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(8-89)
EFG (07-90)

United States Government **Department of Energy**

memorandum

DATE: April 15, 2004

REPLY TO ATTN OF: Office of Pollution Prevention and Resource Conservation: JPowers: 6-7301

SUBJECT: Program Office Progress in Attaining Pollution Prevention Leadership Goals

TO: Distribution

The progress of the Department's sites in attaining the 2005 Pollution Prevention Leadership Goals for waste reduction is summarized in the attached report (Attachment 1). Executive Order (EO) 13148, *Greening the Government Through Leadership in Environmental Management,* requires Federal agencies to establish pollution prevention goals, and the 2005 Pollution Prevention Leadership Goals approved by the Secretary in 1999 serve the Department in meeting this EO requirement.

One of my responsibilities as the Department's Agency Environmental Executive is to report on the DOE's progress toward meeting the pollution prevention (P2) goals. On March 29, 2004, I submitted a report to the Environmental Protection Agency on the Department's progress in implementing Environmental Management Systems and achieving P2 goals. This DOE-wide progress report was based, in large part, on data provided by your sites as reflected in the attachment. While Program Offices and sites under their purview have made tremendous strides toward reaching these goals, further opportunities to reduce waste will need to be pursued in order to attain all of the 2005 P2 goals.

To facilitate the transfer of successful P2 practices to other sites, and thereby further progress towards achieving all of 2005 P2 goals, the Office of Environment, Safety and Health (EH) has collaborated with P2 coordinators in the Program Offices and sites to develop the attached Waste Reduction Revitalization Initiative Report (Attachment 2). This report summarizes best practices that DOE sites have identified as opportunities to reduce or eliminate wastes throughout the DOE complex. Site-specific examples of successful P2 projects and practices that can be implemented at other DOE sites in a timeframe that supports DOE meeting the 2005 P2 goals are presented in the attached report.

The Department is committed to meeting the 2005 P2 goals. The Secretary has charged Department programs to reinvigorate their efforts toward meeting these goals, and I request that you emphasize the importance of this commitment to those site managers

under your purview. If you have any questions regarding the information contained in either of the attached reports please contact Jane Powers at *jane.powers@eh.doe.gov* or 202-586-7301.

Beverly A. Cook
Assistant Secretary
Environment, Safety and Health

Attachments (2)

DISTRIBUTION:

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National Nuclear Security Administration

Everett Beckner, Deputy Administrator, National Nuclear Security Administration

cc: Pollution Prevention Coordinators

Program Office
Pollution Prevention Progress Report

2003 Waste Reduction Performance

U.S. Department of Energy

March 2004

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Program Office Pollution Prevention Progress Report

March 2004

Contents

INTRODUCTION

This report describes progress toward achieving the Department's Pollution Prevention Leadership Goals, by Program Office, for the reduction of waste generation at DOE sites by December 2005. The report highlights waste reduction as of 2003, and waste reduction needed to meet the 2005 pollution prevention (P2) leadership goals.

Executive Order (EO) 13148, *Greening the Government Through Leadership in Environmental Management* requires Federal agencies to establish pollution prevention goals, and the P2 leadership goals approved by the Secretary in 1999, serve the Department in meeting this EO requirement. DOE Order 450.1, *Environmental Protection Program* (issued January 15, 2003) implements EO 13148 requirements by requiring the establishment of Environmental Management Systems (EMS) at DOE sites that provide systematic planning, integrated execution, and evaluation of programs for P2.

EMS implementation reflects accepted management principles based on the "Plan, Do, Check, Act" model using a standard process to identify environmental goals, implement them, determine progress, and make adjustments to ensure continual improvement. DOE O 450.1 requires Departmental elements to reduce or eliminate the generation of waste as part of implementing an EMS.

The Assistant Secretary for Environment, Safety and Health (EH-1), as the Department's Agency Environmental Executive, is responsible for reporting DOE's progress annually to the Environmental Protection Agency (EPA). On September 1, 2003, EH-1 sent a memorandum to each Program Office requesting it provide waste reduction data necessary for the 2003 annual progress report on the Department's implementation of the Greening the Government EOs. The data in this report were provided by P2 coordinators across the Department in response to the EH-1 request, and were used to prepare a roll-up of DOE's progress in meeting established P2 goals that EH-1 submitted to EPA on March 29, 2004. A copy of this report has been posted on the EH Environmental Policy and Guidance website at: *http://www.eh.doe.gov/oepa/data/eo13148/2004.pdf*

If you have questions or comments about the Program Office P2 Progress Report, please contact Jane Powers, P2 Unit, EH-43 (202-586-7301; *jane.powers@eh.doe.gov*.

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

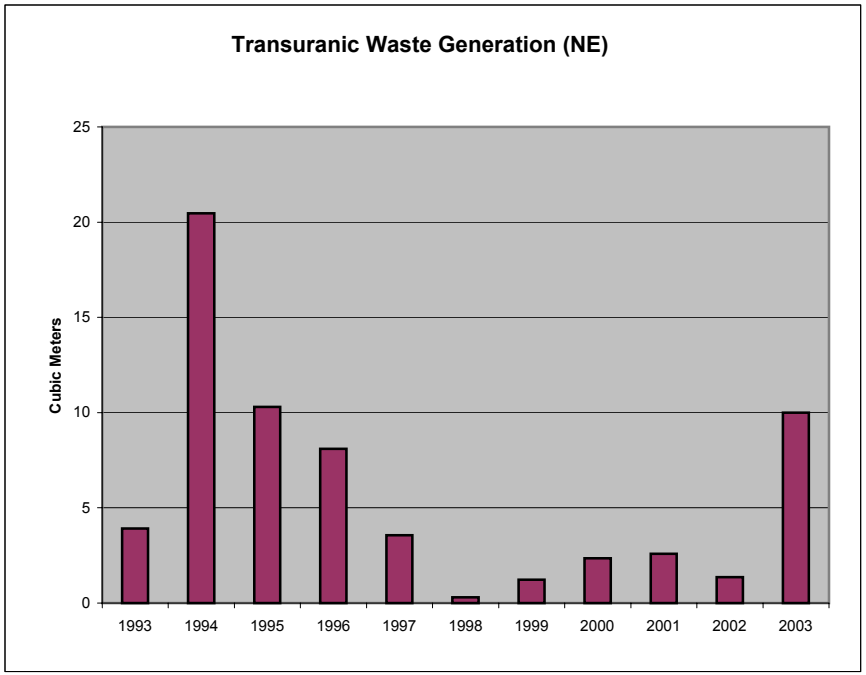
NE Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	2262	2938	1366	630	441	507	617	926	492	792	3525
Transuranic	4	20	10	8	4	0	1	2	3	1	10
Low-Level Mixed	634	341	15	15	8	3	2	2	2	5	38
Hazardous	69	76	55	205	172	14	8	7	5	3	30
Sanitary	1600	1170	1751	826	1086	885	787	620	435	165	149

NE Waste Reduction Performance

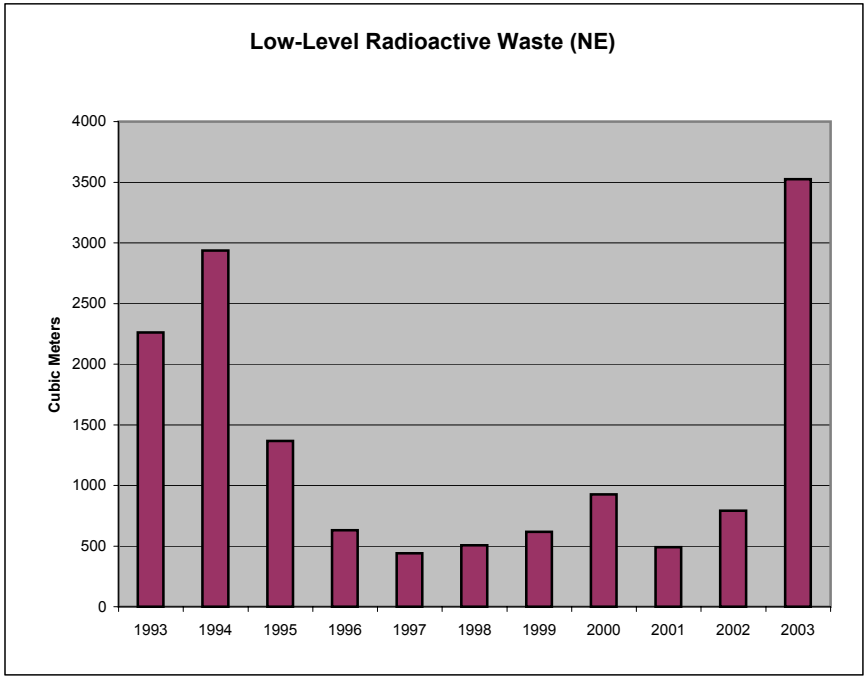
TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive	2,262	452	3,525	3,073	0%	80%
Transuranic Waste	4	1	10	9	0%	80%
Low-Level Mixed	634	127	38	0	94%	80%
Hazardous Waste	69	7	30	23	57%	90%
Sanitary Waste	1,600	400	149	0	91%	75%
Units: cubic meters (cm) = metric tons						

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)



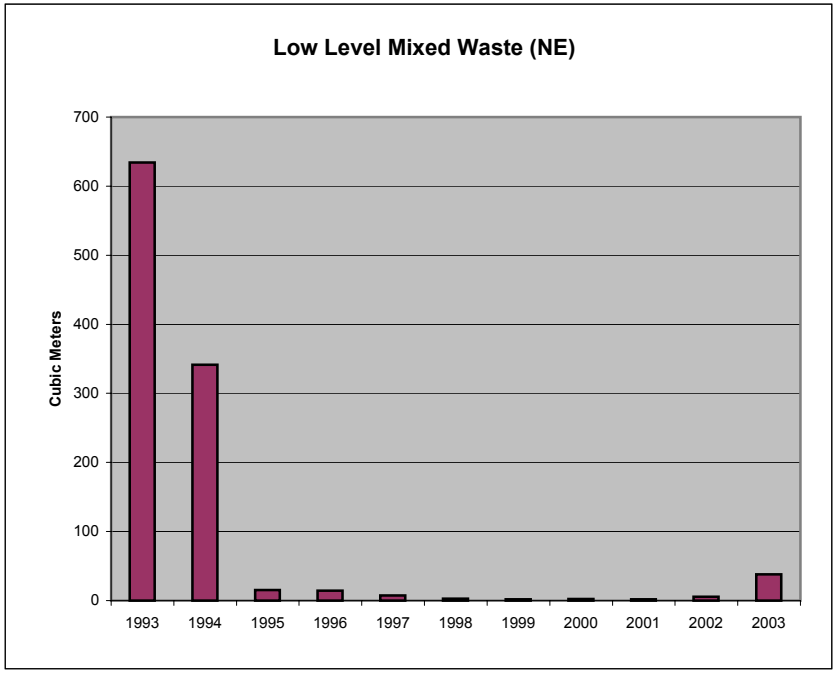
	2002	2003
Complex Wide TRU Waste	175	187
Total NE Generation	1	10
NE Site Contribution:		
Argonne Nat'l Lab - West	1	10
	(cubic meters)	

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)



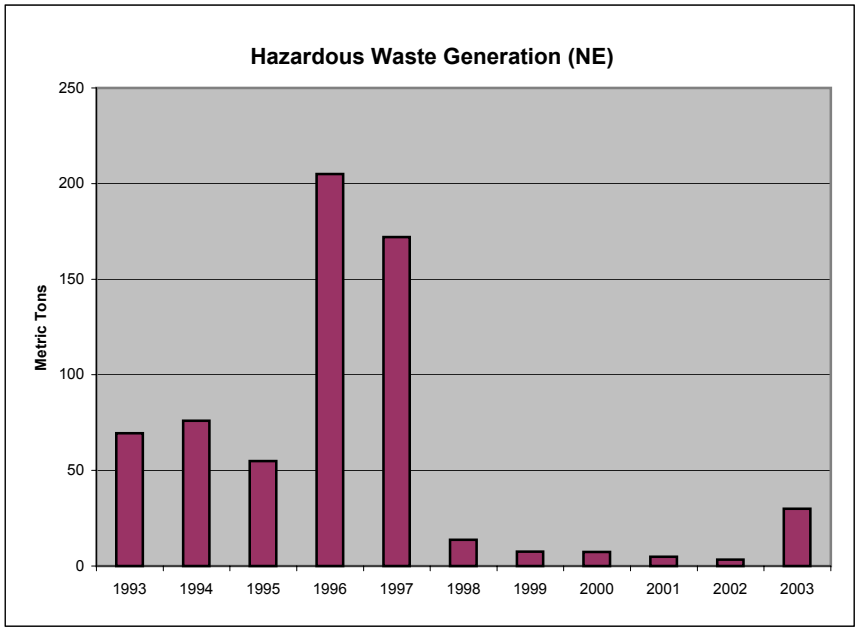
	2002	2003
Complex Wide LL Waste	12,167	12,560
Total NE Generation	792	3,525
NE Site Contribution:		
Argonne Nat'l Lab - East	2	3
Argonne Nat'l Lab - West	208	126
Idaho National EE Lab	576	3,393
Sandia - NM	6	3
	(cubic meters)	

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)



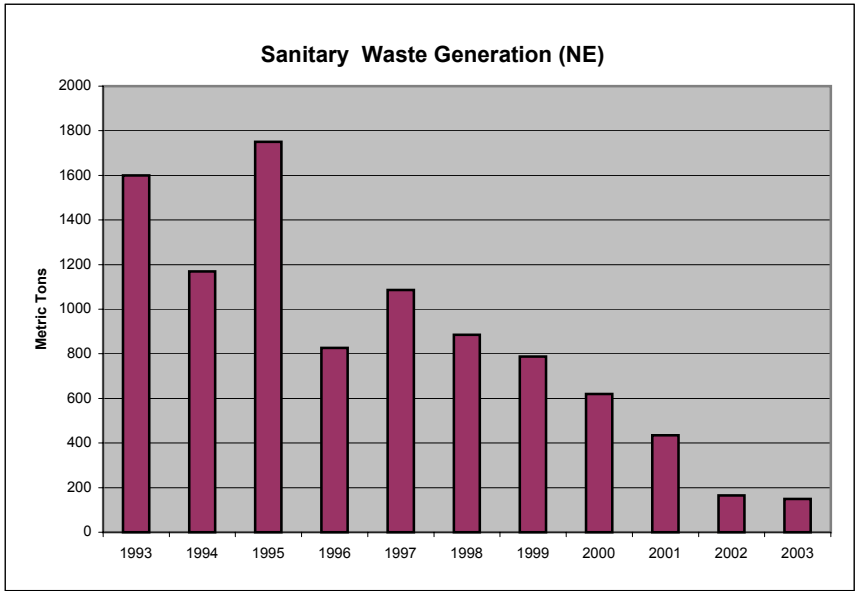
	2002	2003
Complex Wide LL Mixed	476	281
Total NE Generation	5	38
NE Site Contribution:		
Argonne Nat'l Lab - West	1	-
Idaho National EE Lab	4	38
	(cubic meters)	

