Haz. Waste Liquid (Lab Packs)	50	1999	39.5	N/A
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	50	2000	28.1	c, f, h (Off-Site Recycling)
44	Paint Waste	50	2000	10.6	c, d, e
60	Hazardous Waste Liquid	50	2000	35.1	b, c, f
64	CNF Centrifuged Sludge	50	2000	13.8	d, e, f
70	Laboratory Acids (BMP)	50	2000	29.1	e, f
71	Laboratory Bases (BMP)	50	1999	51.4	N/A
72	Laboratory Organics (BMP)	50	1999	9.1	N/A
73	Laboratory Sludges (BMP)	50	1999	44.5	N/A
74	Silver Recovery	50	1999	56.8	N/A
75	Organic Peroxides	50	1999	62.6	N/A
77	Hydrogen Peroxide	50	1999	12.6	N/A
82	Mercury/Mercury Products	50	1999	46.7	N/A
84	Rags Contaminated With Solvents	50	1999	27.9	N/A
85	TSCA Incinerator Ash	50	2000	74.3	f
93	Lead and Lead Products	50	1999	20.7	N/A
122	Hazardous Waste Solid (Bulk)	50	2000	19.9	c, f, h (Swap Shop Available)
123	Water Reactives (Solids)	50	1999	7.4	N/A
125	Cylinders	50	2000	45.4	f, h (Salvaging)
126	Waste Sludge From Closure of B/C Pond	50	1999	0.0	N/A
128	Flammable Solids (Lab Pack)	50	1999	14.9	N/A
129	Flammable Solids	50	1999	39.5	N/A
130	Flammable Corrosive Liquids (Lab Pack)	50	1999	22.3	N/A
131	Oxidizing Solids (Lab Pack)	50	2000	8.2	f, h (Swap Shop Available)
133	TSCA and IWS Sludge	50	2000	0.0	f
137	Waste ORM-A (Lab Pack)	50	1999	24.6	N/A
138	Flammable Liquids (Bulk)	50	2000	7.8	f, h (Swap Shop Available)
139	Combustible Liquids (Bulk)	50	1999	26.2	N/A
140	Hazardous Waste Solid (Lab Pack)	50	2000	8.0	f, h (Swap Shop Available)
141	Waste ORM-A (Bulk)	50	1999	6.7	N/A
142	Corrosive Liquids (Bulk)	50	2000	59.2	f, h (Swap Shop Available)
145	Oily Rags & Solids	50	1999	12.7	N/A
146	Laboratory Trash	50	1999	65.8	N/A
148	K-1453 TSCA Incinerator Wastewaters	50	2000	13.9	c, e, f
149	Aerosol cans	50	2000	7.7	c, d, f
151	Oxidizing Corrosive Liquids {bulk}	50	1999	10.6	N/A
153	Oxidizing Solids {bulk}	50	1999	33.5	N/A
155	TSCA Trash	50	2000	13.9	e, f

Table 2 (continued)

Waste Stream Number	Waste Stream Description	Percent Reduction Using Base Year Data (%)	Goal Year	Goal Year Ratio	Waste Reduction Activities
156	TSCA Secondary Wastes	50	1999	14.0	N/A
157	Respirator Cartridges	50	2000	27.2	f
158	Batteries	50	2000	36.6	b, h (Off-Site Recycling)
159	TSCA Solids	50	2000	199.5	b, e, f
160	Combustible Liquid (Lab Pack)	50	2000	18.1	N/A
161	Corrosive solids (Bulk)	50	1999	9.4	N/A
163	Solvents	50	2000	19.2	c, d, e, f
164	Fluorescent Bulbs	50	2000	12.1	e, f, h (Off-Site Recycling)
165	Incandescent Bulbs	50	1999	16.4	N/A
166	Decant Water PWMP	50	2000	7.8	f
167	Decant Solids PWMP	50	2000	4.3	f
168	Secondary/Tertiary Waste PWMP	50	1999	7.1	N/A
169	Sodium & Mercury Vapor Bulbs	50	1999	170.2	N/A
170	Lab Solids (other than sludges)	50	1999	83.0	N/A
171	TSCA Rinse Residues	50	2000	76.1	f
172	Sodium Vapor-Filled Bulbs	50	1999	1,077.7	N/A
174	SW-31 Seep Water	50	2000	38.7	g
175	Poison B (Bulk)	50	1999	49.4	N/A
176	Treatability Study Returns	50	1999	30.3	N/A
177	PWM Hazardous Waste Liquids	50	1999	42.4	N/A
178	Fire Water Sludge	N/A	N/A	0.0	N/A
179	K-1232 Sludges	N/A	N/A	0.0	N/A
181	Vitrified Waste	N/A	N/A	N/A	N/A
182	Mitchell Branch Seep	N/A	2002	N/A	g

BMP - best management practice
 CNF - Central Neutralization Facility
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 LP - lab pack
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 SPU - Standard Production Unit
 TSCA - Toxic Substances Control Act

The letters designating waste reduction activities are as follows:

a = a. Reformulation/redesign of product
 b = b. In process recycling
 c = c. Equipment/technology modification
 d = d. Substituting raw materials
 e = e. Improving operations
 f = f. Reduction research/planning
 g = g. No effort
 h = h. Other

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETTP in the future.

The waste stream number listed in this table is the number listed on the Hazardous Waste Stream and Annual Report waste stream pages submitted by ETTP to the Tennessee Department of Environment and Conservation.

value in 1999 (54,822,534 kg) results in an 80 percent increase. This year was the eighth year that ETPP could compare waste stream-specific progress. This comparison was performed and summarized in Table 3. This year, no waste streams were generated for the first time since THWRA became effective.

The data reported in this progress report for each hazardous and mixed waste stream include the following:

- Waste stream number
- Waste stream description
- Base year and base year generation rate in kg
- Base year ratio
- Percent reduction established based on ETPP's prioritization, potential reduction opportunities, and past reduction activities
- Reporting year generation in kg
- Reporting year ratio
- Goal year and goal year ratio
- Waste reduction activity information
- Impediments and rationale.

The methodology for calculating the base year ratio, the reporting year ratio, and the goal year ratio is described in the EMEF P2 Program Plan. Table 1 includes baseline generation, 1999 generation, and ratio information. Table 2 includes waste reduction goals, goal ratios, and 1999 waste reduction activities data. Table 3 contains waste stream-specific comparison information. Table 4 provides rationale and impediment information.

Based on ETPP's priorities and completed pollution prevention opportunity assessments (PPOA), ETPP continued to plan and implement pollution prevention (P2) projects. PPOAs will continue to be supported by ETPP during 2000 as appropriate. As PPOAs continue to be performed and projects planned and implemented, the goals will be evaluated and revised, if necessary.

3. EFFORTS TO REDUCE HAZARDOUS WASTE DURING 1999

ETPP has continued to identify and implement many projects and systems supporting P2. Summaries of projects and system implementation performed in previous years are found in the ETPP progress reports for calendar years 1992 through 1998. Examples of P2 projects related to hazardous waste and performed by ETPP during 1999 or 1993 through 1998 projects that continued to be implemented in 1999 are summarized in Appendix C and are listed in Table 5. Table 6 lists additional projects completed by ETPP that reduce other waste types.

Table 3. East Tennessee Technology Park (ETTP) comparison of hazardous waste baseline, goal, and actual ratios