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total NE Generation	3	30
NE Site Contribution:		
Argonne Nat'l Lab - East	1	5
Argonne Nat'l Lab - West	1	1
Idaho National EE Lab	1	24
	(cubic meters)	

OFFICE OF NUCLEAR ENERGY, SCIENCE and TECHNOLOGY (NE)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total NE Generation	165	149
NE Site Contribution:		
Argonne Nat'l Lab - West	165	134
Idaho National EE Lab	-	15
	(cubic meters)	

OFFICE OF ENERGY EFFICIENCY and RENEWABLE ENERGY (EE)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

EE Waste Generation

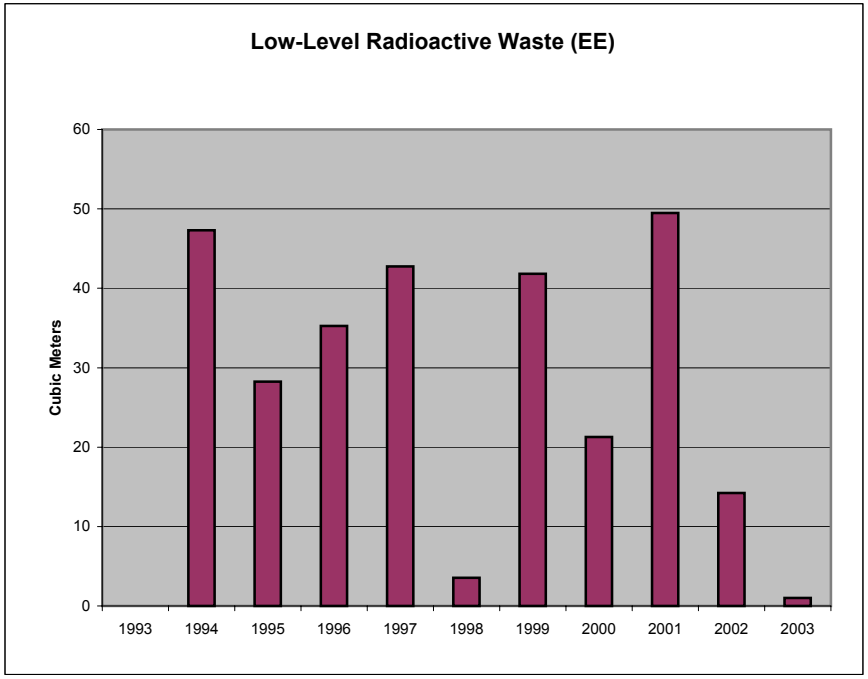
Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	0	47	28	35	43	4	42	21	50	14	1
Transuranic	0	0	0	0	0	0	1	0	0	0	0
Low-Level Mixed	0	0	0	0	0	0	0	0	5	3	0
Hazardous	7	12	11	3	5	5	7	4	1	3	15
Sanitary	-	-	-	-	-	-	-	-	-	-	192

EE Waste Reduction Performance

TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive (1994)	47	9	1	0	98%	80%
Hazardous Waste	7	1	15	14	0%	90%
Units: cubic meters (cm) = metric tons						

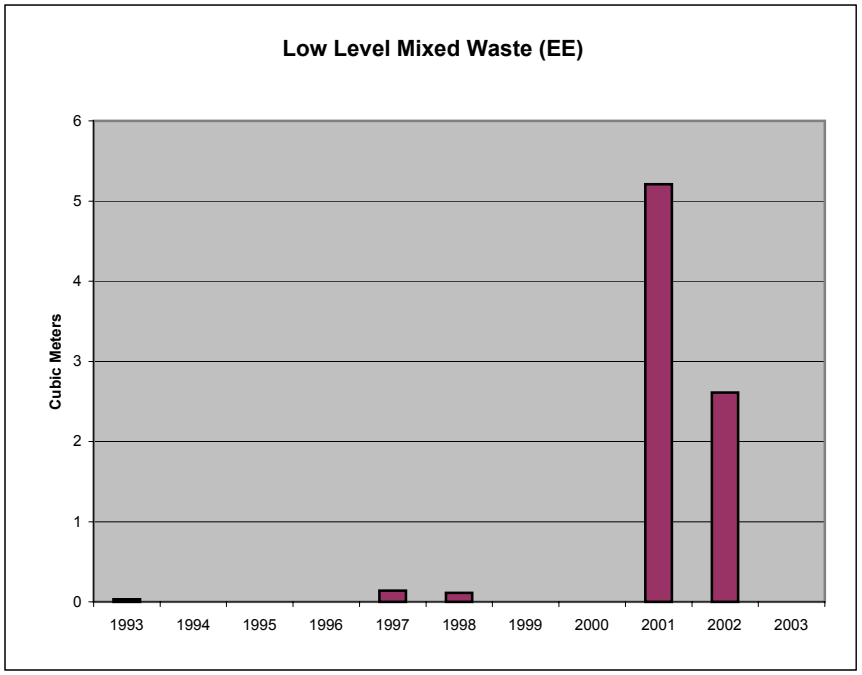
- Data unavailable

OFFICE OF ENERGY EFFICIENCY and RENEWABLE ENERGY (EE)



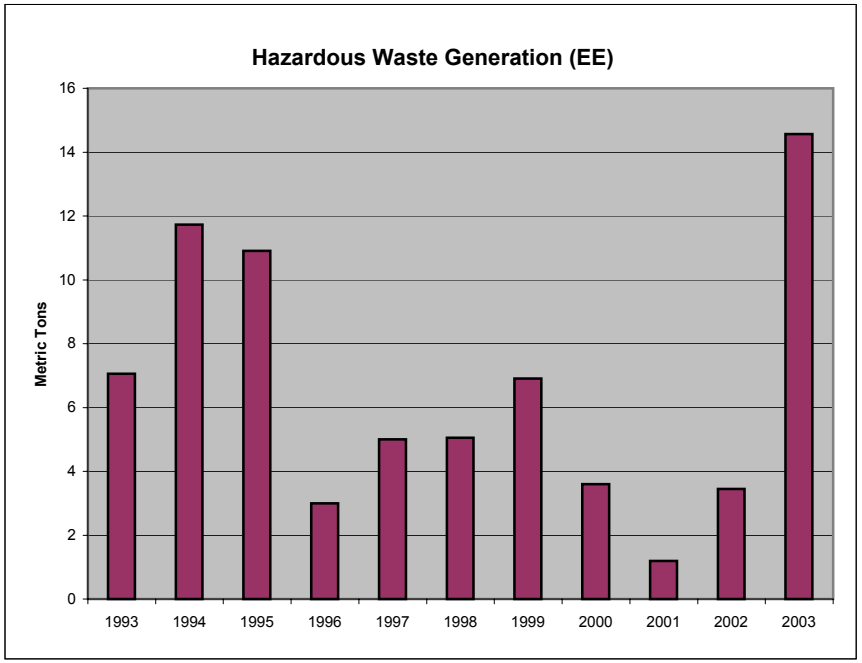
	2002	2003
Complex Wide LL Waste	12,167	12,560
Total EE Generation	14	1
EE Site Contribution:		
Oak Ridge National Lab	14	-
National Renewable Energy Lab	-	1
	(cubic meters)	

OFFICE OF ENERGY EFFICIENCY and RENEWABLE ENERGY (EE)



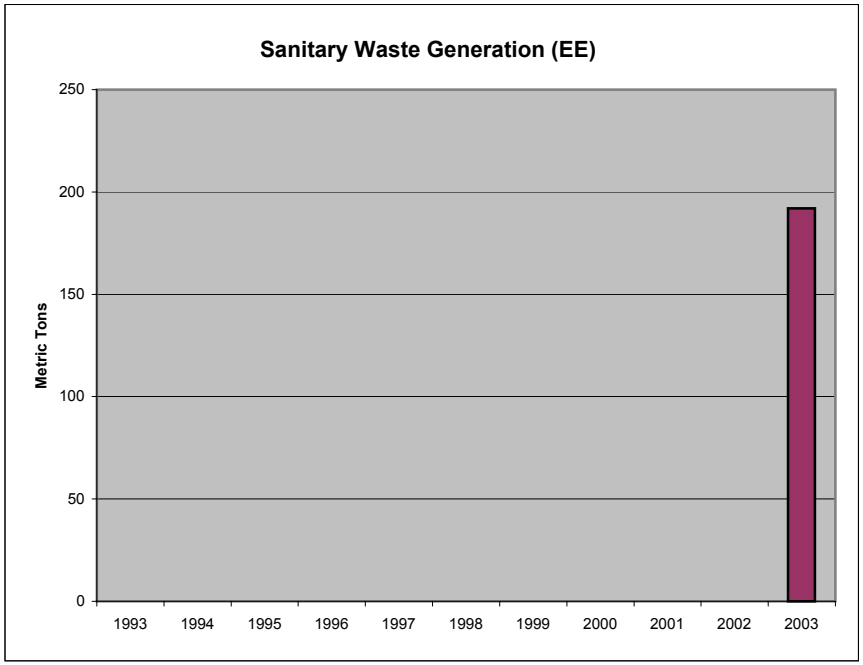
	2002	2003
Complex Wide LL Mixed	476	281
Total EE Generation	3	-
EE Site Contribution:		
Oak Ridge National Lab	3	-
	(cubic meters)	

OFFICE OF ENERGY EFFICIENCY and RENEWABLE ENERGY (EE)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total EE Generation	4	15
EE Site Contribution:		
Los Alamos National Lab	-	1
National Renewable Energy Lab	-	10
Oak Ridge National Lab	2	2
Sandia - CA	1	1
Sandia - NM	1	1
	(cubic meters)	

OFFICE OF ENERGY EFFICIENCY and RENEWABLE ENERGY (EE)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total EE Generation	-	192
EE Site Contribution:		
National Renewable Energy Lab	-	192
	(cubic meters)	

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (RW)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration, and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

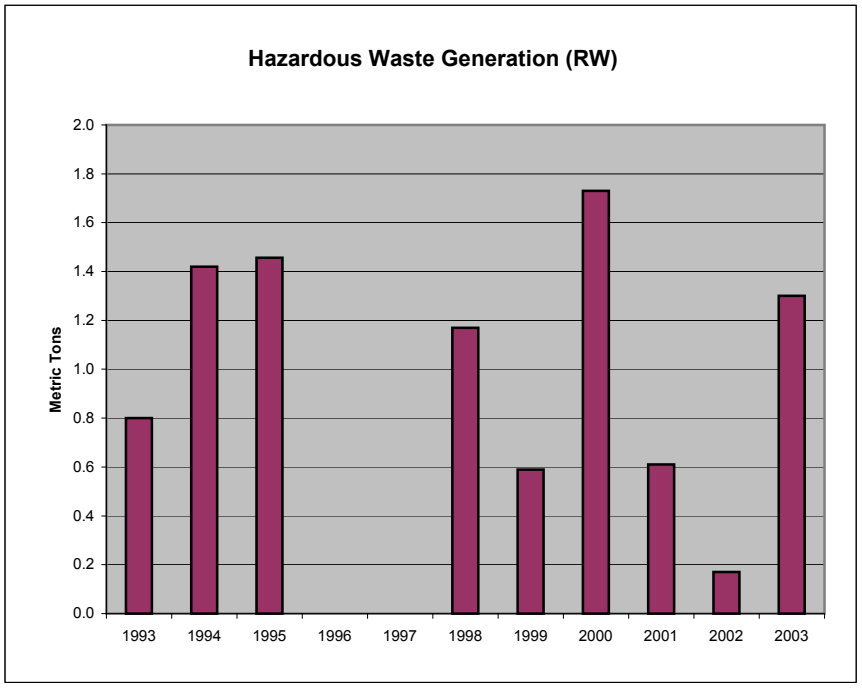
RW Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	139	2	14	0	0	0	0	0	0	0	0
Transuranic	46	0	0	0	0	0	0	0	0	0	0
Low-Level Mixed	0	0	0	0	0	0	0	0	0	0	0
Hazardous	1	1	1	0	0	1	1	2	1	0	1
Sanitary	119	0	0	0	0	0	681	722	720	725	725

RW Waste Reduction Performance

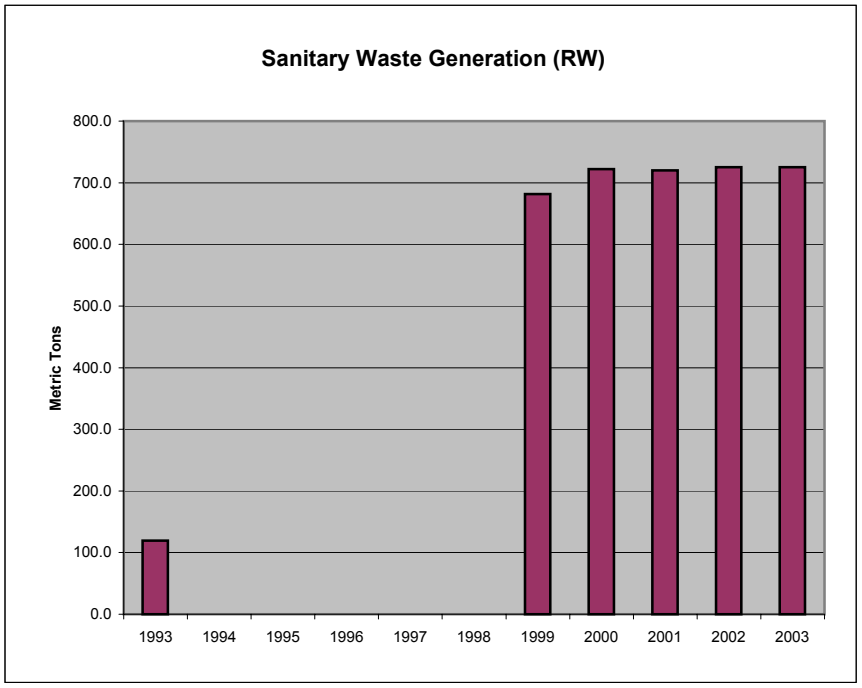
TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive	139	28	0	0	100%	80%
Transuranic Waste	46	9	0	0	100%	80%
Hazardous Waste	1	0	1	1	0%	90%
Sanitary Waste	119	30	725	695	0%	75%
Units: cubic meters (cm) = metric tons						

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (RW)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total RW Generation	0	1
RW Site Contribution:		
Yucca Mountain Site	0	1
	(cubic meters)	

OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT (RW)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total RW Generation	725	725
RW Site Contribution:		
Yucca Mountain Site	725 (cubic meters)	725

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration, and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

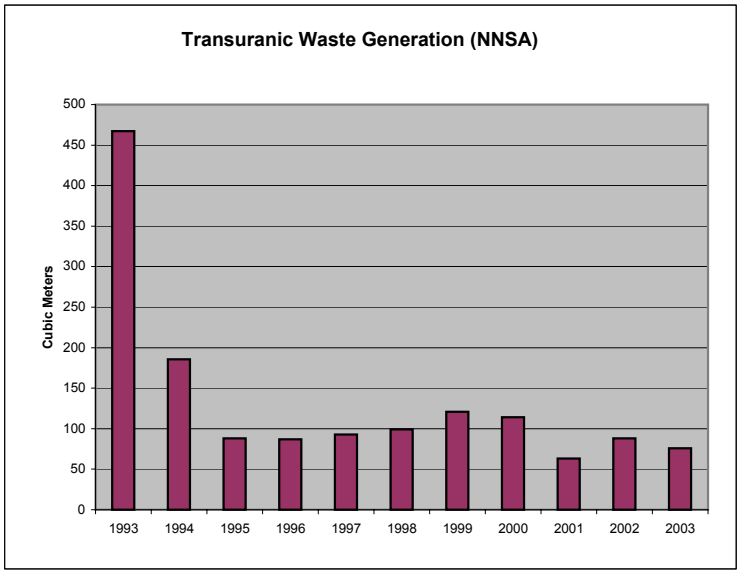
NNSA Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	16309	9056	3049	2169	2799	3322	3042	1828	2710	4762	3576
Transuranic	467	186	88	87	93	99	121	114	63	88	76
Low-Level Mixed	566	944	87	67	344	87	52	46	36	38	40
Hazardous	8468	5748	1184	841	624	751	515	484	493	606	793
Sanitary	64114	58697	47764	52263	33646	22010	25089	17342	16000	15231	16817

NNSA Waste Reduction Performance

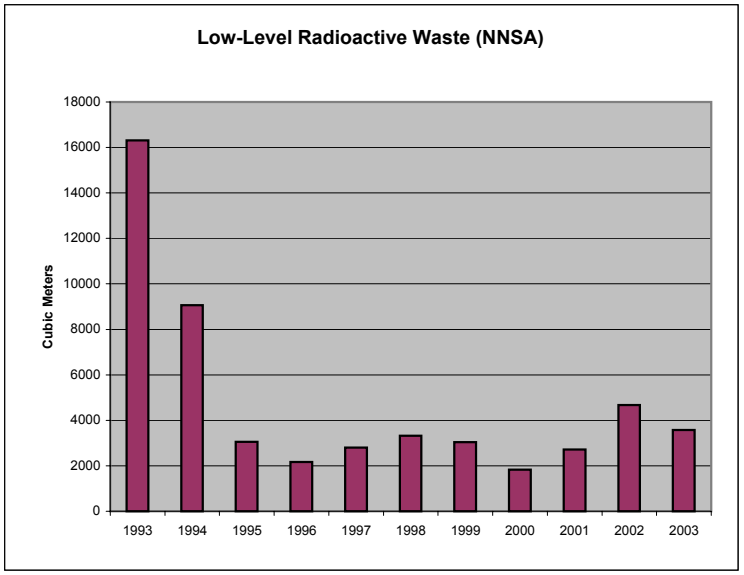
TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive	16,309	3,262	3,576	314	78%	80%
Transuranic Waste	467	93	76	0	84%	80%
Low-Level Mixed	566	113	40	0	93%	80%
Hazardous Waste	8,468	847	793	0	91%	90%
Sanitary Waste	64,114	16,029	16,817	789	74%	75%
Units: cubic meters (cm) = metric tons						

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)



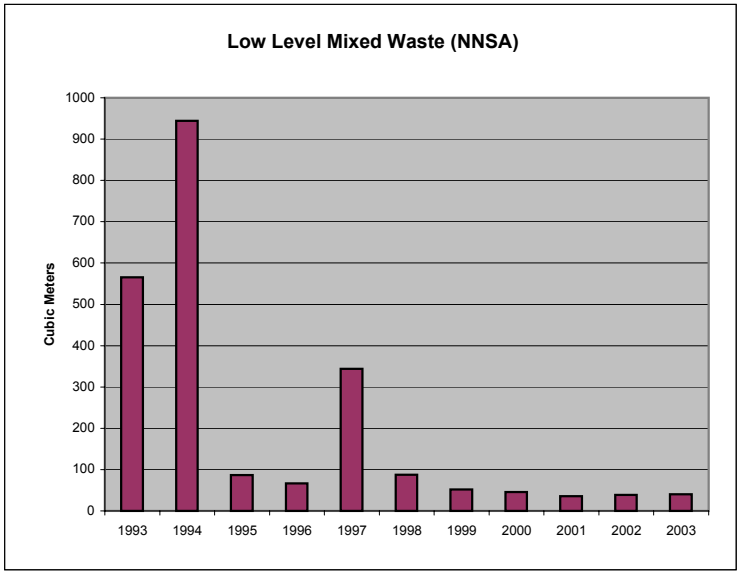
	2002	2003
Complex Wide TRU Waste	175	187
Total NNSA Generation	88	76
NNSA Site Contribution:		
L. Livermore Nat'l Lab	1	2
Los Alamos National Lab	87	74
	(cubic meters)	

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)



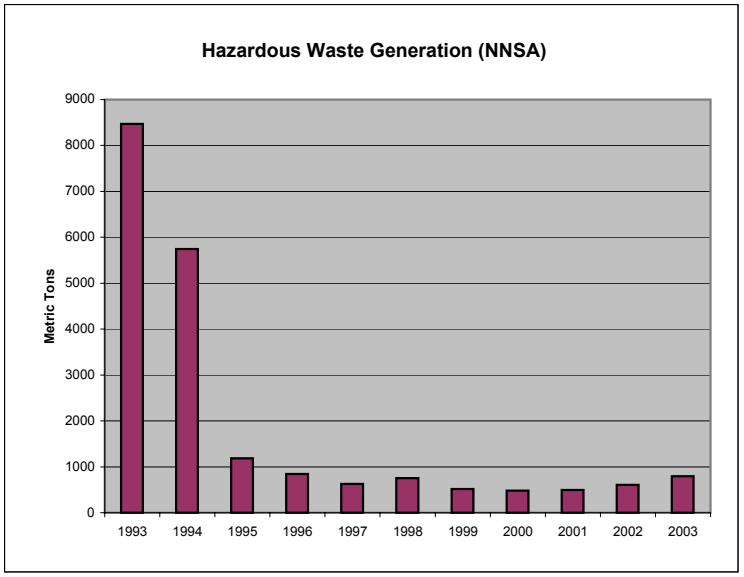
	2002	2003
Complex Wide LL Waste	12,167	12,560
Total NNSA Generation	4,762	3,576
NNSA Site Contribution:		
Argonne National Lab East	6	4
Los Alamos National Lab	87	74
Idaho National EE Lab	909	-
Knolls Atomic Energy Plant	-	48
L. Livermore Nat'l Lab	74	73
Los Alamos National Lab	337	683
Naval-Bettis Atomic Lab	-	304
Oak Ridge Nat'l Lab	-	44
Y-12	2,832	1,926
Pantex	129	58
Sandia - CA	-	2
Sandia - NM	67	31
Savannah River Site	321	329
	(cubic meters)	

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)



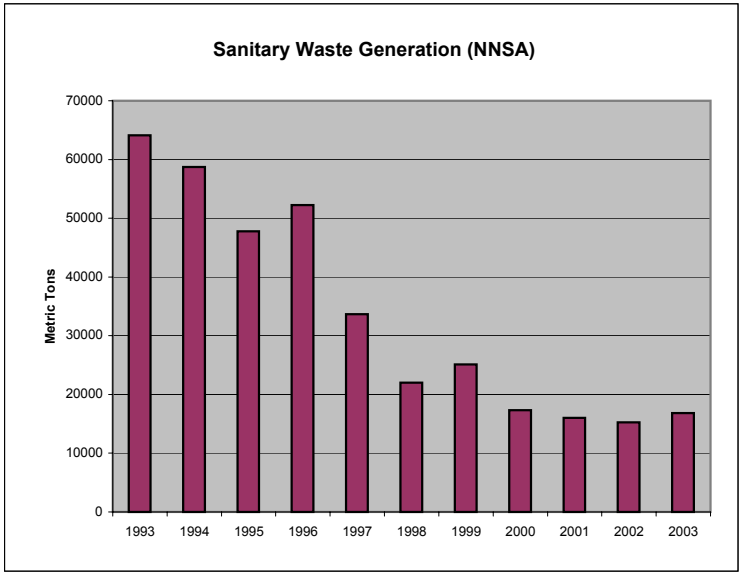
	2002	2003
Complex Wide LL Mixed	476	281
Total NNSA Generation	38	40
NNSA Site Contribution:		
Knolls Atomic Energy Plant	-	1
L. Livermore Nat'l Lab	7	13
Los Alamos National Lab	4	5
Y-12	14	16
Pantex	2	1
Sandia - NM	9	3
Savannah River Site	2	1
	(cubic meters)	

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total NNSA Generation	606	793
NNSA Site Contribution:		
Kansas City Plant	47	58
Knolls Atomic Energy Plant	-	385
L. Livermore Nat'l Lab	246	163
Los Alamos National Lab	14	24
Naval-Bettis Atomic Lab	-	7
Nevada Test Site	10	15
Oak Ridge Nat'l Lab	-	1
Y-12	4	8
Pantex	210	36
Sandia - CA	29	32
Sandia - NM	46	64
	(cubic meters)	

NATIONAL NUCLEAR SECURITY ADMINISTRATION (NNSA)



	2002	2003
Complex Wide San. Waste	38,414	27,902
Total NNSA Generation	15231	16817
NNSA Site Contribution:		
Kansas City Plant	1,214	1,669
Knolls Atomic Energy Plant	-	1,099
L. Livermore Nat'l Lab	1,803	1,690
Los Alamos National Lab	1,822	1,481
Naval-Bettis Atomic Lab	-	1,737
Nevada Test Site	5,432	4,425
Y-12	2,704	2,311
Pantex	666	811
Sandia - CA	180	177
Sandia - NM	1,410	1,417
	(cubic meters)	

OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration, and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

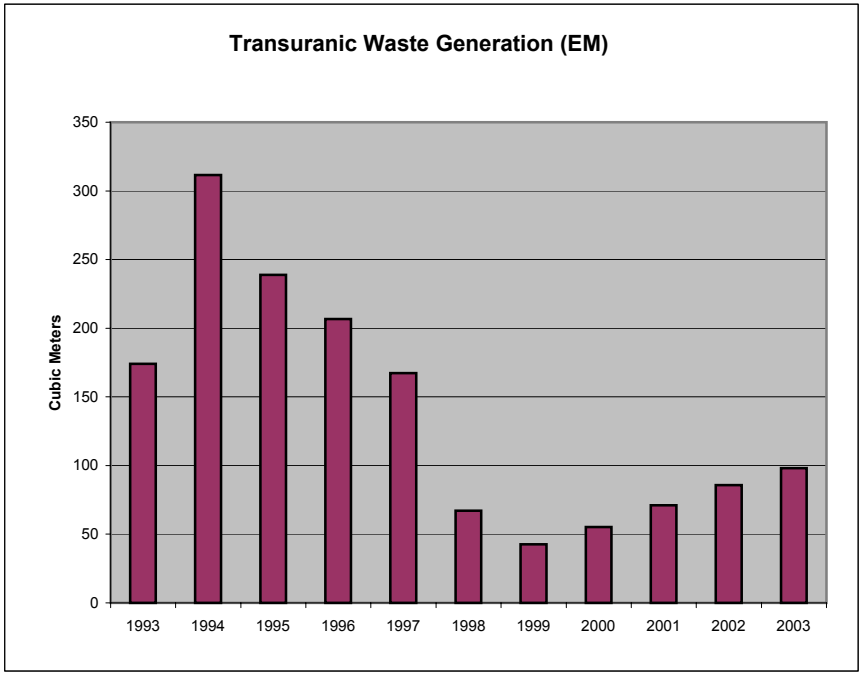
EM Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	20959	16274	16167	11160	12315	8945	6637	6847	6728	5971	4782
Transuranic	174	312	239	207	167	67	43	55	71	87	98
Low-Level Mixed	2029	1750	1184	1266	978	1074	730	718	894	346	172
Hazardous	1205	2738	778	440	368	503	117	98	99	79	37
Sanitary	34336	33840	37348	25623	20628	19456	14270	12491	12722	15238	2911