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Goal Year Ratio	Reporting Year (1999) Generation (kg)	Reporting Year (1999) Ratio	Reporting Year (1999) SPU	Range Factor	Ratio Data Compared	
											1999 Less Than Or Equal To Base Year? (Y/N)	1999 Less Than Or Equal To Goal? (Y/N)
12	K-1501 Hydrogen Softener Blowdown	1991	8,420,000	125.4415	6.71E+06	62.7	2,901,531	84.2	3.44E+06	1.00E+02	Y	N
18	Sodium Hydroxide Solution	1991	0	10.4	6.71E+06	N/A	0	N/A	N/A	1.00E+06	N/A	N/A
35	Flammable Liquids (Lab Packs)	1991	428	63.76363	6.71E+06	31.9	458	133	3.44E+06	1.00E+06	N	N
36	Corrosive Liquids (Lab Packs)	1991	166	24.73075	6.71E+06	12.4	68	19.7	3.44E+06	1.00E+06	Y	N
37	Corrosive Solids (Lab Packs)	1991	161	23.98585	6.71E+06	12.0	0	0	N/A	1.00E+06	Y	Y
38	Poisonous Liquids (Lab Packs)	1991	5	74.49022	6.71E+06	37.2	0	0	N/A	1.00E+08	Y	Y
39	Poisonous Solids (Lab Packs)	1991	4	59.59218	6.71E+06	29.8	1	29	3.44E+06	1.00E+08	Y	Y
40	Oxidizing Liquids (Lab Packs)	1991	19	28.3	6.71E+06	14.2	0	0	N/A	1.00E+07	Y	Y
41	Haz. Waste Liquid (Lab Packs)	1991	53	78.95964	6.71E+06	39.5	0	0	N/A	1.00E+07	Y	Y
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	1991	377,760	56.27885	6.71E+06	28.1	442	0.1	3.44E+06	1.00E+03	Y	Y
44	Paint Waste	1991	14,253	21.23418	6.71E+06	10.6	227	0.6	3.44E+06	1.00E+04	Y	Y
60	Hazardous Waste Liquid	1991	47,168	70.2711	6.71E+06	35.1	159,179	460.5	3.44E+06	1.00E+04	N	N
64	CNF Centrifuged Sludge	1992	112,355	27.6	4.07E+07	13.8	71	0.2	3.44E+06	1.00E+04	Y	Y
70	Laboratory Acids (BMP)	1991	39,083	58.22603	6.71E+06	29.1	103	0.3	3.44E+06	1.00E+04	Y	Y
71	Laboratory Bases (BMP)	1991	6,896	102.7369	6.71E+06	51.4	0	0	N/A	1.00E+05	Y	Y
72	Laboratory Organics (BMP)	1991	12,256	18.25904	6.71E+06	9.1	0	0	N/A	1.00E+04	Y	Y
73	Laboratory Sludges (BMP)	1991	598	89.09031	6.71E+06	44.5	0	0	N/A	1.00E+06	Y	Y
74	Silver Recovery	1991	7,628	113.6423	6.71E+06	56.8	0	0	N/A	1.00E+05	Y	Y
75	Organic Peroxides	1991	1	125.1436	7.99E+06	62.6	0	0	N/A	1.00E+09	Y	Y
77	Hydrogen Peroxide	1991	--	25.1777	6.71E+06	12.6	295	N/A	N/A	1.00E+06	N	N
82	Mercury/Mercury Products	1991	627	93.41074	6.71E+06	46.7	0	0	N/A	1.00E+06	Y	Y
84	Rags Contaminated With Solvents	1991	3,739	55.70379	6.71E+06	27.9	0	0	N/A	1.00E+05	Y	Y
85	TSCA Incinerator Ash	1992	3,488	148.5	2.35E+06	74.3	63,940	161.9	3.95E+07	1.00E+05	N	N
93	Lead and Lead Products	1991	27,813	41.43593	6.71E+06	20.7	0	0	N/A	1.00E+04	Y	Y
122	Hazardous Waste Solid (Bulk)	1991	26,651	39.70478	6.71E+06	19.9	310,584	717.9	3.44E+06	1.00E+04	N	N
123	Water Reactives (Solids)	1991	1	14.89804	6.71E+06	7.4	0	0	N/A	1.00E+08	Y	Y
125	Cylinders	1991	61	90.87807	6.71E+06	45.4	958	2782.7	3.44E+06	1.00E+07	N	N
126	Waste Sludge From Closure of B/C Pond	1991	0	0	--	0.0	0	0	N/A	1.00E+00	Y	Y
128	Flammable Solids (Lab Pack)	1991	20	29.79609	6.71E+06	14.9	0	0	N/A	1.00E+07	Y	Y
129	Flammable Solids	1991	53	78.95964	6.71E+06	39.5	0	0	N/A	1.00E+07	Y	Y
130	Flammable Corrosive Liquids (Lab Pack)	1991	3	44.69413	6.71E+06	22.3	0	0	N/A	1.00E+08	Y	Y
131	Oxidizing Solids (Lab Pack)	1991	11	16.38785	6.71E+06	8.2	4	11.6	3.44E+06	1.00E+07	Y	N
133	TSCA and IWS Sludge	1992	94,474	402.1	2.35E+06	0.0	23,920	6.1	3.95E+07	1.00E+04	Y	N
137	Waste ORM-A (Lab Pack)	1991	33	49.16355	6.71E+06	24.6	0	0	N/A	1.00E+07	Y	Y
138	Flammable Liquids (Bulk)	1991	10,486	15.62209	6.71E+06	7.8	462	1.3	3.44E+06	1.00E+04	Y	Y
139	Combustible Liquids (Bulk)	1991	3,513	52.33683	6.71E+06	26.2	0	0	N/A	1.00E+05	Y	Y
140	Hazardous Waste Solid (Lab Pack)	1991	108	16.08989	6.71E+06	8.0	1	0.3	3.44E+06	1.00E+06	Y	Y
141	Waste ORM-A (Bulk)	1991	8,966	13.35759	6.71E+06	6.7	0	0	N/A	1.00E+04	Y	Y

Table 3 (continued)

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Goal Year Ratio	Reporting Year (1999) Generation (kg)	Reporting Year (1999) Ratio	Reporting Year (1999) SPU	Range Factor	Ratio Data Compared	
											1999 Less Than Or Equal To Base Year? (Y/N)	1999 Less Than Or Equal To Goal? (Y/N)
142	Corrosive Liquids (Bulk)	1991	7,944	118.3501	6.71E+06	59.2	10,278	298.5	3.44E+06	1.00E+05	N	N
145	Oily Rags & Solids	1991	17,075	25.43841	6.71E+06	12.7	0	0	N/A	1.00E+04	Y	Y
146	Laboratory Trash	1991	8,839	131.6838	6.71E+06	65.8	0	0	N/A	1.00E+05	Y	Y
148	K-1453 TSCA Incinerator Wastewaters	1992	64,963,223	27.7	2.35E+06	13.9	57,915,297	1.5	3.95E+07	1.00E+00	Y	Y
149	Aerosol cans	1991	1,033	15.38968	6.71E+06	7.7	30	0.8	3.44E+06	1.00E+05	Y	Y
151	Oxidizing Corrosive Liquids (bulk)	1991	1,422	21.18502	6.71E+06	10.6	0	0	N/A	1.00E+05	Y	Y
153	Oxidizing Solids (bulk)	1991	45	67.0412	6.71E+06	33.5	0	0	N/A	1.E+07	Y	Y
155	TSCA Trash	1992	12,042	51.3	2.35E+06	13.9	7,813	2	3.95E+07	1.E+04	Y	Y
156	TSCA Secondary Wastes	1992	46,922	1997.3	2.35E+06	14.0	0	0	N/A	1.E+05	Y	Y
157	Respirator Cartridges	1991	3,650	54.37786	6.71E+06	27.2	119	3	3.44E+06	1.E+05	Y	Y
158	Batteries	1991	492	73.30	6.71E+05	36.6	11	0	3.44E+06	1.E+05	Y	Y
159	TSCA Solids	1992	93,708	398.9	2.35E+06	199.5	93,075	24	3.95E+07	1.E+04	Y	Y
160	Combustible Liquid (Lab Pack)	1991	2,435	36.27674	6.71E+06	18.1	0	0	N/A	1.E+05	Y	Y
161	Corrosive solids (Bulk)	1991	12,672	18.8788	6.71E+06	9.4	0	0	N/A	1.E+04	Y	Y
163	Solvents	1992	2,980	38.40494	7.76E+06	19.2	377	7	3.44E+06	1.E+05	Y	Y
164	Fluorescent Bulbs	1992	18,819	24.2531	7.76E+06	12.1	52	0	3.44E+06	1.E+04	Y	Y
165	Incandescent Bulbs	1992	2,539	32.72152	7.76E+06	16.4	0	0	N/A	1.E+05	Y	Y
166	Decant Water PWMP	1992	121	15.59395	7.76E+06	7.8	28,481	8,273	3.44E+06	1.E+06	N	N
167	Decant Solids PWMP	1992	67	8.634667	7.76E+06	4.3	22,475	6,528	3.44E+06	1.E+06	N	N
168	Secondary/Tertiary Waste PWMP	1992	1,096	14.12477	7.76E+06	7.1	0	0	N/A	1.E+05	Y	Y
169	Sodium & Mercury Vapor Bulbs	1993	43	51.2	8.40E+06	170.2	0	0	N/A	1.E+07	Y	Y
170	Lab Solids (other than sludges)	1993	115	136.887	8.40E+06	83.0	0	0	N/A	1.E+07	Y	Y
171	TSCA Rinse Residues	1993	69,083	152.2184	4.54E+06	76.1	229	1	3.44E+06	1.E+04	Y	Y
172	Sodium Vapor-Filled Bulbs	1993	5	59.51607	8.40E+06	1,077.7	0	0	N/A	1.E+08	Y	Y
174	SW-31 Seep Water	1994	6,386,543	77.3	8.26E+06	38.7	7,151,520	208	3.44E+06	1.E+02	N	N
175	Poison B (Bulk)	1994	816	98.8	8.26E+06	49.4	0	0	N/A	1.E+06	Y	Y
176	Treatability Study Returns	1994	50	60.5	8.26E+06	30.3	0	0	N/A	1.E+07	Y	Y
177	PWM Hazardous Waste Liquids	1994	7	84.8	8.25E+06	42.4	0	0	N/A	1.E+08	Y	Y
178	Fire Water Sludge	N/A	N/A	N/A	N/A	0.0	0	0	N/A	N/A	N/A	N/A
179	K-1232 Sludges	N/A	N/A	N/A	N/A	0.0	0	0	N/A	N/A	N/A	N/A
181	Vitrified Waste	N/A	N/A	N/A	N/A	N/A	0	0	N/A	N/A	N/A	N/A
182	Mitchell Branch Seep	N/A	N/A	N/A	N/A	N/A	12,037,362	350	3,442,680	1.E+02	N/A	N/A

BMP - best management practice
 CNF - Central Neutralization Facility
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 SPU - Standard Production Unit
 TSCA - Toxic Substances Control Act

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETPP in the future.