EM Waste Reduction Performance

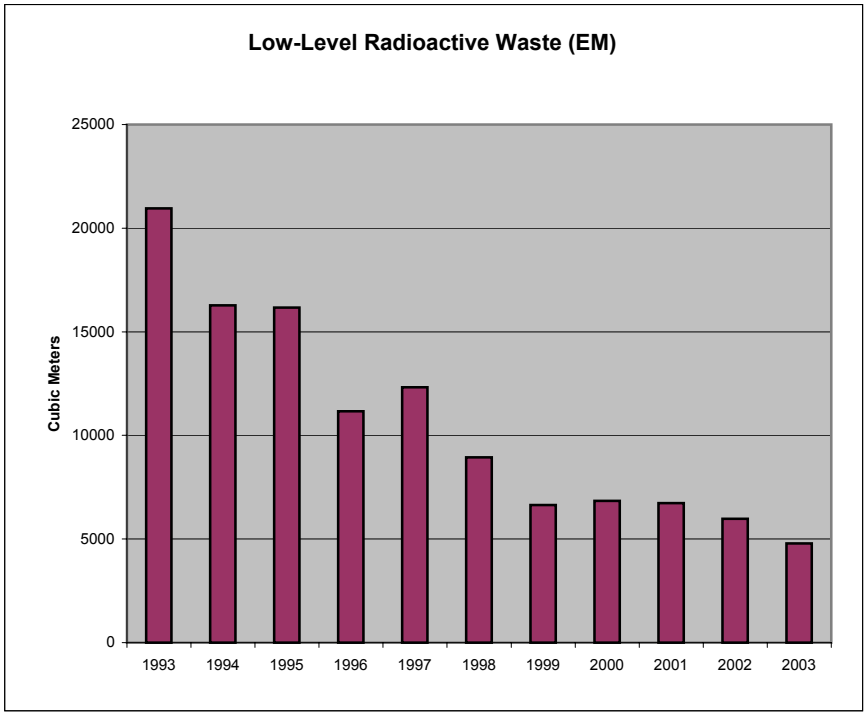
TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive	20,959	4,192	4,782	590	77%	80%
Transuranic Waste	174	35	98	63	44%	80%
Low-Level Mixed	2,029	406	178	0	91%	80%
Hazardous Waste	1,205	121	37	0	97%	90%
Sanitary Waste	34,336	8,584	2,911	0	92%	75%
Units: cubic meters (cm) = metric tons						

OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)



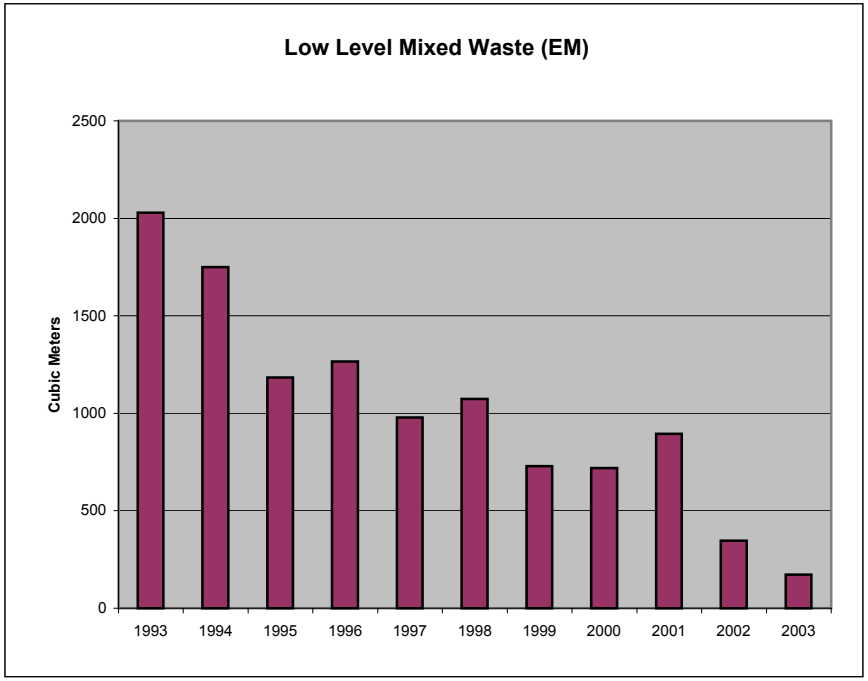
	2002	2003
Complex Wide TRU Waste	175	187
Total EM Generation	87	98
EM Site Contribution:		
Idaho National EE Lab	1	-
Oak Ridge National Lab	2	-
Savannah River Site	76	98
West Valley	8	-
	(cubic meters)	

OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)



	2002	2003
Complex Wide LL Waste	12,167	12,560
Total EM Generation	5,971	4,782
EM Site Contribution:		
Argonne Nat'l Lab - East	3	3
East Tennessee Tech. Park	74	38
Fernald	310	-
Hanford	90	60
Idaho National EE Lab	667	-
L. Livermore National Lab	6	11
Oak Ridge Nat'l Lab	22	-
Y-12	27	-
Savannah River Site	4,344	4,669
WIPP	-	1
West Valley	428	-
	(cubic meters)	

OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)



	2002	2003
Complex Wide LL Mixed	476	281
Total EM Generation	346	172
EM Site Contribution:		
East Tennessee Tech. Park	25	137
Fernald	10	-
Hanford	13	-
Idaho National EE Lab	38	-
L. Livermore National Lab	3	5
Oak Ridge Nat'l Lab	18	-
Y-12	7	-
Savannah River Site	232	30
West Valley	-	-
	(cubic meters)	

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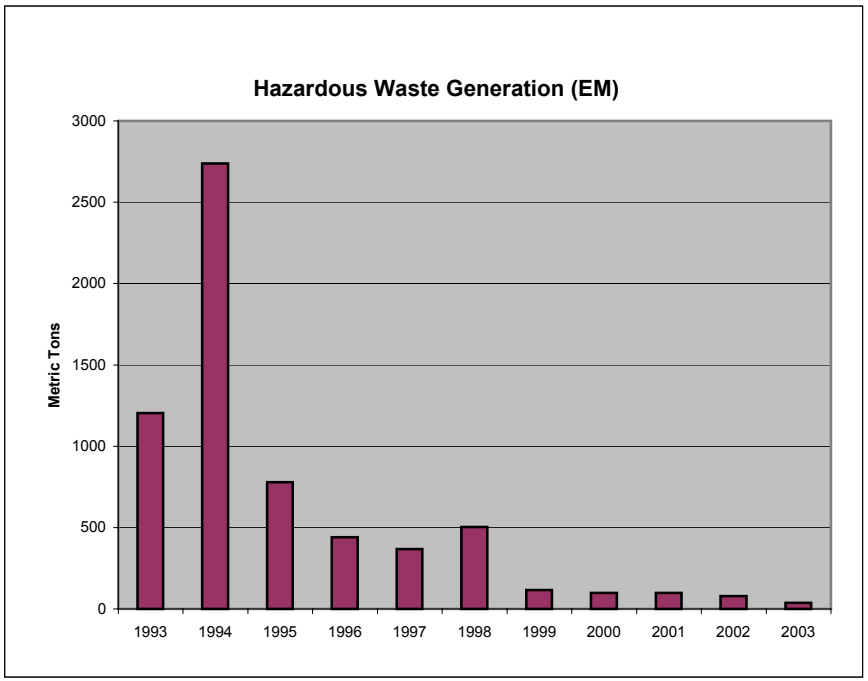
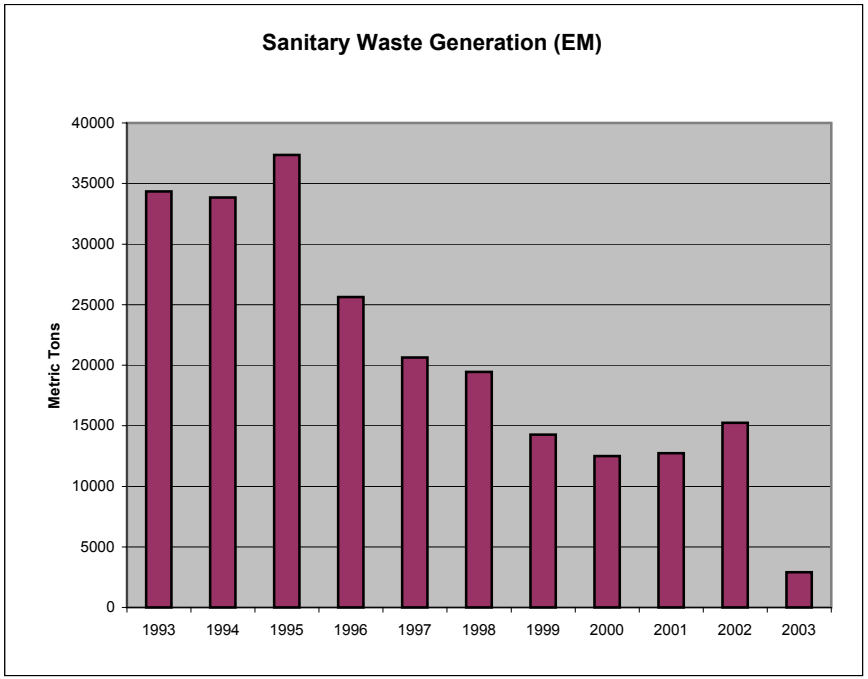


	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total EM Generation	79	37
EM Site Contribution:		
Fernald	7	-
Hanford	7	-
Idaho National EE Lab	26	-
L. Livermore National Lab	9	5
Los Alamos National Lab	-	1
Nevada Test Site	1	-
Oak Ridge Nat'l Lab	1	-
Sandia - CA	-	1
Sandia - NM	1	-
Savannah River Site	18	23
WIPP	9	7
West Valley	-	-
	(cubic meters)	

OFFICE OF ENVIRONMENTAL MANAGEMENT (EM)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total EM Generation	15,238	2,911
EM Site Contribution:		
East Tennessee Tech. Park	278	311
Fernald	11,392	-
Grand Junction	-	24
Hanford	185	265
Idaho National EE Lab	1,043	265
Rocky Flats	486	429
Santa Susanna	43	56
Savannah River Site	1,380	1,472
WIPP	100	89
West Valley	331	-

(cubic meters)

OFFICE OF FOSSIL ENERGY (FE)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

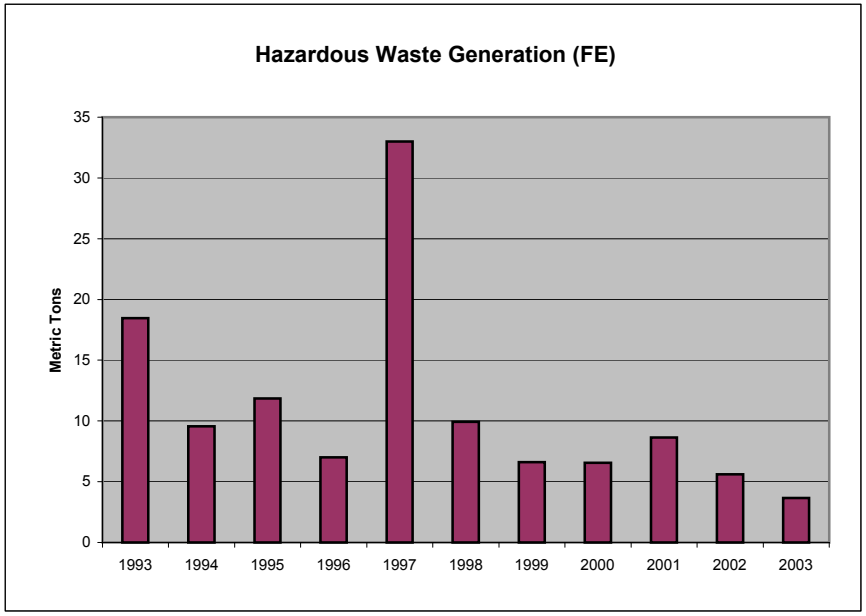
FE Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	0	0	0	0	0	0	0	0	0	0	0
Transuranic	0	0	0	0	0	0	0	0	0	0	0
Low-Level Mixed	0	0	0	0	0	0	0	0	0	0	0
Hazardous	18	10	12	7	33	10	7	7	9	6	4
Sanitary	3731	99	96	0	77	538	700	520	527	631	545

FE Waste Reduction Performance

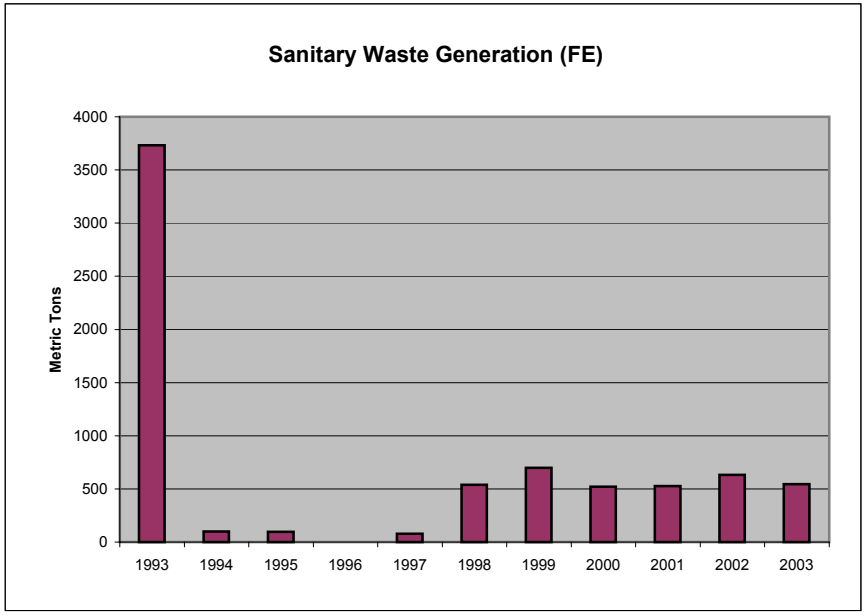
TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Hazardous Waste	18	2	4	2	78%	90%
Sanitary Waste	3,731	933	545	0	85%	75%
Units: cubic meters (cm) = metric tons						

OFFICE OF FOSSIL ENERGY (FE)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total FE Generation	6	4
FE Site Contribution:		
National Energy Technology Lab	6	3
Four other FE sites total 0.72	-	1
	(cubic meters)	

OFFICE OF FOSSIL ENERGY (FE)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total FE Generation	631	545
FE Site Contribution:		
Albany Research Center	-	136
National Energy Technology Lab	411	204
Naval Preserve : WY	-	2
Strategic Petroleum Res. Project	220	203
	(cubic meters)	

POWER MARKETING ADMINISTRATIONS (PM)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

PM Waste Generation

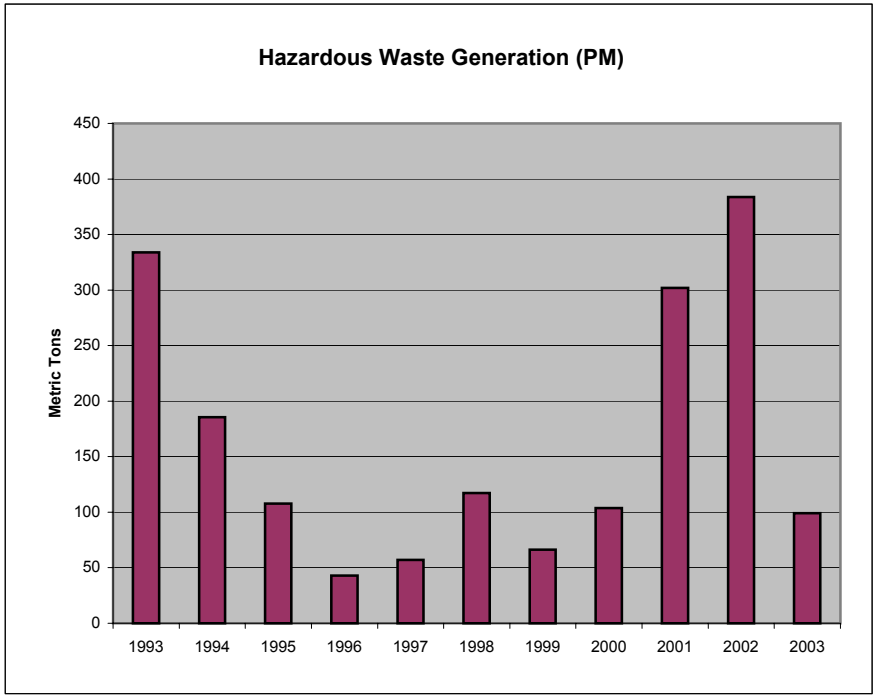
Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	0	0	0	0	0	0	0	0	0	0	0
Transuranic	0	0	0	0	0	0	0	0	0	0	0
Low-Level Mixed	0	0	0	0	0	0	0	0	0	0	0
Hazardous	334	185	108	43	57	117	66	104	302	384	99
Sanitary	8068	6385	237	3241	1540	1357	1388	1797	776	778	1264

PM Waste Reduction Performance

TYPE OF WASTE	1993 Baseline Waste Gen (mt)	2005 Goal Waste Gen (mt)	2003 Status Waste Gen (mt)	Waste reduction needed to meet 2005 goal (mt)	% Reduction made to date	2005 Goal % (baseline reduction)
Hazardous Waste	334	33	99	66	70%	90%
Sanitary Waste	8,068	2,017	1,264	0	84%	75%
Units: cubic meters (cm) = metric tons						

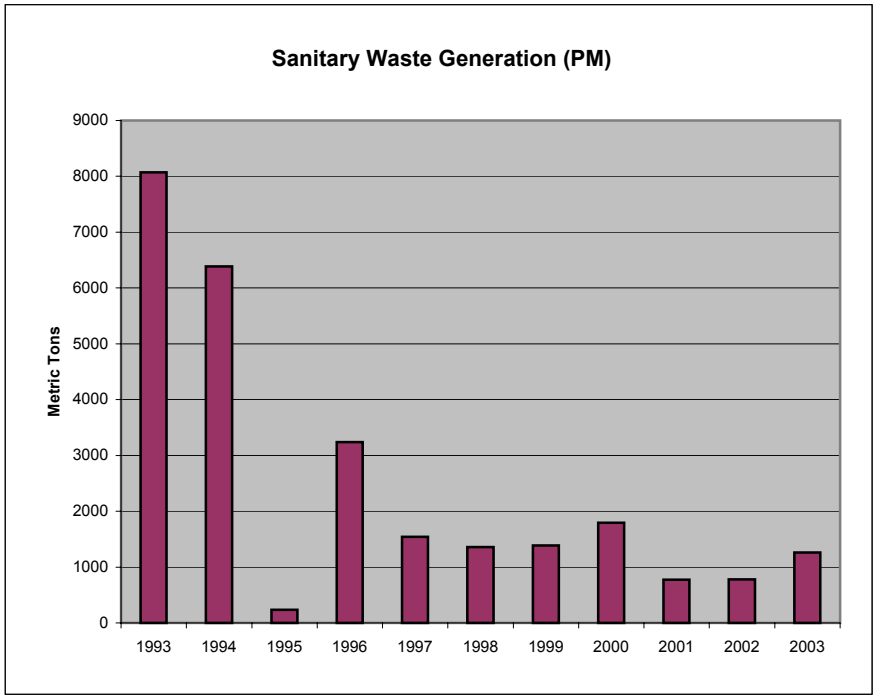
Data available for Southwestern, Southeastern and Western Power Administrations

POWER MARKETING ADMINISTRATIONS (PM)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total PM Generation	384	99
PM Site Contribution:		
Southwestern Power Admin	236	39
Souhteastern Power Admin	148	60
	(cubic meters)	

POWER MARKETING ADMINISTRATIONS (PM)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total PM Generation	778	1264
PM Site Contribution:		
Southwestern Power Admin	13	12
Western Area Power Admin	765	1,252
	(cubic meters)	

OFFICE OF SCIENCE (SC)

DOE Pollution Prevention Goals for Waste Reduction*

Category	2005 Goal (reduction from 1993 baseline)
Low-Level Radioactive Waste	80%
Transuranic Waste	80%
Low-Level Mixed Waste	80%
Hazardous Waste	90%
Sanitary Waste	75%

*Routine waste from national security operations, scientific research, administration and maintenance, refurbishing of facilities in standby status; does not include cleanup or stabilization of legacy wastes.

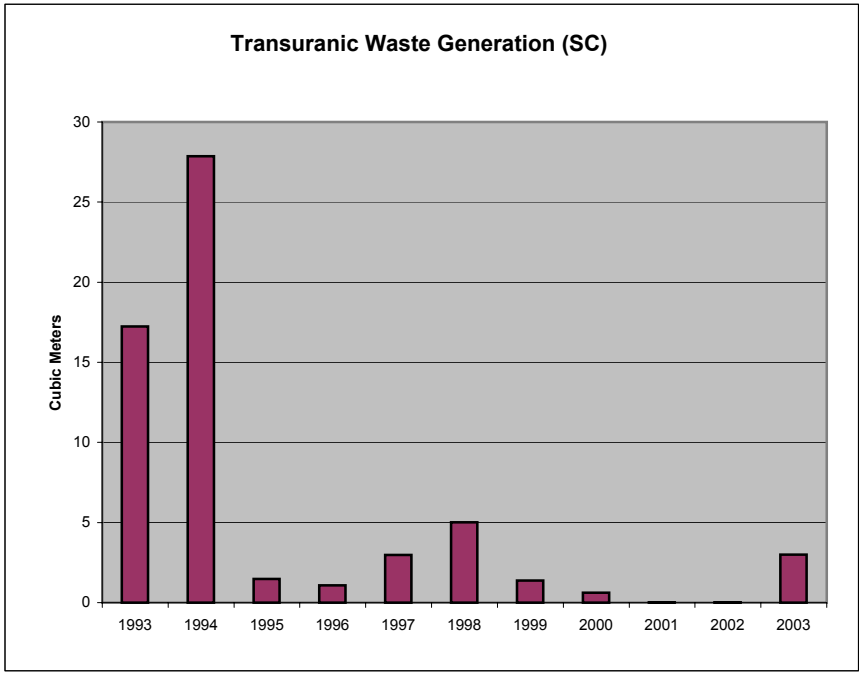
SC Waste Generation

Type	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Low-Level Radioactive	1984	3537	1216	1007	884	840	762	626	649	714	676
Transuranic	17	28	1	1	3	5	1	1	0	0	3
Low-Level Mixed	95	96	51	24	41	34	24	28	30	83	31
Hazardous	4317	3737	1932	1507	1611	659	315	293	280	286	306
Sanitary	9576	7805	9804	7230	4889	4322	5087	4846	5534	5346	5299

SC Waste Reduction Performance

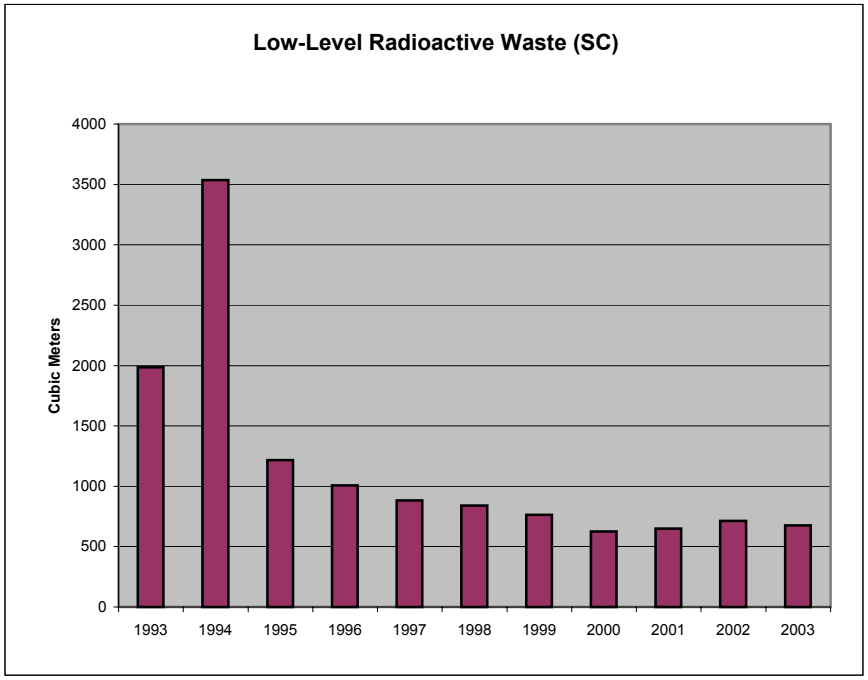
TYPE OF WASTE	1993 Baseline Waste Gen (cm)	2005 Goal Waste Gen (cm)	2003 Status Waste Gen (cm)	Waste reduction needed to meet 2005 goal (cm)	% Reduction made to date	2005 Goal % (baseline reduction)
Low-Level Radioactive	1,984	397	676	279	66%	80%
Transuranic Waste	17	3	3	0	82%	80%
Low-Level Mixed	95	19	31	12	67%	80%
Hazardous Waste	4,317	432	306	0	93%	90%
Sanitary Waste	9,576	2,394	5,299	2,905	45%	75%
Units: cubic meters (cm) = metric tons						

OFFICE OF SCIENCE (SC)



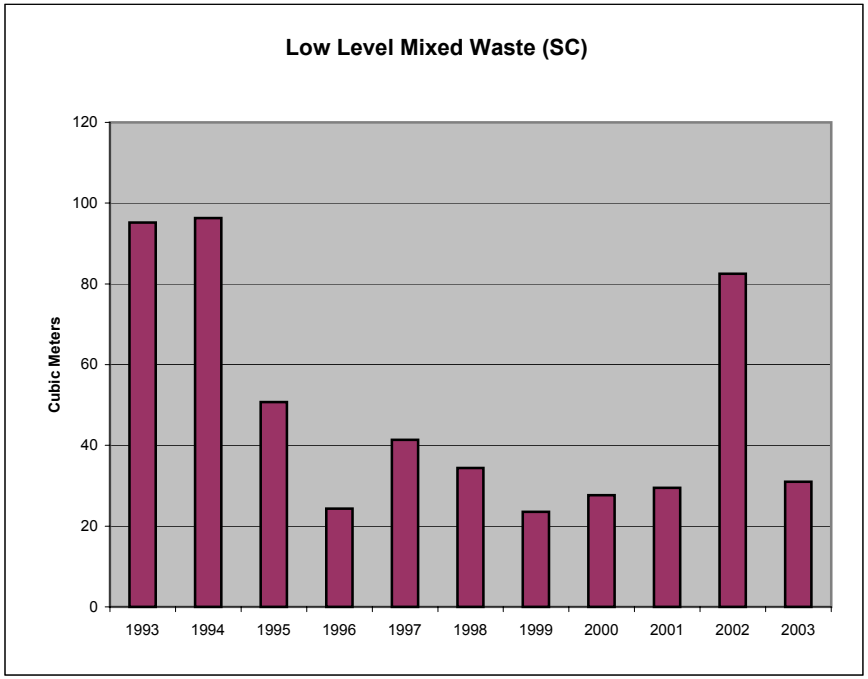
	2002	2003
Complex Wide TRU Waste	175	187
Total SC Generation	-	3
SC Site Contribution:		
Oak Ridge Nat'l Lab	-	3
	(cubic meters)	

OFFICE OF SCIENCE (SC)



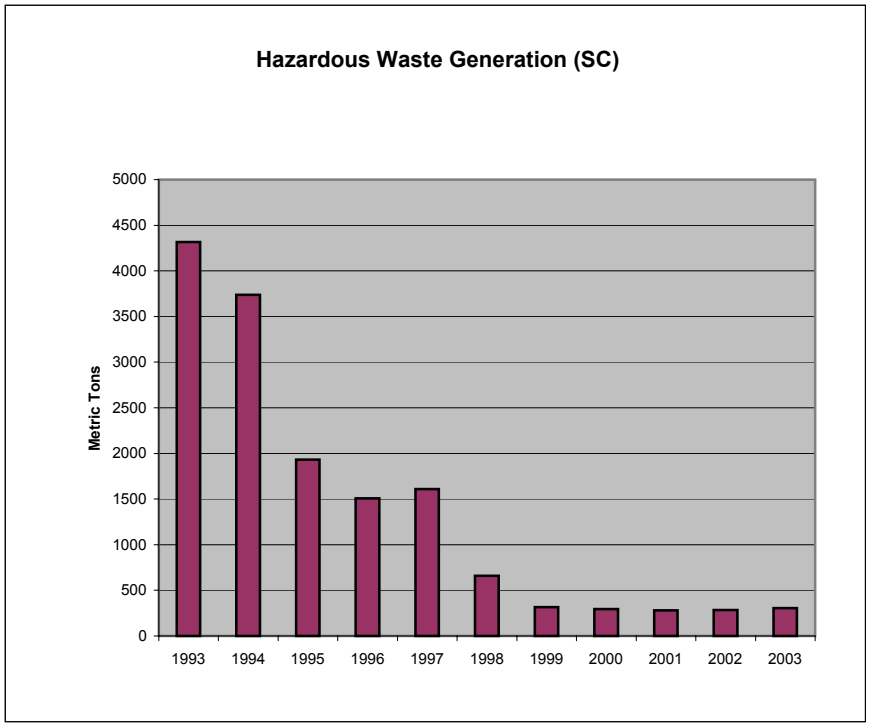
	2002	2003
Complex Wide LL Waste	12,167	12,560
Total SC Generation	714	676
SC Site Contribution:		
Argonne Nat'l Lab - East	61	39
Brookhaven National Lab	146	72
Fermi Nat'l Accelerator Lab	294	366
Lawrence Berkeley Nat'l Lab	5	3
L. Livermore National Lab	1	1
Los Alamos Nat'l Lab	7	31
Oak Ridge Institute	1	-
Oak Ridge Nat'l Lab	148	64
Pacific Northwest Nat' Lab	40	93
Jefferson National Accelerator	11	7
	(cubic meters)	