The waste stream number listed in this table is the number listed on the Hazardous Waste Stream and Annual Report waste stream pages submitted by ETPP to the Tennessee Department of Environment and Conservation.

Table 4. East Tennessee Technology Park (ETTP) hazardous waste reduction impediments and rationale information

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
12	K-1501 Hydrogen Softener Blowdown	A3,B3,C3,D2,E2,F2,G3,H2,I2	In 1993, equipment was modified to prevent groundwater infiltration and allow for separation of the non-RCRA sodium softener (K069). In 1996, the Steam Plant adjusted its rinse cycle durations to reduce the quantity of water used for the fast rinse (K524).
18	Sodium Hydroxide Solution	None identified.	N/A - None identified.
35	Flammable Liquids (Lab Packs)	A3,B3,C3,D2,E2,F1,G3,H2,I2	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETTP, and large quantities of chemicals were transferred to new owners during the clean-out of Building K-1416 (K835).
36	Corrosive Liquids (Lab Packs)	A2,B1,C1,D2,E2,F1,G3,H2,I2	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETTP, and large quantities of chemicals were transferred to new owners during the clean-out of Building K-1416 (K835).
37	Corrosive Solids (Lab Packs)	None identified.	N/A - None identified.
38	Poisonous Liquids (Lab Packs)	None identified.	N/A - None identified.
39	Poisonous Solids (Lab Packs)	A2,B1,C1,D2,E2,F1,G3,H2,I2	This wastestream was specifically addressed in a Level I Pollution Prevention Opportunity Assessment. A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETTP.
40	Oxidizing Liquids (Lab Packs)	None identified.	N/A - None identified.
41	Haz. Waste Liquid (Lab Packs)	None identified.	N/A - None identified.
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	A3,B3,C3,D2,E3,F1,G3,H2,I2	Air compressors containing non-RCRA lubricants were installed in 1993 (K130). In 1999, various oils certified to be nonradioactive were collected from around the plant and sent to an off-site recycler (K789).

Table 4 (continued)

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
44	Paint Waste	A3,B3,C3,D2,E3,F3,G3,H2,I2	Segregation of paints solids and thinners is performed to allow reuse. Paints with RCRA constituents have been replaced where possible. Tint choices have been reduced and the paint inventory has been permanently reduced.
60	Hazardous Waste Liquid	A3,B3,C3,D2,E3,F2,G3,H2,I2	The site has been recycling antifreeze since 1992 (K203). In 1994, the garage purchased a recirculating high pressure washer (K512). In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETP.
64	CNF Centrifuged Sludge	A3,B3,C3,D2,E3,F3,G3,H2,I2	Coal yard runoff to CNF was eliminated in 1993 (K019). In 1994, CNF discontinued the use of coagulants during treatment of Steam Plant wastewater due to the low metals content of the waste (K422). In 1997, CNF substituted sodium hydroxide for lime in its neutralization activities (K121).
70	Laboratory Acids (BMP)	A3,B3,C3,D1,E3,F2,G3,H2,I2	Groundwater sample sizes were reduced in 1992, and groundwater sampling frequency was reduced in 1994 (K091, K429). NOTE: Many of the pollution prevention efforts to reduce this wastestream were related to the Analytical Services Laboratory, which moved off-site in the fall of 1998.
71	Laboratory Bases (BMP)	None identified.	N/A - None identified.
72	Laboratory Organics (BMP)	None identified.	N/A - None identified.
73	Laboratory Sludges (BMP)	None identified.	N/A - None identified.
74	Silver Recovery	None identified.	N/A - None identified.
75	Organic Peroxides	None identified.	N/A - None identified.
77	Hydrogen Peroxide	None identified.	N/A - None identified.
82	Mercury/Mercury Products	None identified.	N/A - None identified.
84	Rags Contaminated With Solvents	None identified.	N/A - None identified.
85	TSCA Incinerator Ash	A3,B3,C3,D2,E3,F2,G3,H2,I2	Wastestream generation is dependent upon incinerator operations and feed materials. This wastestream has been evaluated in a Level III Pollution Prevention Opportunity Assessment.
93	Lead and Lead Products	None identified.	N/A - None identified.

Table 4 (continued)

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
122	Hazardous Waste Solid (Bulk)	A3,B3,C3,D2,E3,F3,G3,H2,I2	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1997, ETPP's nondestructive assay equipment was upgraded to reduce solid waste produced from waste characterization (K514). In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETPP.
123	Water Reactives (Solids)	None identified.	N/A - None identified.
125	Cylinders	A3,B3,C3,D2,E2,F3,G3,H2,I2	Personnel collect cylinders from buildings slated for decontamination and decommissioning and attempt to send them back to the vendor for reuse prior to sending them to an on-site Transportable Gas Recontainerization System for salvaging/treatment.
126	Waste Sludge From Closure of B/C Pond	None identified.	N/A - None identified.
128	Flammable Solids (Lab Pack)	None identified.	N/A - None identified.
129	Flammable Solids	None identified.	N/A - None identified.
130	Flammable Corrosive Liquids (Lab Pack)	None identified.	N/A - None identified.
131	Oxidizing Solids (Lab Pack)	A3,B1,C1,D2,E2,F1,G3,H2,I1 (Waste is nonroutine.)	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETPP.
133	TSCA and IWS Sludge	A3,B1,C2,D2,E3,F2,G3,H2,I2	Wastestream generation is dependent upon incinerator operations and feed materials. This wastestream has been evaluated in a Level III Pollution Prevention Opportunity Assessment.
137	Waste ORM-A (Lab Pack)	None identified.	N/A - None identified.
138	Flammable Liquids (Bulk)	A3,B3,C3,D2,E3,F3,G3,H2,I1 (Waste is nonroutine.)	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETPP.
139	Combustible Liquids (Bulk)	None identified.	N/A - None identified.

Table 4 (continued)

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
140	Hazardous Waste Solid (Lab Pack)	A3,B1,C1,D2,E2,F1,G3,H2,I1 (Waste is nonroutine.)	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETTP.
141	Waste ORM-A (Bulk)	None identified.	N/A - None identified.
142	Corrosive Liquids (Bulk)	A3,B2,C2,D2,E3,F3,G3,H2,I1 (Waste is nonroutine.)	A three-site Swap Shop is available to facilitate the reuse of surplus chemicals. In 1999, an "Action Plan for Disposition of Excess Chemicals and Materials" was developed for ETTP.
145	Oily Rags & Solids	None identified.	N/A - None identified.
146	Laboratory Trash	None identified.	N/A - None identified.
148	K-1453 TSCA Incinerator Wastewaters	A3,B3,C3,D2,E1,F2,G3,H2,I2	A quench water reduction project was implemented in 1994 (K654). A camera cooling water system upgrade was completed in 1997, thereby reducing incinerator camera cooling water generation by 50% (K532).
149	Aerosol cans	A3,B3,C3,D1,E3,F3,G3,H2,I2	Alternatives to aerosol cans have been found across the site since 1993, and an aerosol can evacuator is being used to segregate the contents from the used containers (K691).
151	Oxidizing Corrosive Liquids {bulk}	None identified.	N/A - None identified.
153	Oxidizing Solids {bulk}	None identified.	N/A - None identified.
155	TSCA Trash	A3,B3,C3,D2,E3,F3,G3,H2,I2	The wastestream was evaluated in a Level III Pollution Prevention Opportunity Assessment. In 1999, the TSCA Incinerator moved its solids repackaging effort to a new location, thereby reducing the use of dust masks and other disposable personal protective equipment (K805).
156	TSCA Secondary Wastes	None identified.	N/A - None identified.
157	Respirator Cartridges	A3,B3,C3,D2,E2,F2,G2,H2,I2	Respirator use has been evaluated in several Pollution Prevention Opportunity Assessments for different processes across the site. In 1998, a reconfiguration of the equipment setup allowed for respirator use to be eliminated during the aerosol can venting activity (K655).
158	Batteries	A3,B3,C3,D2,E3,F3,G3,H2,I1 (Management transition has delayed some recycling activities.)	Rechargeable batteries are being used where applicable (K526). Various batteries have been collected from around the plant and are awaiting shipment to an off-site recycler. However, some batteries cannot be certified to be nonradiologically contaminated.