OFFICE OF SCIENCE (SC)



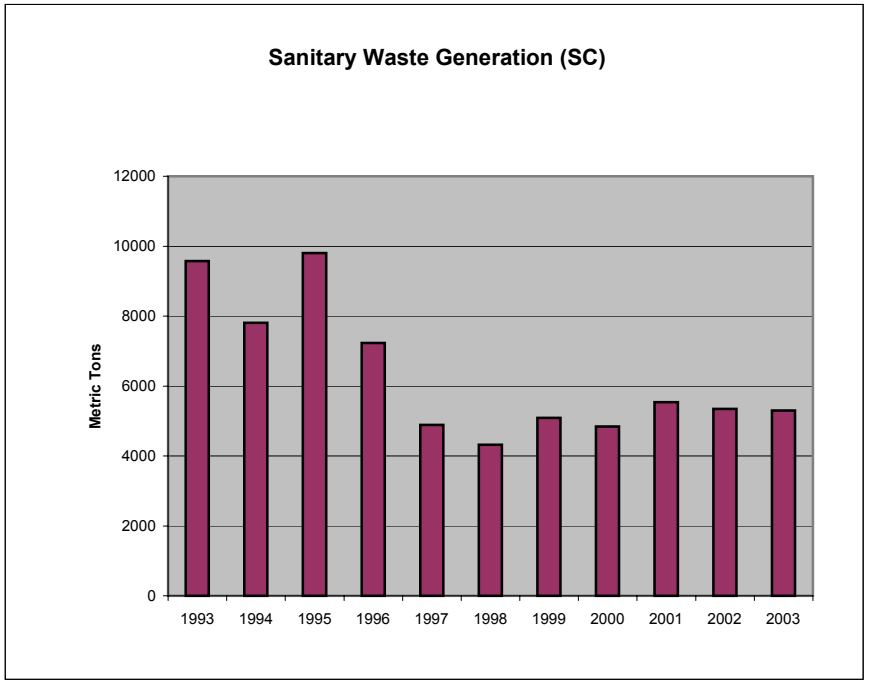
	2002	2003
Complex Wide LL Mixed	476	281
Total SC Generation	83	31
SC Site Contribution:		
Argonne Nat'l Lab - East	50	20
Brookhaven National Lab	3	1
L. Livermore National Lab	1	1
Oak Ridge Nat'l Lab	1	1
Pacific Northwest Nat' Lab	28	8
	(cubic meters)	

OFFICE OF SCIENCE (SC)



	2002	2003
Complex Wide Haz. Waste	1,368	1,285
Total SC Generation	286	306
SC Site Contribution:		
Ames Lab	3	3
Argonne Nat'l Lab - East	45	28
Brookhaven National Lab	88	107
Fermi Nat'l Accelerator Lab	30	33
Lawrence Berkeley Nat'l Lab	33	28
L. Livermore National Lab	7	10
Los Alamos Nat'l Lab	-	2
Oak Ridge Institute	1	-
Oak Ridge Nat'l Lab	9	8
Pacific Northwest Nat' Lab	7	9
Princeton Plasma Physics Lab	11	21
Sandia - CA	1	1
Sandia - NM	1	2
Stanford Linear Accelerator	45	47
Jefferson National Accelerator	5	7
	(cubic meters)	

OFFICE OF SCIENCE (SC)



	2002	2003
Complex Wide Sanitary Waste	38,414	27,902
Total SC Generation	5346	5299
SC Site Contribution:		
Argonne Nat'l Lab - East	1,462	1,063
Brookhaven National Lab	555	576
Fermi Nat'l Accelerator Lab	338	318
Lawrence Berkeley Nat'l Lab	664	375
Oak Ridge Institute	46	53
Oak Ridge Nat'l Lab	1,143	1,039
OSTI	18	17
Pacific Northwest Nat' Lab	174	1,021
Princeton Plasma Physics Lab	120	93
Stanford Linear Accelerator	519	503
Jefferson National Accelerator	307	241
	(cubic meters)	

Attachment 2

COMPILATION OF POLLUTION PREVENTION BEST PRACTICES IN SUPPORT OF THE WASTE REDUCTION REVITALIZATION INITIATIVE

U. S. Department of Energy

April 2004

TABLE OF CONTENTS

1. Introduction and Background

The Department of Energy (DOE) is committed to demonstrating leadership in environmental management by integrating environmental accountability into day-to-day decision-making and long-term planning processes across all Departmental missions, activities, and functions. Whether supporting the country in national security, basic and applied science or energy for economic security, the Department must advance the national policy of preventing or reducing pollution at the source whenever feasible and cost-effective. The Department has pursued P2 and waste minimization activities for more than 10 years.

On November 12, 1999, the Secretary of Energy issued a Memorandum entitled "Pollution Prevention and Energy Efficiency Leadership Goals for Fiscal Year 2000 and Beyond." The Memorandum directed DOE facilities to use pollution prevention practices in everyday operations because DOE facilities that "employ pollution prevention (P2) and energy efficiency practices will save money by enhancing productivity while reducing their cumulative impact on the environment." To evaluate the progress of this effort, the Secretarial Memorandum described several P2 goals for DOE to achieve by 2005.

DOE has actively engaged in promoting P2 activities pre-dating Executive Order (EO) 13148 (Greening the Government through Leadership in Environmental Management). DOE also started a P2 Awards Program to increase acceptance and awareness of its P2 program. In addition, it annually prepares the EO 13148 Annual Progress Report that examines the Department's progress in complying with the requirements of EO 13148 and meeting the Secretarial P2 Goals.

The purpose of this best practices summary is to highlight DOE's success in identifying opportunities to reduce or eliminate pollution in its operations throughout the DOE Complex. This summary presents examples of these innovative and cost-effective practices in each category established by the DOE P2 Goals. It is intended to provide DOE line management with examples of P2 projects developed elsewhere that have potential applicability at their sites. It is also intended to provide contact points within the DOE complex to provide guidance to those seeking to replicate these successes.

There are three sections in this summary. The first section briefly discusses the background of DOE's P2 efforts since 1999. The second section identifies the project selection criteria and defines the terms used in the project summaries. Finally, the last section contains the one-page project summaries of 34 successful P2 best-practice projects. The project summaries contain information regarding the nature of the project, project savings, waste reduction amounts, and contact information.

The information in this document is intended to facilitate the transfer of successful P2 practices to other sites, thereby furthering progress towards meeting the DOE P2 goals.

1.1. Executive Order 13148, Greening the Government through Leadership in Environmental Management

EO 13148 was issued to ensure that Federal agencies integrate environmental accountability into daily decision making and planning in all their activities. The EO, issued in April 2000, complemented and reinforced already existing pollution prevention goals and environmental objectives that the DOE developed in 1999 and the Department's Agency Environmental Executive (AEE) reiterated in 2002. EO 13148 defines pollution prevention as source reduction and "other practices that reduce or eliminate the creation of pollutants through: (a) increased efficiency in the use of raw materials, energy, water, or other resources; or (b) protection of natural resources by conservation." Source reduction pertains to any practice that reduces the amount of hazardous substances, pollutants, or contaminants entering waste streams or the environment prior to recycling, treatment, or disposal, and the hazards to public health and the environment associated with them.

The Department has expanded the EO definition of pollution prevention to include recycling. This expanded definition is consistent with that used in 1996 International Organization for Standardization (ISO) Document 14001, Environmental Management Systems – Specification with Guidance for Use, and by the Council on Environmental Quality. In furtherance of the EO requirement that agencies implement environmental management systems (EMS), the Department developed DOE Order 450.1, *Environmental Protection Program*, which requires all DOE elements to implement an EMS into their existing, DOE-required Integrated Safety Management Systems (ISMS). DOE's Deputy Secretary issued the Order on January 15, 2003.

As part of its efforts to ensure that the goals and requirements of EO 13148 are incorporated into existing DOE operational activities, DOE adopted the P2 Goals in the Secretarial Memorandum of 1999. The goals set ambitious Department-wide targets for the reduction or elimination of waste in six specific waste categories, and for an increase in the purchase of products with recycled-content and environmentally preferable products and services. These goals and the results to date are listed in Table 1.

Table 1: Secretarial P2 Goals for 2005

Category	***Performance as of FY 2003***	***2005 Goal***
Affirmative Procurement	*79% purchased*	*100%*
Low-Level Radioactive Waste	*70% reduced*	*80%*
Transuranic Waste	*74% reduced*	*80%*
Low-Level Mixed Waste	*92% reduced*	*80%*
Hazardous Waste	*91% reduced*	*90%*
Sanitary Waste	*77% reduced*	*75%*
Recycling	*50% recycled*	*45%*

The primary function of P2 is to reduce or eliminate the generation of waste, the release of pollutants to the environment, and the use of Class I ozone-depleting substances (ODS) through source reduction, re-use, segregation, and recycling and by procuring recycled-content materials and environmentally preferable products and services. As illustrated in Table 1, DOE and site personnel have responded to the challenge and have made great headway. DOE is determined to improve upon the success of its efforts and meet the challenge established five years ago. However, these goals and accomplishments indicate only "how much" waste has been reduced, not "how" it was reduced. In order to disseminate effective methods on how to reduce waste, awards programs, annual reports and best practices summaries such as this document are being used.

1.2. P2 Awards Program

DOE established the P2 Awards Program to recognize outstanding performance by Departmental operations by granting awards in numerous categories related to waste reduction and reuse, recycling, and affirmative procurement of materials with recycled content. In addition to the P2 Awards Program, eligible entries in the Awards Program are nominated for inclusion in the White House Closing the Circle competition. The White House Closing the Circle competition recognizes Federal employees and facilities making significant contributions in the areas of waste prevention, recycling, and affirmative procurement. Individual sites also have their own awards programs to incentivize worker involvement in P2 programs.

1.3. Annual Progress Report

In the Secretarial Memorandum of 1999, DOE established P2 goals to be achieved by 2005 for routine generation of hazardous, low-level radioactive, low-level mixed and sanitary wastes. DOE measures and reports on the progress towards meeting these goals each year. Each DOE site gathers and reports data on waste generation, reduction, and site-specific P2 accomplishments including quantity of material recycled/reused. The resulting data are collected and analyzed for inclusion in the "Annual Progress Report for Executive Order 13148: Greening the Government through Leadership in Environmental Management." This report presents waste generation data by reporting site, waste type, and year. Data on P2 accomplishments, including amounts of waste reduced and material recycled/reused, are also available by reporting site, waste type, and year. Annual report data are analyzed to assess DOE's overall progress toward achieving its 2005 P2 goals.

2. Selecting and Defining the Projects

Despite each facility's unique characteristics and mission, many activities or functions are similar throughout the DOE complex. The challenge for DOE is to identify those P2 practices or processes that can be implemented at other facilities. To assist the Program Offices in identifying innovative and effective P2 practices or processes, the Office of Pollution Prevention and Resource Conservation (EH-43) has compiled a list of examples of such projects implemented at certain sites in the past for other DOE sites to consider.

2.1. Project Selection Criteria

DOE has developed and implemented hundreds of P2 projects and practices at DOE sites over the years. For this task, the Office of Pollution Prevention and Resource Conservation (EH-43) restricted its review to those projects nominated for the 2002 P2 Awards Program, projects reported in the 2002 Waste Reporting Accomplishments database, and other successful projects and practices provided by the Program Offices. At the time of the review, information on the projects conducted in 2003 had not been reported. In reviewing the information in these databases, EH-43 noted that P2 projects ranged from resource-intensive efforts involving the construction of new facilities to simple, easily implemented practices. The purpose of this review was to identify only those P2 projects that meet the following criteria:

- the project can be readily implemented at other sites in order to meet the 2005 goals;
- the project has the ability to reduce or eliminate generation of waste.

Costs and resource requirements were key factors in assessing ability to implement. As FY 2004 budgets are already established, projects that required large capital outlays and extensive resource support were not considered. However, those projects with modest project costs and resource requirements were screened for inclusion in this report.

2.2. P2 Project Definition

Section 3 of this report contains one-page summary descriptions of 34 projects that represent recent best practices used at DOE sites to reduce or minimize waste and improve cost-effectiveness. These projects were drawn from the 2002 P2 accomplishments database at http://tis.eh.doe.gov/p2/wastemin/accomp.asp and the Fossil Energy ESS&H (FE-7) Best Practices database http://bestpractices.fossil.energy.gov. These databases provide information on P2 accomplishments between 1996 and 2003. P2 projects nominated in 2002 for awards, including the White House Closing the Circle competition, can be viewed at http://tis.eh.doe.gov/p2/p2awards/index.html. Best-practice P2 projects from 2003 and later years, including those of other federal agencies, will be included in future updates of this report.

Project Summary Format

The information at the top of each project summary identifies: (1) the **Project** name; (2) the conditions for potential **P2 Applicability** of the project to other sites; (3) the **DOE Facility** at which the project was implemented; (4) the implementing **DOE Organization**; (5) the specific **Secretarial P2 Goal(s)** being met by implementing the project; and (6) the **P2 Method (and Benefit)** by which the Secretarial Goal is being met and its associated benefit. Note that the project may contribute towards more than one Secretarial P2 Goal.

Additional information shown on the project summaries includes details concerning the savings and value of the project, the DOE group benefiting from the project, and the project contact. This information is contained in the **Summary Data** table on each summary page. The elements of this table are defined below:[1]

- In the **Savings** field, the monetary savings realized by the implementing group are identified. The entry may not include monetary savings alone; it may also include costs avoided by implementing the project.
- The **Lifecycle Waste Reduction** entry represents the quantity of waste materials not generated due to implementing the project. The data may be estimated for some projects on either a monthly or an annual basis. The data also may be reported as a total quantity.
- In the **Useful Life** field, the expected lifespan of the project is reported. For those projects that implemented process improvements (e.g., adopted new recycling practices), the timeframe is identified as "indefinite."
- The **Program Office** is the DOE Office that serves as the facility landlord and benefits from the project.
- The **Project Contact** is the person knowledgeable about the P2 project and who can be contacted for additional information.
- The **Original Problem** field contains a brief description of the events or circumstances upon which the P2 project was based.
- The **Project Solution** field describes the steps taken to implement the P2 project. The commercial names of devices and companies used to achieve the P2 objectives are identified in some cases. Identification of these devices and companies should not be construed as an endorsement of the specific devices and companies, but rather a record of how the accomplishment was achieved.
- The **Value of Improvement** field provides a brief description of the monetary value derived from implementing the P2 project, and the basis for the monetary value.
- The **Other Benefits** field highlights non-monetary benefits of the P2 project.

[1] NOTE – The best practice examples are drawn from different sources with different reporting criteria. Thus, reporting fields vary somewhat in content for each example.

3. Examples of Successful Best-Practice P2 Projects

Table 2 lists the 34 best-practice P2 projects summarized in this section. This table also relates the projects to the Secretarial P2 Goals they meet.

Table 2. Best-Practice P2 Projects and Applicable Secretarial P2 Goals

Project Name	Secretarial P2 Goals						
	Affirmative Procurement	*Low-Level Radioactive Waste*	*Transuranic Waste*	*Low-Level Mixed Waste*	*Hazardous Waste*	*Sanitary Waste*	*Recycling*
1. Purchase of Materials Containing Recycled Concrete and PET	X					X	X
2. Material Substitution with Biodegradable Fluid	X			X	X		
3. Work Control to Minimize Low-Level Waste		X				X	X
4. Washable Contamination Barriers		X				X	X
5. Recycling Oil from Radiological Control Areas		X					X
6. Lead-Free Protective Aprons	X	X		X	X		
7. Brick Saw And Heating, Ventilation And Air Conditioning (HVAC) System		X					
8. 253-H Instrument Calibration and Repair Shop		X					
9. Plutonium-238 Waste Reduction			X				
10. Pu-238 Residue Solidification Process			X				
11. TRU Characterization			X				
12. Reduction of Mixed and Low-Level Waste with Imaging Scanner		X		X			
13. Reuse/Recycle Radioactively-Contaminated Lead from Dismantled Casks				X			X
14. Closing the Loop on the Ferric Chloride Waste Stream					X		X
15. Steel Fittings Reduce Oil Spills					X		
16. Rebuilt Radio-Frequency Power Tubes Save Money					X		X
17. Hot Water Parts Washer at Heavy Equipment Shop					X		
18. Oven Cleans Lab Glassware					X		
19. Nitric Acid Recovery from Metal Plating					X		X
20. Microbes Help Clean Up Oil Spills					X		
21. Machine Coolant					X		X
22. Caustic Stripper Reuse		X			X		
23. Electronic Pest Control					X		
24. Solar-Powered Barricade Flashers	X				X		
25. SPR Paint Waste Minimization Team	X				X		
26. You've Got Recyclable Mail						X	X
27. Concrete Recycling						X	X
28. Materials Recovery Facility (MRF)						X	X
29. Diskette Recycling Project						X	X
30. Construction and Demolition (C&D) Waste Recycling						X	X
31. Styrofoam Reuse						X	X
32. The Recycling of Building 913 at Sandia/CA						X	X
33. Perseverance over Resistance: ORO Recycling of Excess Zinc Bromide				X	X		X
34. Deconstruction and Recycling of Building 8-8						X	X

Project 1: Purchase of Materials Containing Recycled Concrete and PET

P2 Applicability: Sites that generate concrete demolition wastes, and/or use parking bumpers or other large, non-structural cast products

DOE Facility: Strategic Petroleum Reserve Project Management Office

Project Group: Fossil Energy

Secretarial P2 Goal(s): Affirmative Procurement, Sanitary Waste, and Recycling

P2 Method (and Benefit): Re-use (Concrete and plastic waste were reused/recycled.)

SUMMARY DATA			
Savings:	$20,500	**Program Office:**	FE
Lifecycle Waste Reduction:	9740 tons of virgin materials	**Project Contact:**	Kathy Batiste, DOE SPR Teresa Heaton, SPR
		Phone:	(504) 734-4400 (504) 734-4387
Useful Life:	~25 years	**Email:**	Katherine.Batiste@spr.doe.gov Teresa.heaton@spr.doe.gov
Original Problem:	As part of the 9/11 security enhancements, the Strategic Petroleum Reserve needed to install new parking lots.		
Project Solution:	To construct the parking lots, the SPR specified that the foundation fill material be prepared using crushed recycled concrete and the parking bumpers be made of recycled PET plastic. These specifications successfully satisfy the requirement for purchasing of specific EPA-designated recycled materials mandated by EO 13101.		
Value of Improvement:	The Bryan Mound site ordered 5,160 cubic yards (6970 tons) of recycled concrete fill at a total cost of $97,500. The site also ordered 140 parking bumpers, which were made of recycled plastic milk bottles. At Choctaw Ridge, a parking lot constructed of 2,770 tons of crushed recycled concrete was installed, and included new concrete parking stops and foundations containing fly-ash at a cost of $60,000 The use of crushed concrete versus crushed limestone resulted in an overall cost savings of $20,500.		
Other Benefits:	• Obtained 9740 tons of crushed, recycled concrete for use in parking lots and 140 parking bumpers constructed of recycled plastic. • The recycled materials in these products would have been sent to a landfill if no market existed for products with recycled content.		

Project 2: Material Substitution with Biodegradable Fluid

P2 Applicability: Sites that use hydraulic-powered equipment in radiation zones

DOE Facility: Los Alamos National Laboratory (LANL)
Project Group: FWO-SWO
Secretarial P2 Goal(s): Affirmative Procurement, Low-Level Mixed Waste, and Hazardous Waste
P2 Method (and Benefit): Source Reduction (Mixed hydraulic oil waste is avoided through product substitution.)

SUMMARY DATA			
Savings:	~$15,000 per year	**Program Office:**	LANL
Lifecycle Waste Reduction:	~3-4 cubic feet of mixed low-level waste per year	**Project Contact:**	Chris Duy, LANL
		Phone:	(505) 667-5854
Useful Life:	Indefinite	**Email:**	cduy@lanl.gov
Original Problem:	Forklifts operating in radiological control areas at LANL sometimes leak hydraulic fluid resulting in small volumes of liquid and soil that had to be expensively treated as low-level mixed waste.		
Project Solution:	The site reduced the potential for creating these wastes by switching to BioSoy™ , a less-toxic hydraulic fluid composed mainly of soybean extracts that previously was used successfully at Sandia. Soil contaminated with spilled BioSoy™ does not qualify as RCRA hazardous waste unless the concentration of heavy metals from wear on the equipment is sufficiently high.		
Value of Improvement:	Although the savings are difficult to quantify, LANL estimated that as much as $15,000 a year might be saved from the reduced volume low-level mixed waste.		
Other Benefits:	• BioSoy™ is a biodegradable and renewable resource and is therefore an environmentally preferable product. • The use of BioSoy™ reduces the potential for creating low-level mixed waste.		

Project 3: Work Control to Minimize Low-Level Waste

P2 Applicability: Sites that unpackage new equipment or materials in radiation zones, thereby creating suspect radioactive wastes from the packaging materials

DOE Facility: Los Alamos National Laboratory

Project Group: Solid Waste Operations

Secretarial P2 Goal(s): Low-Level Radioactive Waste, Sanitary Waste, and Recycling

P2 Method (and Benefit): Segregation (Contaminated packaging waste is avoided and recycling enabled though segregation of process materials.)

SUMMARY DATA			
Savings:	~$35,000 per year	**Program Office:**	LANL
Lifecycle Waste Reduction:	~70 cubic meters during 1999 and 2000	**Project Contact:**	Bob Dodge, LANL
		Phone:	(505) 665-0493
Useful Life:	Indefinite	**Email:**	rdodge@lanl.gov
Original Problem:	Contractors at LANL who performed work in radiological control areas at LANL often brought extra equipment and packaging with them to the job. When the excess cardboard, wooden pallets, plastic wrap, and supplies touched the ground, they became suspect low-level radioactive waste and had to be tested for contamination in a time-consuming process.		
Project Solution:	LANL imposed new rules on workers who entered these areas. The new rules require each job to be carefully planned in advance to enable development of a list of necessary equipment. The workers are now allowed to bring only those items on the list into these areas. Bins are set up outside the gate to store extra equipment and collect sanitary waste. The pallets, cardboard, and other recyclable materials are recycled, and the remainder is disposed of as sanitary waste.		
Value of Improvement:	During the first two years of the program, approximately 70 cubic meters of pallets, cardboard, and trash were collected outside the gate, saving about $35,000 since all of that material could have become low-level waste.		
Other Benefits:	• Employees save time by avoiding the need to scan the material exiting the waste storage area for radiation. • The potential for creating low-level radioactive waste is reduced. • The workforce is more aware of pollution prevention opportunities and impacts.		

Project 4: Washable Contamination Barriers

P2 Applicability: Sites that use plastic sheeting to control the spread of radioactive material

DOE Facility: Los Alamos National Laboratory

Project Group: Solid Waste Operations

Secretarial P2 Goal(s): Low-Level Radioactive Waste, Sanitary Waste, and Recycling

P2 Method (and Benefit): Re-use (Low-level plastic-sheeting waste is reduced through re-use/recycling.)

SUMMARY DATA			
Savings:	~$10,000 per year	**Program Office:**	LANL
Lifecycle Waste Reduction:	0.5 cubic meters of low-level waste per year	**Project Contact:**	Kevin Barbour, LANL
		Phone:	(505) 667-4045
Useful Life:	Indefinite	**Email:**	jkb@lanl.gov
Original Problem:	Plastic sheeting was placed on the floors in radiological-control areas at LANL prior to almost all operations to simplify cleanup and prevent contamination from contacting the floors and spreading. All of this plastic sheeting was eventually disposed of as low-level waste.		
Project Solution:	A team from Solid Waste Operations switched to washable tarps that can be cleaned commercially and reused indefinitely. The tarps are waterproof, just like the plastic sheeting. The decision to use these tarps was based largely on the past success of using launderable personal protective equipment.		
Value of Improvement:	Approximately $10,000 in waste disposal costs are avoided each year.		
Other Benefits:	The washable tarps tear less frequently and last much longer than plastic sheeting.		

Project 5: Recycling Oil from Radiological Control Areas

P2 Applicability: Sites that dispose of used oil potentially contaminated with tritium

DOE Facility: Los Alamos National Laboratory

Project Group: ESH-19

Secretarial P2 Goal(s): Low-Level Radioactive Waste and Recycling

P2 Method (and Benefit): Recycling (Low-level oil waste is reduced through improved technology, and recycling is enabled.)

SUMMARY DATA			
Savings:	Recycling fees are minimal, but disposing of a 55-gallon drum of radioactive oil costs ~$7000	**Program Office:**	LANL
Lifecycle Waste Reduction:	Varies, but usually >500 gallons per year	**Project Contact:**	Dustie Rich, LANL
		Phone:	(505) 665-0792
Useful Life:	Indefinite	**Email:**	dustie@lanl.gov
Original Problem:	Oil from radiological control areas at LANL was screened for radioactivity using a liquid scintillation test that used light to detect tritium. Due to the dense matrix of oil, the analysis almost always returned a false-positive result (tritium was rarely present). As a consequence, drums of oil were treated as potentially contaminated and disposed of as radioactive waste even though a high percentage were generated in ways in which contamination could not have occurred. The oil was disposed as radioactive waste at a high cost instead of being economically recycled.		
Project Solution:	American Radiation Services, Inc. developed a new test that can accurately determine whether used oil is radioactive. The test includes an oxidation procedure that facilitates detection of radioactive isotopes. False-positive results for tritium are no longer a problem. If no contamination is detected, the oil can be recycled.		
Value of Improvement:	Each drum that can be recycled instead of sent away as radioactive waste saves the generating group about $7000.		
Other Benefits:	Many of the drums of oil that were previously categorized as radioactive waste because they originated from a radiological control area can now be recycled.		

Project 6: Lead-Free Protective Aprons

P2 Applicability: Sites that use leaded aprons to shield workers from radiation

DOE Facility: Los Alamos National Laboratory
Project Group: Pit Disposition Science and Technology Group
Secretarial P2 Goal(s): Affirmative Procurement, Low-Level Radioactive Waste, Low-Level Mixed Waste, and Hazardous Waste
P2 Method (and Benefit): Source Reduction (Lead and mixed lead waste is avoided through material substitution.)

SUMMARY DATA			
Savings:	Varies. EarthSafe™ aprons do not need to be handled as hazardous or mixed low-level waste, but these types of aprons are more expensive to handle than sanitary or low-level waste.	**Program Office:**	LANL
Lifecycle Waste Reduction:	~10 lb per apron	**Project Contact:**	Jane Lloyd, LANL
		Phone:	(505) 665-0227
Useful Life:	~5 years	**Email:**	jlloyd@lanl.gov
Original Problem:	Employees in the Pit Disposition and Science Technology Group wore lead-containing aprons in certain radiological control areas to minimize exposure to radiation. Because lead is a regulated metal, the aprons must be managed as hazardous waste or, if they become contaminated with any radioactive material, they must be managed as mixed low-level waste that is quite expensive. In addition, the leaded aprons are quite heavy and uncomfortable to wear for long periods of time and their vinyl covers can be torn which could result in lead exposure.		
Project Solution:	The lead-containing aprons were replaced with lead-free EarthSafe™ aprons. These aprons work as well in situations where a leaded apron would be appropriate. The EarthSafe™ aprons do not contain any hazardous components, but meet the same protection standards as traditional lead-containing aprons.		
Value of Improvement:	When the EarthSafe™ aprons are no longer usable, they are disposed as sanitary or low-level radioactive waste instead of as hazardous or low-level mixed waste. The EarthSafe™ aprons are cheaper to dispose of because they contain no hazardous materials.		
Other Benefits:	• The EarthSafe™ aprons last as long and shield against radiation as well as the lead-containing aprons they replaced. • Users prefer the EarthSafe™ aprons because they are about 20% lighter and more comfortable to wear.		