Table 4 (continued)

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
159	TSCA Solids	A3,B1,C3,D2,E1,F3,G3,H2,I2	This wastestream was evaluated in a Level III Pollution Prevention Opportunity Assessment. When feasible, wooden scaffolding has been replaced with reusable metal scaffolding (K530). Equipment storage lockers are used to house contaminated equipment for reuse within contaminated areas (K531).
160	Combustible Liquid (Lab Pack)	None identified.	Respirator use has been evaluated in several Pollution Prevention Opportunity Assessments for different processes across the site. In 1998, a reconfiguration of the equipment setup allowed for respirator use to be eliminated during the aerosol can venting activity (K655).
161	Corrosive solids (Bulk)	None identified.	N/A - None identified.
163	Solvents	A3,B3,C3,D3,E3,F3,G3,H2,I2	When feasible, personnel use mechanical decontamination techniques (such as scabbling) rather than solvents (K810). Aqueous-based and ultrasonic cleaning systems have replaced solvent-based cleaning systems (K038).
164	Fluorescent Bulbs	A3,B3,C2,D2,E3,F3,G3,H2,I1 (Management transition has delayed some recycling activities.)	Intact fluorescent bulbs that can be certified to be non-radioactive are collected for off-site recycling.
165	Incandescent Bulbs	None identified.	N/A - None identified.
166	Decant Water PWMP	A2,B2,C2,D2,E2,F2,G2,H2,I2	This is an historical wastestream that can no longer be reduced.
167	Decant Solids PWMP	A2,B2,C2,D2,E2,F2,G2,H2,I2	This is an historical wastestream that can no longer be reduced.
168	Secondary/Tertiary Waste PWMP	None identified.	N/A - None identified.
169	Sodium & Mercury Vapor Bulbs	None identified.	N/A - None identified.
170	Lab Solids (other than sludges)	None identified.	N/A - None identified.
171	TSCA Rinse Residues	A2,B2,C2,D2,E3,F3,G3,H2,I2	N/A - None identified.
172	Sodium Vapor-Filled Bulbs	None identified.	N/A - None identified.
174	SW-31 Seep Water	A2,B2,C2,D2,E2,F2,G2,H2,I2	This wastestream is generated from leachate of the K-1070 burial ground.
175	Poison B (Bulk)	None identified.	N/A - None identified.
176	Treatability Study Returns	None identified.	N/A - None identified.
177	PWM Hazardous Waste Liquids	None identified.	N/A - None identified.
178	Fire Water Sludge	None identified.	N/A - None identified.
179	K-1232 Sludges	None identified.	N/A - None identified.

Table 4 (continued)

Waste Stream Number	Waste Stream Description	Impediments	Comments Including Additional Information Concerning Impediments and Rationale as Needed
181	Vitrified Waste	None identified.	N/A - None identified.
182	Mitchell Branch Seep	A2,B2,C2,D2,E2,F2,G2,H2,I2	This wastestream is generated from Mitchell Branch groundwater which is a CERCLA site.

BMP - best management practice
 CERCLA - *Comprehensive Response, Compensation, and Liability Act*
 CNF - Central Neutralization Facility
 ETP - East Tennessee Technology Park
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 LP - lab pack
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 RCRA - *Resource Conservation and Recovery Act*
 SPU - Standard Production Unit
 TSCA - *Toxic Substances Control Act*

The letters and numbers designating impediments are as follows:

- A = a. Training or technical assistance
- B = b. Technical feasibility
- C = c. Economic practicality
- D = d. Measurement/accounting methods
- E = e. Tennessee hazardous waste regulations
- F = f. Implementation experience
- G = g. High costs of hazardous waste management
- H = h. Accidental generation
- I = i. Other
- 1 = No; hurt reduction
- 2 = NA; was not necessary or did not impact reduction
- 3 = Yes; helped reduction

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETP in the future.

The waste stream number listed in this table is the number listed on the Hazardous Waste Stream and Annual Report waste stream pages submitted by ETP to the Tennessee Department of Environment and Conservation.

Table 5. Recent East Tennessee Technology Park (ETTP) pollution prevention projects related to hazardous waste reduction

Project Number	Project Title	Total Waste Reduced (kg)
K782 & K803	Three Building BNFL D&D and Recycling Project (1998 and 1999)	5,142,370
K841	Recycle of Scrap Metals from KFAD Phase II Demolition	282,659
K771	Use of Biopolymer Slurry for Trench Shoring	79,827
K759 & K845	Reuse of Empty Mixed and Mixed-PCB Waste Drums (FY 1998 and FY 1999)	72,505
K835	Reuse of Excess Chemicals from K-1416	25,855
K758	Reuse of Excess ASO Materials	19,121
K716	Sale of Lead Acid Batteries (1998/1999)	19,061
K717 & K784	Intact Light Bulb Recycling	13,654
K749	Reuse of Excess TVS Materials	11,731
K727 & K789	Site-Wide Used Oil Recycling (1998)	11,295
K766	Reuse of Depleted Uranyl-Nitrate Waste	6,750
K701	Launder Oily Rags from the ETTP Garage	3,975
K702	Reclassify ETTP Garage Oily Rags and Debris as Sanitary Waste	3,682
K747	Disposal of Technical Division Chemicals as Non Rad Materials	1,496
K643	Lead Resale (1997/1998)	1,179
K708	Reuse of Lead Bricks from Radiochemistry Labs (1998)	1,179
K687	Nearly Waste Free Laboratory	1,102
K691	Aerosol Can Evacuator	579
K763	Recycling of Nickel-Cadmium Batteries (1998)	304
K726	Site-Wide Silver Recycling (1998)	284
K781	Legacy Scrap Lead Waste Recycling (1998)	188
K762	Recycling of Mercury and Mercury Batteries (1998)	134
K761	Recycling of Lithium Batteries (1998)	41

Table 6. Other recent East Tennessee Technology Park (ETTP) pollution prevention projects

Project Number	Project Title	Total Waste Reduced (kg)
K783	A Model for Converting Waste & Environmental Liabilities Into Assets (at K-1401)	9,070,295.00
K843	Salvage of K-31 and K-33 Switch Yard Materials	2,398,000.00
K840	Reuse of KFAD Construction Rubble As Fill	736,694.44
K773	Reuse of Construction Rubble As Fill	393,803.19
K734 and K772	Total Paper/Cardboard Recycling Program (1998 and 1999)	388,761.08
K839	Reuse of PWM Metal Pallets by BNFL	376,000.00
K764	Recycle of Metal Pallets	244,290.81
K777	UF6 Cylinder Project K-1066-F Yard Cleanup Project	203,558.78
K778	Central Neutralization Facility (CNF) Sludge Disposition Project	167,512.05
K735 and K793	Sale of Scrap Metals for Recycling (1998 and 1999)	134,917.84
K779	7A Vault Clean Up	103,000.00
K733	Sale of Computer Cards and Printer Paper for Recycling (1998)	40,089.17
K740 and K796	Excess Furniture Sales (1998 and 1999)	37,047.28
K676 and K786	Tire Sale for Retreading (1998 and 1999)	24,792.49
K768	Equipment Transfer (1998)	23,700.60
K729	Wooden Pallet Recycling (1998)	23,387.62
K765	Downposting of the K-1417-B Drum Storage Yard	18,029.74
K836	Recycle of ETTP Computers at TORNRC (1999)	16,124.19
K739 and K795	Aluminum Beverage Can Recycling (1998 and 1999)	4,866.17
K730	Reuse of 52" x 52" Wooden Pallets (FY 1998)	4,536.00
K183	Decontamination in K-1004-A	3,264.00
K806	Donation of Trailers K-1310-E and K-1310-F to Mt. Zion Church	2,748.42
K627	Substitution of Poly-Tanks for Drums Used to Collect Lab Acids	2,630.00
K731 and K791	Recycling Cooking Oil (1998 and 1999)	2,531.50
K541	Nylon Bags for Respirator Collection	2,470.00
K807	K-1225 Office Renovations	1,832.28
K680	Limit K-1008-C Respirator Washes to Two Cycles	1,792.00
K741 and K797	Refurbished Toner Cartridges for Laser Printers (1998 and 1999)	1,740.74
K703	Donation of Excess Metrology Equipment to North Carolina Agricultural & Technical State University	589.68
K811	Conversion of FYB Packages to CD-ROM	573.35
K776	TSCA Incinerator Facility Pallet Reuse	181.44
K805	PPE Reduction from Relocation of TSCAI Solids Repackaging Process	120.00
K738 and K794	Reuse of Packing Peanuts (1998 and 1999)	48.98

Table 6 (continued)

Project Number	Project Title	Total Waste Reduced (kg)
K728	Reuse of Plastic Reagent Bottles (1998)	21.60
K626	Upgrade Storm Drains to Reduce HP Sampling Requirements	17.00
K750	Reuse of Chemicals in Photometal Process	11.28
K780 and K801	Reuse of Used Video Tapes (1998 and 1999)	3.60

4. SUPPORT ACTIVITIES

Activities that support ETTP P2 implementation are summarized in this Chap.

4.1 WASTE MINIMIZATION AND P2 PROJECT DATABASE

ETTP developed and has used a database to meet its waste minimization/reduction project tracking needs. This database has been updated several times during the last several years. The current system used to track ETTP P2 projects is the Oak Ridge Operations EMEF Pollution Prevention Information Management System (P2IMS). The ETTP-specific project description summary included in Appendix C of this progress report was generated from this database.

4.2 PROMOTIONAL ACTIVITIES

As in 1993 through 1998, the P2 promotional activities performed by the EMEF P2 Program that incorporated ETTP included: circulating P2-based literature, publishing articles in the Bechtel Jacobs Company newsletter, the *M&I Times*, holding periodic P2 Advocacy Council meetings with the P2 Advocates from each organization, and holding special topics meetings.

5. IMPEDIMENTS TO REDUCTION

Specific impediments for ETTP's THWRA-regulated hazardous and mixed waste streams are identified in Table 4. These impediments are consistent with the impediments in Appendix C of the EMEF P2 Program Plan.

6. SUMMARY INFORMATION

Summary information required under THWRA is included in Appendix F of the *1999 Annual Report of Hazardous Waste Activities for the East Tennessee Technology Park, Oak Ridge, Tennessee*, BJC/OR-509 (Bechtel Jacobs Company 1999b).

REFERENCES

- Bechtel Jacobs Company LLC (Bechtel Jacobs Company) 1999a. *Oak Ridge Operations Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention Program Plan*, BJC/OR-306, East Tennessee Technology Park (ETTP), May.
- Bechtel Jacobs Company 1999b. *1999 Annual Report of Hazardous Waste Activities for the East Tennessee Technology Park, Oak Ridge, Tennessee*, BJC/OR-509, ETTP, February.
- Tennessee Department of Environment and Conservation (TDEC) 1990. *Tennessee Hazardous Waste Reduction Act*, TCA 68-212-301 et. seq.

APPENDIX A

**SUMMARY OF THE SCOPE OF THE REQUIREMENTS
OF THE TENNESSEE HAZARDOUS WASTE REDUCTION ACT**

SUMMARY OF THE SCOPE OF THE REQUIREMENTS OF THE *TENNESSEE HAZARDOUS WASTE REDUCTION ACT*

The Tennessee Hazardous Waste Reduction Act of 1990 (THWRA), as detailed in Sections 68-212-306, 68-212-307, and 68-212-308, requires the compilation of an annual report of progress in hazardous waste reduction. This report is required to be retained at the facility, and shall not be considered a public record, but shall be accessible to any officer, employee, or representative of the state upon request. The annual progress reports compiled by the Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention (P2) Program for the East Tennessee Technology Park (ETTP) (formerly the Oak Ridge K-25 Site) fulfill this requirement. These THWRA-required progress reports are maintained by the ETTP Document Management Center for review by any representative of the Tennessee Department of Environment and Conservation (TDEC) or the U.S. Department of Energy. The THWRA regulates large quantity generators and small quantity generators but not conditionally exempt small quantity generators.

These progress reports describe compliance status with the following sections of the THWRA:

Section 68-212-304 - This section of the THWRA requires all large quantity generators and small quantity generators to complete a hazardous waste reduction plan, and maintain this plan at the generating facility.

Section 68-212-305 - This section of the THWRA requires that the following elements be presented in the hazardous waste reduction plan:

1. A dated and signed written policy demonstrating facility management support for the plan
2. The scope and objectives of the plan, including review of methods, procedures, and training, as well as specific goals for hazardous waste reduction
3. Information regarding technically and economically practical hazardous waste reduction opportunities and an implementation schedule for these options
4. Information regarding hazardous waste accounting systems that identify the costs of waste management and include consideration of compliance costs, oversight costs, and liability to the extent feasible.
5. Description of facility awareness and training programs for employees
6. Information regarding the incorporation of the plan into management practices and procedures
7. Establishment of hazardous waste stream-specific source reduction goals, expressed in numeric quantitative terms, or discussion of actions planned to establish these goals
8. Rationale for these goals, and discussion of any impediments to achieving these goals.

Section 68-212-306 - This section of the THWRA requires generators to annually review the plan and complete a progress report which reviews and quantifies progress in hazardous waste reduction for each waste stream goal established in Section 68-212-305. This section also mandates amendments to the plan, if necessary. The first year's progress report must be completed by March 1 of the next year. (Note that based

on discussions with State regulators, progress reports for each subsequent year must be completed by March 31 of the next year.)

Section 68-212-308 - This section of the THWRA requires summary information to be submitted to the TDEC as part of the annual hazardous waste generator report on forms provided by the TDEC and including: information such as stream-specific reduction goals, any progress made toward these goals in numeric terms, narrative explaining the reported information, description of actions for established numeric goals, and description of impediments to reduction of specific waste streams. This information is required to be submitted by March 1 of each year.

These progress reports address all of these elements and provide stream-specific information required by these elements for hazardous waste reduction activities at ETPP.

APPENDIX B

**OAK RIDGE OPERATIONS ENVIRONMENTAL MANAGEMENT
AND ENRICHMENT FACILITIES POLLUTION PREVENTION
PROGRAM PLAN SUPPLEMENT**

OAK RIDGE OPERATIONS ENVIRONMENTAL MANAGEMENT AND ENRICHMENT FACILITIES POLLUTION PREVENTION PROGRAM PLAN SUPPLEMENT

Because the Oak Ridge Operations Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention (P2) Program updated the *Oak Ridge Operations Environmental Management and Enrichment Facilities (EMEF) Pollution Prevention Program Plan*, BJC/OR-306 in May 1999, limited portions of the plan are updated in the following text.

In Appendix C, Tables C.1 and C.2 have been updated to add information concerning the extension of the goal year from 1999 to 2000 and to include revised impediments.

In Appendix F, the following additional entries to Table F.1 are added to reflect that ORO personnel, including ETPP personnel, received the following awards related to the following efforts since May 1999:

Year	Award
1999	DOE Local Pollution Prevention Award – A Model for Converting Waste and Environmental Liabilities into Assets
1999	DOE Local Pollution Prevention Award – Oak Ridge Operations Pollution Prevention Information Management System (P2IMS)
1999	DOE Local Pollution Prevention Award – Old Hydrofracture Facility Project
1999	DOE Local Pollution Prevention Award – Use of Biopolymer Slurry for Trench Shoring
1999	DOE Local Pollution Prevention Award Honorable Mention – 7A Vault Cleanup
1999	DOE Local Pollution Prevention Award Honorable Mention – UF6 Cylinder Project K-1066-F Yard Cleanup Project
1999	DOE Local Pollution Prevention Award Honorable Mention – Central Neutralization Facility Sludge Disposition Project
1999	DOE Local Pollution Prevention Award Honorable Mention – Integrated Planning and Design for the 9822 Basin and 81-10 Sump Removal Action
1999	DOE Local Pollution Prevention Award Honorable Mention – Compendium of Resources for the Oak Ridge Operations Pollution Prevention Program
1999	DOE Headquarters Pollution Prevention Award – P2 in Design (Multi-Site)

**Table C.1. East Tennessee Technology Park (ETTP) hazardous waste
baseline generation rates, SPUs, and ratios
(March 2000 Supplement to BJC/OR-306)**

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Range Factor
12	K-1501 Hydrogen Softener Blowdown	1991	8,420,000	125.44154	6.71E+06	1.E+02
18	Sodium Hydroxide Solution	1991	0	10.4	6.71xE+06	1.E+06
35	Flammable Liquids (Lab Packs)	1991	428	63.763632	6.71E+06	1.E+06
36	Corrosive Liquids (Lab Packs)	1991	166	24.730755	6.71E+06	1.E+06
37	Corrosive Solids (Lab Packs)	1991	161	23.985852	6.71E+06	1.E+06
38	Poisonous Liquids (Lab Packs)	1991	5	74.490225	6.71E+06	1.E+08
39	Poisonous Solids (Lab Packs)	1991	4	59.59218	6.71E+06	1.E+08
40	Oxidizing Liquids (Lab Packs)	1991	19	28.3	6.71E+06	1.E+07
41	Haz. Waste Liquid (Lab Packs)	1991	53	78.959638	6.71E+06	1.E+07
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	1991	377,760	56.278854	6.71E+06	1.E+03
44	Paint Waste	1991	14,253	21.234183	6.71E+06	1.E+04
60	Hazardous Waste Liquid	1991	47,168	70.271098	6.71E+06	1.E+04
64	CNF Centrifuged Sludge	1992	112,355	27.6	4.07E+07	1.E+04
70	Laboratory Acids (BMP)	1991	39,083	58.226029	6.71E+06	1.E+04
71	Laboratory Bases (BMP)	1991	6,896	102.73692	6.71E+06	1.E+05
72	Laboratory Organics (BMP)	1991	12,256	18.259044	6.71E+06	1.E+04
73	Laboratory Sludges (BMP)	1991	598	89.090309	6.71E+06	1.E+06
74	Silver Recovery	1991	7,628	113.64229	6.71E+06	1.E+05
75	Organic Peroxides	1991	1	125.14358	7.99E+06	1.E+09
77	Hydrogen Peroxide	1991	--	25.177696	6.71xE+06	1.E+06
82	Mercury/Mercury Products	1991	627	93.410742	6.71E+06	1.E+06
84	Rags Contaminated With Solvents	1991	3,739	55.70379	6.71E+06	1.E+05
85	TSCA Incinerator Ash	1992	3,488	148.5	2.35E+06	1.E+05
93	Lead and Lead Products	1991	27,813	41.435932	6.71E+06	1.E+04
122	Hazardous Waste Solid (Bulk)	1991	26,651	39.704779	6.71E+06	1.E+04
123	Water Reactives (Solids)	1991	1	14.898045	6.71E+06	1.E+08
125	Cylinders	1991	61	90.878074	6.71E+06	1.E+07
126	Waste Sludge From Closure of B/C Pond	1991	0	0	--	1.E+00
128	Flammable Solids (Lab Pack)	1991	20	29.79609	6.71E+06	1.E+07
129	Flammable Solids	1991	53	78.959638	6.71E+06	1.E+07
130	Flammable Corrosive Liquids (Lab Pack)	1991	3	44.694135	6.71E+06	1.E+08
131	Oxidizing Solids (Lab Pack)	1991	11	16.387849	6.71E+06	1.E+07
133	TSCA and IWS Sludge	1992	94,474	402.1	2.35E+06	1.E+04
137	Waste ORM-A (Lab Pack)	1991	33	49.163548	6.71E+06	1.E+07
138	Flammable Liquids (Bulk)	1991	10,486	15.62209	6.71E+06	1.E+04
139	Combustible Liquids (Bulk)	1991	3,513	52.336832	6.71E+06	1.E+05
140	Hazardous Waste Solid (Lab Pack)	1991	108	16.089888	6.71E+06	1.E+06
141	Waste ORM-A (Bulk)	1991	8,966	13.357587	6.71E+06	1.E+04
142	Corrosive Liquids (Bulk)	1991	7,944	118.35007	6.71E+06	1.E+05
145	Oily Rags & Solids	1991	17,075	25.438412	6.71E+06	1.E+04
146	Laboratory Trash	1991	8,839	131.68382	6.71E+06	1.E+05
148	K-1453 TSCA Incinerator Wastewaters	1992	64,963,223	27.7	2.35E+06	1.E+00
149	Aerosol cans	1991	1,033	15.38968	6.71E+06	1.E+05
151	Oxidizing Corrosive Liquids {bulk}	1991	1,422	21.18502	6.71E+06	1.E+05

Table C.1 (continued)

Waste Stream Number	Waste Stream Description	Base Year	Base Year Generation (kg)	Base Year Ratio	Base Year SPU	Range Factor
153	Oxidizing Solids (bulk)	1991	45	67.041202	6.71E+06	1.E+07
155	TSCA Trash	1992	12,042	51.3	2.35E+06	1.E+04
156	TSCA Secondary Wastes	1992	46,922	1997.3	2.35E+06	1.E+05
157	Respirator Cartridges	1991	3,650	54.377864	6.71E+06	1.E+05
158	Batteries	1991	492	73.30	6.71E+05	1.E+05
159	TSCA Solids	1992	93,708	398.9	2.35E+06	1.E+04
160	Combustible Liquid (Lab Pack)	1991	2,435	36.276739	6.71E+06	1.E+05
161	Corrosive solids (Bulk)	1991	12,672	18.878803	6.71E+06	1.E+04
163	Solvents	1992	2,980	38.404937	7.76E+06	1.E+05
164	Fluorescent Bulbs	1992	18,819	24.253105	7.76E+06	1.E+04
165	Incandescent Bulbs	1992	2,539	32.721522	7.76E+06	1.E+05
166	Decant Water PWMP	1992	121	15.593951	7.76E+06	1.E+06
167	Decant Solids PWMP	1992	67	8.6346671	7.76E+06	1.E+06
168	Secondary/Tertiary Waste PWMP	1992	1,096	14.124769	7.76E+06	1.E+05
169	Sodium & Mercury Vapor Bulbs	1993	43	51.2	8.40E+06	1.E+07
170	Lab Solids (other than sludges)	1993	115	136.88695	8.40E+06	1.E+07
171	TSCA Rinse Residues	1993	69,083	152.21837	4.54E+06	1.E+04
172	Sodium Vapor-Filled Bulbs	1993	5	59.516067	8.40E+06	1.E+08
174	SW-31 Seep Water	1994	6,386,543	77.3	8.26E+06	1.E+02
175	Poison B (Bulk)	1994	816	98.8	8.26E+06	1.E+06
176	Treatability Study Returns	1994	50	60.5	8.26E+06	1.E+07
177	PWM Hazardous Waste Liquids	1994	7	84.8	8.25E+06	1.E+08
178	Fire Water Sludge	N/A	N/A	N/A	N/A	N/A
179	K-1232 Sludges	N/A	N/A	N/A	N/A	N/A
181	Vitrified Waste	N/A	N/A	N/A	N/A	N/A
182	Mitchell Branch Seep	N/A	N/A	N/A	N/A	1.E+02

BMP - best management practice
 CNF - Central Neutralization Facility
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 SPU - Standard Production Unit
 TSCA - Toxic Substances Control Act

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETP in the future.

Due to the variety of activities performed at the East Tennessee Technology Park, several waste streams are reported that have had zero generation rates since 1991. If waste is generated in these waste streams in the future, baseline and goal values will be determined as applicable and needed.

Table C.2. East Tennessee Technology Park (ETTP) hazardous waste reduction goals, goal years, goal-year ratios, and impediments (March 2000 Supplement to BJC/OR-306)

Waste Stream Number	Waste Stream Description	Percent Reduction Using Base Year Data (%)	Goal Year	Goal Year Ratio	Impediments
12	K-1501 Hydrogen Softener Blowdown	50	2000	62.7	A3,B3,C3,D2,E2,F2,G3,H2,I2
18	Sodium Hydroxide Solution	N/A	N/A	N/A	None identified.
35	Flammable Liquids (Lab Packs)	50	2000	31.9	A3,B3,C3,D2,E2,F1,G3,H2,I2
36	Corrosive Liquids (Lab Packs)	50	2000	12.4	A2,B1,C1,D2,E2,F1,G3,H2,I2
37	Corrosive Solids (Lab Packs)	50	1999	12.0	None identified.
38	Poisonous Liquids (Lab Packs)	50	1999	37.2	None identified.
39	Poisonous Solids (Lab Packs)	50	2000	29.8	A2,B1,C1,D2,E2,F1,G3,H2,I2
40	Oxidizing Liquids (Lab Packs)	50	1999	14.2	None identified.
41	Haz. Waste Liquid (Lab Packs)	50	1999	39.5	None identified.
42	Waste Oils and Waste Oils Contaminated with PCBs and/or Solvents	50	2000	28.1	A3,B3,C3,D2,E3,F1,G3,H2,I2
44	Paint Waste	50	2000	10.6	A3,B3,C3,D2,E3,F3,G3,H2,I2
60	Hazardous Waste Liquid	50	2000	35.1	A3,B3,C3,D2,E3,F2,G3,H2,I2
62	Centrifuge Epoxies/Resins	50	1999	8.2	
64	CNF Centrifuged Sludge	50	2000	13.8	A3,B3,C3,D2,E3,F3,G3,H2,I2
70	Laboratory Acids (BMP)	50	2000	29.1	A3,B3,C3,D1,E3,F2,G3,H2,I2
71	Laboratory Bases (BMP)	50	1999	51.4	None identified.
72	Laboratory Organics (BMP)	50	1999	9.1	None identified.
73	Laboratory Sludges (BMP)	50	1999	44.5	None identified.
74	Silver Recovery	50	1999	56.8	None identified.
75	Organic Peroxides	50	1999	62.6	None identified.
77	Hydrogen Peroxide	50	1999	12.6	None identified.
82	Mercury/Mercury Products	50	1999	46.7	None identified.
84	Rags Contaminated With Solvents	50	1999	27.9	None identified.
85	TSCA Incinerator Ash	50	2000	74.3	A3,B3,C3,D2,E3,F2,G3,H2,I2
93	Lead and Lead Products	50	1999	20.7	None identified.
107	Diocetyl Phthalate	50	1999	27.4	
122	Hazardous Waste Solid (Bulk)	50	2000	19.9	A3,B3,C3,D2,E3,F3,G3,H2,I2
123	Water Reactives (Solids)	50	1999	7.4	None identified.
125	Cylinders	50	2000	45.4	A3,B3,C3,D2,E2,F3,G3,H2,I2
126	Waste Sludge From Closure of B/C Pond	50	1999	0	None identified.
127	Flammable Corrosive Solids (LP)	50	1999	6.4	
128	Flammable Solids (Lab Pack)	50	1999	14.9	None identified.
129	Flammable Solids	50	1999	39.5	None identified.
130	Flammable Corrosive Liquids (Lab Pack)	50	1999	22.3	None identified.
131	Oxidizing Solids (Lab Pack)	50	2000	8.2	A3,B1,C1,D2,E2,F1,G3,H2,I1 (Waste is nonroutine.)

Table C.2 (continued)

Waste Stream Number	Waste Stream Description	Percent Reduction Using Base Year Data (%)	Goal Year	Goal Year Ratio	Impediments
133	TSCA and IWS Sludge	50	2000	0	A3,B1,C2,D2,E3,F2,G3,H2,I2
137	Waste ORM-A (Lab Pack)	50	1999	24.6	None identified.
138	Flammable Liquids (Bulk)	50	2000	7.8	A3,B3,C3,D2,E3,F3,G3,H2,I1 (Waste is nonroutine.)
139	Combustible Liquids (Bulk)	50	1999	26.2	None identified.
140	Hazardous Waste Solid (Lab Pack)	50	2000	8	A3,B1,C1,D2,E2,F1,G3,H2,I1 (Waste is nonroutine.)
141	Waste ORM-A (Bulk)	50	1999	6.7	None identified.
142	Corrosive Liquids (Bulk)	50	2000	59.2	A3,B2,C2,D2,E3,F3,G3,H2,I1 (Waste is nonroutine.)
144	Bioremediation Project	50	1999	8.8	
145	Oily Rags & Solids	50	1999	12.7	None identified.
146	Laboratory Trash	50	1999	65.8	None identified.
148	K-1453 TSCA Incinerator Wastewaters	50	2000	13.9	A3,B3,C3,D2,E1,F2,G3,H2,I2
149	Aerosol cans	50	2000	7.7	A3,B3,C3,D1,E3,F3,G3,H2,I2
151	Oxidizing Corrosive Liquids {bulk}	50	1999	10.6	None identified.
152	Oxidizing Liquids (Bulk)	50	1999	10.6	
153	Oxidizing Solids {bulk}	50	1999	33.5	None identified.
155	TSCA Trash	50	2000	13.9	A3,B3,C3,D2,E3,F3,G3,H2,I2
156	TSCA Secondary Wastes	50	1999	14	None identified.
157	Respirator Cartridges	50	2000	27.2	A3,B3,C3,D2,E2,F2,G2,H2,I2
158	Batteries	50	2000	36.6	A3,B3,C3,D2,E3,F3,G3,H2,I1 (Management transition has delayed some recycling activities.)
159	TSCA Solids	50	2000	199.5	A3,B1,C3,D2,E1,F3,G3,H2,I2
160	Combustible Liquid (Lab Pack)	50	2000	18.1	None identified.
161	Corrosive solids (Bulk)	50	1999	9.4	None identified.
163	Solvents	50	2000	19.2	A3,B3,C3,D3,E3,F3,G3,H2,I2
164	Fluorescent Bulbs	50	2000	12.1	A3,B3,C2,D2,E3,F3,G3,H2,I1 (Management transition has delayed some recycling activities.)
165	Incandescent Bulbs	50	1999	16.4	None identified.
166	Decant Water PWMP	50	2000	7.8	A2,B2,C2,D2,E2,F2,G2,H2,I2
167	Decant Solids PWMP	50	2000	4.3	A2,B2,C2,D2,E2,F2,G2,H2,I2
168	Secondary/Tertiary Waste PWMP	50	1999	7.1	None identified.
169	Sodium & Mercury Vapor Bulbs	50	1999	170.2	None identified.
170	Lab Solids (other than sludges)	50	1999	83	None identified.

Table C.2. (continued)

Waste Stream Number	Waste Stream Description	Percent Reduction Using Base Year Data (%)	Goal Year	Goal Year Ratio	Impediments
171	TSCA Rinse Residues	50	2000	76.1	A2,B2,C2,D2,E3,F3,G3,H2,I2
172	Sodium Vapor-Filled Bulbs	50	1999	1077.7	None identified.
173	Photo Waste (K-1035)	50	1999	15.5	
174	SW-31 Seep Water	50	2000	38.7	A2,B2,C2,D2,E2,F2,G2,H2,I2
175	Poison B (Bulk)	50	1999	49.4	None identified.
176	Treatability Study Returns	50	1999	30.3	None identified.
177	PWM Hazardous Waste Liquids	50	1999	42.4	None identified.
178	Fire Water Sludge	N/A	N/A	0	None identified.
179	K-1232 Sludges	N/A	N/A	0	None identified.
181	Vitrified Waste	N/A	N/A	N/A	N/A - None identified.
182	Mitchell Branch Seep	N/A	2002	N/A	N/A - None identified.

BMP - best management practice
 CNF - Central Neutralization Facility
 IWS - Ionizing Wet Scrubber
 kg - kilogram
 LP - lab pack
 N/A - not applicable
 PCB - polychlorinated biphenyls
 PWM - Pond Waste Management (project)
 PWMP - Pond Waste Management Project
 SPU - Standard Production Unit
 TSCA - Toxic Substances Control Act

The letters and numbers designating impediments are as follows:

- A = a. Training or technical assistance
- B = b. Technical feasibility
- C = c. Economic practicality
- D = d. Measurement/accounting methods
- E = e. Tennessee hazardous waste regulations
- F = f. Implementation experience
- G = g. High costs of hazardous waste management
- H = h. Accidental generation
- I = i. Other
- 1 = No; hurt reduction
- 2 = NA; was not necessary or did not impact reduction
- 3 = Yes; helped reduction

Note: General pollution prevention impediments such as radiation control issues, contamination concerns, lack of appropriate substitutes, and irregular generation may impact hazardous waste streams depending on the activities performed at ETTP in the future.

Due to the variety of activities performed at the East Tennessee Technology Park, several waste streams are reported that have had zero generation rates since 1991. If waste is generated in these waste streams in the future, baseline and goal values will be determined as applicable and needed.

APPENDIX C

**EAST TENNESSEE TECHNOLOGY PARK
POLLUTION PREVENTION PROJECT DESCRIPTIONS**

Table C.1. Recent East Tennessee Technology Park (ETTP) pollution prevention project descriptions related to hazardous waste reduction

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K782 & K803	Three Building BNFL D&D and Recycling Project (1998 and 1999)	BNFL Inc. was awarded a \$238M fixed price contract on 8/25/97 to deliver vacant and decontaminated buildings (K-29, K-31, K-33) to DOE-ORO. BNFL Inc. will finance the project; design the decontamination facilities; apply for and receive required permits and licenses; construct necessary facilities and bring them on-line; operate the facilities to decontaminate metals and equipment; salvage metal and equipment; and deactivate the decontamination facilities. BNFL Inc. will recover the resources it has invested both through recycle activities and through the delivery of vacated and decontaminated building space paid for by DOE on a fixed-unit-price basis. The underlying intent was to transfer the primary share of the financial, performance, and operational responsibility from the Government to BNFL Inc. The concept directly supports Reindustrialization of ETTP, which is targeted as a key mission by the DOE resulting in accelerated cleanup, cost savings for DOE and indirect benefits to the Oak Ridge work force and community.	RCRA	82,580
			MLLW	858,120
			LLW	4,201,670
K841	Recycle of Scrap Metals from KFAD Phase II Demolition	As a part of the K-25 Auxiliary Facilities Decontamination (KAFAD) project, during the decontamination of Buildings K-1031, K-1131, and K-1410, approximately 12,465 pounds of nickel, 41,420 pounds of copper, 5140 pounds of lead sheets, and 564,259 pounds of clean scrap steel were recycled.	MLLW	26,768
			LLW	255,891

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K771	Use of Biopolymer Slurry for Trench Shoring	<p>The K-1070-C/D and Mitchell Branch Plumes Project in the ETTP watershed was a removal action designed to capture and treat contaminated groundwater that originates from two areas. The objective of the Plumes project was to collect groundwater in trenches and pump it to the Industrial wastewater treatment facility at ETTP for treatment and discharge under its CWA Permit. Chlorinated hydrocarbons, chlorinated volatile and semi-volatile organic compounds, and radionuclides were the contaminants of concern in the plumes. The project used a new technical approach in the shoring of the groundwater collection trenches. Rather than shoring the trenches with wood, as is traditionally done in construction operations, a biopolymer slurry was used for trench stabilization. This method of shoring was much safer for field personnel because it did not require anyone to be in the trench during construction. The shoring technique also eliminated the generation of a mixed waste stream, and disposal costs associated with it.</p>	MLLW	79,827

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K759 & K845	Reuse of Empty Mixed and Mixed-PCB Waste Drums (FY 1998 and FY 1999)	This two-year project will enable approximately 64% (roughly 132,873 kg) of the empty mixed and mixed-PCB waste drums currently in storage at ETTP to be reused. The current inventory of both types of drums is approximately 8600. All of the drums are being accepted by US Ecology, Inc., to be used as containers for waste being compacted at their existing radioactively licensed waste treatment facility. The ETTP-generated drums will be used in place of new waste drums which are currently purchased to facilitate compaction. The estimated 36% of the drums that cannot be used due to the size or type of container will be disposed of by U.S. Ecology. This project requires treatment of the mixed-PCB drums at ETTP to remove PCBs prior to releasing them to U.S. Ecology. Decontamination is being accomplished by washing the drums at the ETTP Central Processing Facility (CPF).	MLLW	31,923
			MTSCA	40,582
K835	Reuse of Excess Chemicals from K 1416	The ETTP Maintenance Project's Environmental Compliance Officer lead an effort to reduce the disposal of materials generated by the clean out of Building K-1416. This facility was formerly used to store excess materials inventory, and was full of chemicals between 8 and 15 years old. A total of 43,000 pounds of chemicals were shipped to a local company for reuse, 10,500 pounds of chemicals were reused on-site at ETTP, and an additional 3,500 pounds are awaiting final sale and shipment to another off-site chemical company. All of these materials were still in usable form, but due to their expiration dates, they were not eligible to be sent back to their manufacturers. This effort saved the site as much as \$256,500 in avoided disposal costs.	RCRA	25,855

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K758	Reuse of Excess ASO Materials	During the Analytical Services Organization (ASO) move from ETTP to the Oak Ridge Y-12 Plant in August-September 1998, new users were found for the majority of the excess chemicals, office supplies, and equipment. The establishment of Nonradioactive Material Management Areas (NRMMA's), which occurred immediately prior to the announcement that the labs would have to move, was instrumental in allowing the items to be reused in other areas across the Oak Ridge Reservation (ORR). The NRMMA's also enabled the site to donate many of the remaining office supplies to local schools through the Gifts Program. Generator Set-Aside Fee (GSAF) Program funds were used to ship materials to new users at Y-12 and the Oak Ridge National Laboratory (ORNL). In addition to the avoided treatment and disposal costs that have been reported, this project also saved the ORR thousands of dollars in purchasing costs.	MLLW	798
			SAN	18,323
K716	Sale of Lead Acid Batteries (1998/1999)	Lead acid batteries were collected from emergency lighting fixtures and from vehicles and sold to an off-site recycler.	MLLW	19,061
K717 & K784	Intact Light Bulb Recycling	Intact, spent light bulbs are collected from facilities across the park, including legacy waste areas, and staged for shipment to an off-site recycler. Bulbs that are being recycled in accordance with established criteria are considered by the Tennessee Department of Environment and Conservation (TDEC) to be "characteristic by-product" rather than RCRA hazardous waste. Previously, the bulbs were crushed and stored on-site as MLLW for future disposal.	RCRA	5,113
			MLLW	8,541

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K749	Reuse of Excess TVS Materials	In 1998, new users were sought for materials left over from the Transportable Vitrification System (TVS) demonstration project so that the materials would not be declared as waste. Six thousand pounds of silica and 8400 lbs. of sodium carbonate were returned to the source. New users (both on-site and off-site) were found for the following items: 500 pounds of sodium nitrate, 3200 pounds of manganese dioxide, two 55-gal drums of caustic, 14 cases of sample containers, 23 tubes of caulking, 6 bottles of de-icer, 13 boxes of latex gloves, 1 box of shoe covers, 2 charged fire extinguishers, 2 boxes of water filter cartridges, assorted flexible drain lines and hoses, assorted gaskets, 2 boxes of general purpose flood lighting, about 500 perforated base insulation hangers, about 500 self-locking washer clips, tape, lamps, and fuses. This effort prevented the generation of approximately 11,730 kg of waste, thereby avoiding at least in \$2,329 in treatment and disposal costs.	RCRA	240
			MLLW	454
			SAN	11,037
K727 & K789	Site-Wide Used Oil Recycling (1998)	Various types of used oil, primarily generated by the ETTP Garage, were recycled through an off-site vendor. The recycled oils included motor oil, gear oil, hydraulic oil, compressor oil, and transmission fluid. The oil streams were previously treated at the <i>Toxic Substances Control Act Incinerator (TSCAI)</i> as MLLW, but have since been certified as RCRA waste due to the NRMMA program. Cost savings from the recycling project were based on avoided treatment costs at TSCAI.	RCRA	11,295

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K766	Reuse of Depleted Uranyl-Nitrate Waste	Existing depleted uranyl-nitrate waste was reused in downblending operations conducted on fissile waste in storage at ETTP. The 286 containers of fissile waste contained 11 kg of U-235 and 377 kg of U-238. The fissile waste was mixed with 6,750 kg of depleted uranyl-nitrate waste to lower the U-235 concentration to levels that are treatable at the Y-12 Central Pollution Control Facility (CPCF) and West End Treatment Facility (WETF). The downblended waste will be treated at the Y-12 facilities. The reuse of the existing uranyl-nitrate avoided the generation of additional depleted uranium and avoided cost for its disposal as a separate waste stream.	MLLW	6,750
K701	Launder Oily Rags from the ETTP Garage	In Calendar Year 1998, the ETTP Garage began laundering and reusing oily rags generated from vehicle maintenance activities. Previously the rags were considered MLLW and were treated at TSCAI. Because of the ETTP Garage's recent certification as a NRMMA, the oily rag waste stream was reclassified as a RCRA waste and became eligible for off-site release. Approximately 80% of the rags generated at the ETTP Garage are launderable. The remaining 20% are unsuitable for laundering because they contain free liquid oil or excessive quantities of grease or silicone sealants. Annual cost savings from the project include avoided treatment/disposal costs, as well as the reduced cost of purchasing replacement rags. This project also reduces sanitary waste by allowing the reuse of waste collection drums.	RCRA	3,278
			SAN	697

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K702	Reclassify ETTP Garage Oily Rags and Debris as Sanitary Waste	Oily rags and debris generated by the garage and previously managed as RCRA waste were tested to determine whether they are characteristic for benzene. The D018 code was removed from the waste, thereby enabling 27 drums (one year's worth) of oily rags and debris to be recharacterized as sanitary waste and sent to the industrial landfill.	RCRA	3,682
K747	Disposal of Technical Division Chemicals as Non Rad Materials	Because of the decision that the Technical Division would privatize on April 1, 1998, DOE announced that all out-of-date chemicals in K-1004-C and K-1006 needed to be disposed by March 31, 1998. In just two weeks, ASO personnel assisted the Technical Division in establishing these areas as NRMMA's, characterizing the chemicals, and completing all required paperwork to get these chemicals shipped to Laidlaw for disposal. This project avoided indefinite storage of the chemicals at ETTP as LLW and MLLW.	MLLW	748
			LLW	748
K643	Lead Resale (1997/1998)	Lead generated from several ETTP projects was collected and sold by ETTP Property Sales for the purpose of recycling. The lead consisted primarily of spent shotgun shells, shell casings, and lead bricks. The shells and casings were generated at the ETTP Central Training Facility by the Security Force.	RCRA	1,179
K708	Reuse of Lead Bricks from Radiochemistry Labs (1998)	Due to lab consolidation, the Analytical Services Organization declared an additional 100 lead bricks as excess material. Lab personnel were able to reuse 24 of the bricks at the East Tennessee Technology Park, and shipped the remaining 76 bricks to the Y-12 Lead Shop for reuse. This effort prevented the treatment of approximately 2,600 pounds of hazardous waste.	RCRA	1,179

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K687	Nearly Waste Free Laboratory	The high pressure asher (HPA) lab in K-1004-B was used to perform metals analyses on waste oils destined for TSCAI. The lab developed a new way to digest the oil samples without contaminating them with certain acids. By using a mixture of 50% nitric acid and 50% hydrochloric acid heated to 300 degrees Fahrenheit, reusing the acid mixture until it could no longer solubilize the metals, and neutralizing the acid mixture with micro-soap, the lab eliminated the generation of approximately 5 gallons per week of PCB-contaminated acids and reduced the generation of RCRA-contaminated acids from approximately 500 ml per day to only 5 ml per day.	MLLW	123
			MTSCA	979
K691	Aerosol Can Evacuator	The K-1414 Garage formerly generated approximately three 55-gal drums per year of aerosol cans during vehicle maintenance activities, and the used cans were handled and stored as hazardous waste. An "aerosol can extractor" was purchased and used to remove all of the can contents so that the cans themselves could be disposed as sanitary waste. By using the equipment, the garage now generates only one 55-gal drum of hazardous waste every ten years, and the cans themselves are discarded as sanitary waste.	RCRA	579
K763	Recycling of Nickel-Cadmium Batteries (1998)	A 10/9/98 shipment of 303.6 kg of nickel-cadmium (Ni-Cd) batteries (considered to be RCRA, legacy waste) was made to Safety-Kleen for the purpose of treatment/recycling.	RCRA	304
K726	Site-Wide Silver Recycling (1998)	Silver collected from photographic processes in ETPP NRMMA is picked up by an off-site vendor for recycle. Silver recovered and sold consists of photo and x-ray film, silver flake, silver from canisters, and occasionally silver from sludges in storage at EM facilities.	RCRA	284

Table C.1 (continued)

Project Number	Project Title	Project Description	Waste Type(s) Reduced	Total Waste Reduced by Waste Type (kg)
K781	Legacy Scrap Lead Waste Recycling (1998)	Scrap lead from legacy waste storage was shipped to Safety-Kleen for recycling. Safety-Kleen brokers the lead to Exide/General Battery.	RCRA	188
K762	Recycling of Mercury and Mercury Batteries (1998)	Shipments of mercury and mercury batteries were made to Safety-Kleen on October 2, 1998 and October 9, 1998 for the purpose of mercury recovery. The shipments included batteries, elemental mercury removed from abandoned equipment, a mercury thermometer, mercury switches, and level indicators. Safety-Kleen brokers the wastes to Bethlehem Apparatus for recovery of the mercury.	RCRA	134
K761	Recycling of Lithium Batteries (1998)	An October 13, 1998 shipment of 41.0 kg of lithium batteries (considered to be RCRA, legacy waste) was made to Safety-Kleen for the purpose of treatment/recycling.	RCRA	41

CWA - Clean Water Act
 DOE - U.S. Department of Energy
 D&D - Decontamination and Decommissioning
 EM - Office of Environmental Management
 LLW - low-level radioactive waste
 kg - kilogram
 ml - milliliters
 MLLW - mixed low level radioactive waste
 ORO - Oak Ridge Operations
 PCB - polychlorinated biphenyls
 RCRA - Resource Conservation and Recovery Act waste
 % - percent

INTERNAL DISTRIBUTION

1. C. A. Manrod, STR
2. T. P. A. Perry
3. J. T. Shannon, PDCC File
- 4-6. EMEF-DMC – RC

EXTERNAL DISTRIBUTION

- 7-8. Ana L. Gonzalez, Pollution Prevention Coordinator, U.S. Department of Energy, Oak Ridge Operations Office, Post Office Box 2001, Oak Ridge, Tennessee, 37830-8620
9. Lori Manis, Pollution Prevention Project Manager, DPRA, Incorporated, 151 Lafayette Drive, Suite 210, Oak Ridge, TN 37830
10. Crit Parrott, Pollution Prevention Contract Manager, DPRA, Incorporated, 151 Lafayette Drive, Suite 210, Oak Ridge, TN 37830