Project 7: Brick Saw And Heating, Ventilation And Air Conditioning (HVAC) System

P2 Applicability: Sites able to relocate a non-radioactive operation from a radiologically contaminated area, thereby avoiding contamination and the generation of radioactive waste

DOE Facility: Oak Ridge Y-12 National Security Complex

Project Group: NNSA

Secretarial P2 Goal(s): Low-Level Radioactive Waste

P2 Method (and Benefit): Source Reduction (Radioactive waste is avoided through process segregation.)

SUMMARY DATA			
Savings:	$38,000	**Program Office:**	EM
Lifecycle Waste Reduction:	0.363 metric tons	**Project Contact:**	Richard W. Martin, Y-12
		Phone:	(865) 576-9428
Useful Life:	Indefinite	**Email:**	gilbertjm@y12.doe.gov
Original Problem:	The Oak Ridge Y-12 National Security Complex (Y-12) needed to establish a new brick sawing location to support re-bricking of its furnaces. Because the previous location for sawing the brick was in a radiological area, all material and scrap from the brick sawing process had to be managed as low-level waste.		
Project Solution:	The Y-12 Pollution Prevention Program worked with the re-bricking crew to establish a new sawing location in a non-contaminated area and thereby lower waste-handling and disposal costs.		
Value of Improvement:	The annual savings from this project were $38,000 through time savings and by avoiding management of personal protective equipment (PPE) as low-level radioactive waste.		
Other Benefits:	• The waste brick material may now be disposed of as sanitary waste, • The new sawing location provides a source of brick for other areas of Y-12.		

Project 8: 253-H Instrument Calibration and Repair Shop

P2 Applicability: Sites with space to relocate a station for maintenance of radiologically contaminated equipment in a clean area to a radiologically contaminated area, thereby avoiding the expense of decontamination and generation of radioactive decontamination waste

DOE Facility: Savannah River Site (SRS)

Project Group: EM

Secretarial P2 Goal(s): Low-Level Radioactive Waste

P2 Method (and Benefit): Segregation/Source Reduction (Equipment decontamination and the generation of associated wastes were avoided through process segregation.)

SUMMARY DATA			
Savings:	$1,890,000	**Program Office:**	SRS
Lifecycle Waste Reduction:	4.25 metric tons	**Project Contact:**	Stephen J. Mackmull, SRS
		Phone:	(803) 208-7756
Useful Life:	3 years	**Email:**	stephen.mackmull@srs.gov
Original Problem:	SRS had no area with the required controls and services to work on radioactively contaminated monitoring equipment. Such equipment was disposed as waste unless surveys showed rad-release levels were satisfied.		
Project Solution:	The 253-H Instrument Calibration and Repair Shop provided a “hot shop” location in the field where monitoring equipment can be calibrated and/or serviced or repaired without first being decontaminated.		
Value of Improvement:	Relocating the instrument calibration and repair shop resulted in savings of $1,890,000 by reducing low-level waste generation and the cost of replacing equipment.		
Other Benefits:	• The generation and disposal of low-level waste were reduced. • The need to purchase decontamination materials and replace equipment was reduced.		

Project 9: Plutonium-238 Waste Reduction

P2 Applicability: Sites that generate substantial volumes of TRU-contaminated plastic bottles and other lightweight wastes with high void fractions

DOE Facility: Los Alamos National Laboratory

Project Group: NMT-9

Secretarial P2 Goal(s): Transuranic Waste

P2 Method (and Benefit): Source Reduction (Volumes of packaged waste are reduced through improved technology.)

SUMMARY DATA			
Savings:	~$56,000 per year	**Program Office:**	LANL
Lifecycle Waste Reduction:	~45% less plastic-containing TRU waste by volume	**Project Contact:**	Jason Brock, LANL
		Phone:	(505) 667-2574
Useful Life:	10+ years	**Email:**	jbrock@lanl.gov
Original Problem:	In creating plutonium-238 ingots at LANL to act as heat generators in spacecraft, plastic instruments and bottles used in the process deteriorate and require disposal as transuranic (TRU) waste. Individual instruments and bottles contain a substantial void volume which resulted in inefficiently packaged drums of TRU waste.		
Project Solution:	A team in the Plutonium-238 Science & Engineering Group developed a plaster-cast saw that would fit into a glovebox where plutonium-238 ingots are produced. As the plastic materials wore out and became waste, the plaster-cast saw was used to cut the materials into smaller pieces, thereby reducing volume by half.		
Value of Improvement:	Since the cost of disposing of lightweight TRU waste such as plastics is based on volume, the volume reduction achieved by sawing saves about $56,000 annually in TRU disposal costs.		
Other Benefits:	• The volume of drummed plastic TRU waste created during this process has been reduced by about 45%. • Disposal space at WIPP is saved because the same mass of TRU waste is compacted into a smaller volume.		

Project 10: Pu-238 Residue Solidification Process

P2 Applicability: Sites individually treating acidic and basic wastes that are amenable to neutralization by blending, and sites that use unreliable paper filters to separate precipitates from solutions

DOE Facility: Los Alamos National Laboratory

Project Group: NMT-9

Secretarial P2 Goal(s): Transuranic Waste

P2 Method (and Benefit): Source Reduction/Re-use (Transuranic wastes and consumption of treatment chemicals are reduced through process improvements.)

SUMMARY DATA			
Savings:	~$150,000 per year	**Program Office:**	LANL
Lifecycle Waste Reduction:	~1500 liters of TRU liquid waste per year	**Project Contact:**	Bob Grundemann, LANL
		Phone:	(505) 667-5231
Useful Life:	Indefinite	**Email:**	rgrundemann@lanl.gov
Original Problem:	Acidic and basic plutonium-238 (Pu-238)-contaminated liquids are processed at LANL to remove and solidify the residual plutonium in the solutions. The process to recover plutonium-238 requires the pH of the initial feed to be ~4. Sodium hydroxide or nitric acid solution usually must be added to the solutions to achieve this pH. This practice sometimes more than doubled the initial volume of the solutions. In addition, the paper filters used to catch the precipitate formed during treatment of the solutions occasionally failed. Retreatment of the filtrate was required whenever this happened.		
Project Solution:	Since both acidic and basic liquids contaminated with Pu-238 were being generated and sent through the plutonium recovery process, LANL decided to try mixing necessary quantities of the two streams together to produce the desired initial pH. A degradation-resistant polypropylene filter was used in combination with the paper filter, thereby eliminating the problem with failed filters.		
Value of Improvement:	The new process saves about $150,000 in treatment costs annually.		
Other Benefits:	• The new method for recovering Pu-238 requires about 50% less time, saving 40 hours worth of effort every month. • The new process cuts the production of TRU waste by 125 liters per month, a reduction of over 50%. • The quantity of chemicals that must be added to the waste during the recovery process is minimized.		

Project 11: TRU Characterization

P2 Applicability: Sites that currently store and/or generate suspect transuranic (TRU) waste

DOE Facility: Hanford Site

Project Group: EM

Secretarial P2 Goal(s): Transuranic Waste

P2 Method (and Benefit): Segregation/Source Reduction (TRU waste storage and disposal needs were reduced through improved waste characterization.)

SUMMARY DATA			
Savings:	$10,200,000	**Program Office:**	EM
Lifecycle Waste Reduction:	90 cubic meters	**Project Contact:**	Oscar M. Holgado, RL
		Phone:	(509) 373-0589
Useful Life:	1 year	**Email:**	Oscar_m_holgado@rl.gov
Original Problem:	The Hanford Site stores approximately 14,800 cubic meters of retrievably stored suspect TRU waste at the burial grounds. In the absence of adequate characterization technology, much of this waste in inventory was originally classified as contact-handled suspect TRU waste based on process knowledge. The original basis for TRU classification was 10 nanocuries TRU per gram for this inventory, but the limit is currently 100 nanocuries TRU per gram.		
Project Solution:	Using the current 100 nanocuries TRU per gram limit, much of the waste meets the requirements for disposal as Low-Level Radioactive Waste (LLW). A TRU mobile assay service was contracted in order to identify and segregate TRU waste from the LLW waste. A total of 509, 55-gal drums were assayed. As a result, 375 drums (90 cubic meters) were determined to be LLW; these were returned to the burial grounds for disposal.		
Value of Improvement:	Based on the return on investment (ROI) cost guide in DOE/RL-97-12, Rev. 5 which indicates the disposal cost of TRU waste is $117,750/$m^3$, total life-cycle cost savings were determined to be $10,200,000.		
Other Benefits:	Transportation and disposal of 375 drums at WIPP were avoided, thereby saving space for disposal of qualifying TRU waste.		

Project 12: Reduction of Mixed and Low-Level Waste with Imaging Scanner

P2 Applicability: Sites requiring repetitive analyses of liquid samples for chemical and radiochemical species of technetium

DOE Facility: Los Alamos National Laboratory

Project Group: C-INC

Secretarial P2 Goal(s): Low-Level Radioactive Waste and Low-Level Mixed Waste

P2 Method (and Benefit): Source Reduction (Laboratory LLW and mixed LLW were reduced through improved technology.)

SUMMARY DATA			
Savings:	~$4000/year	**Program Office:**	EM
Lifecycle Waste Reduction:	0.4 cubic meters/year of mixed and low-level waste	**Project Contact:**	Doug Berning, LANL
		Phone:	(505) 667-6134
Useful Life:	15 years	**Email:**	dberning@lanl.gov
Original Problem:	The Isotope and Nuclear Chemistry Group at LANL analyzes waste material from Hanford for various technetium species using traditional high-performance liquid chromatography and liquid scintillation counting. These methods generated mixed and low-level laboratory waste, were time consuming, and had the potential for spills and causing radiation and chemical exposure to the employees.		
Project Solution:	A Bioscan AR-2000 imaging scanner (manufactured by Bioscan, Inc.) was purchased to replace the old analysis methods. The gas-filled counter in the scanner is able to detect the presence of radioactive species spatially separated on paper chromatography strips. Up to eight samples can be placed under the detector at one time. The new system has reduced the volume of mixed and low-level waste by about 95% since the liquid scintillation fluid, vials, and pipette tips have been eliminated.		
Value of Improvement:	The new method reduces costs by $4,000/yr, with break-even after six years of use.		
Other Benefits:	• The Bioscan AR-2000 imaging scanner yields more data than the old system. • Approximately 0.4 m^3 per year of mixed low-level and low-level waste will no longer be generated and require disposal. • There is less potential for spills or employee exposure to the samples and reagents. • The scanner reduces preparation and analysis time for each sample by about 90% (from 2.5 hours to 20 minutes), thereby increasing lab productivity.		

Project 13: Reuse/Recycle Radioactively-Contaminated Lead from Dismantled Casks

P2 Applicability: Sites currently storing contaminated lead materials that may be suitable for re-use and recycling as lead shielding

DOE Facility: Idaho National Engineering and Environmental Laboratory

Project Group: EM

Secretarial P2 Goal(s): Low-Level Mixed Waste and Recycling

P2 Method (and Benefit): Re-use/Recycling (Disposal of lead waste was avoided through reuse and recycling.)

SUMMARY DATA			
Savings:	$499,000	**Program Office:**	EM
Lifecycle Waste Reduction:	99 Metric Tons	**Project Contact:**	Anne Dustin, INEEL
		Phone:	(208) 526-3952
Useful Life:	1 year	**Email:**	dustal@inel.gov
Original Problem:	Over 200,000 pounds (99 metric tons) of radioactively-contaminated lead from dismantled casks and shielding were generated at INEEL. Traditional disposal options would have been very costly.		
Project Solution:	The radioactively-contaminated lead was fabricated into lead bricks and reused at the Idaho State University Accelerator Center as radiation shielding. These bricks allowed the Accelerator Center to increase the number of experiments performed at their facility. In addition, the additional shielding will prolong the life of the facility by a projected 50 years.		
Value of Improvement:	INEEL and the Accelerator Center avoided costs of $1,440,000 by eliminating the need to process and dispose of the contaminated lead, and the need to purchase new lead bricks for the Accelerator Center. The $940,000 cost of recycling and recasting the lead resulted in net savings of $499,000.		
Other Benefits:	The need for waste disposal space was reduced by successfully reusing 99 metric tons of contaminated lead.		

Project 14: Closing the Loop on the Ferric Chloride Waste Stream

P2 Applicability: Sites that generate spent ferric chloride solutions

DOE Facility: Los Alamos National Laboratory

Project Group: DX-1

Secretarial P2 Goal(s): Hazardous Waste and Recycling

P2 Method (and Benefit): Recycling (Spent ferric chloride solution and its copper content are recycled.)

SUMMARY DATA			
Savings:	~$8,000/year	**Program Office:**	LANL/DOD
Lifecycle Waste Reduction:	~1,100 gallons of ferric chloride solution annually	**Project Contact:**	Joe Bonner, LANL
		Phone:	(505) 665-5053
Useful Life:	Indefinite	**Email:**	jbonner@lanl.gov
Original Problem:	The Detonator Technology Group (DX-1) at LANL uses ferric chloride solution to etch copper in work conducted for the DOD. The spent ferric chloride solution, which was the single largest hazardous waste generated at the site, previously was treated and disposed. About 1,100 gallons of spent ferric chloride solution were disposed of every year.		
Project Solution:	LANL located a company (Phibro-Tech, Inc.) that recovers the copper and purifies the ferric chloride solution so that it can be used again. DX-1 buys regenerated ferric chloride solution from Phibro-Tech, thereby closing the loop on the former waste stream.		
Value of Improvement:	Phibro-Tech and its transporter charge approximately $1,600 per shipment to transport the spent ferric chloride solution, and $2 per gallon to recycle the solution. After deducting the extra cost of shipping drums of spent ferric chloride solution to California for treatment, DX-1 now avoids about $8,000 in annual waste disposal costs.		
Other Benefits:	• Approximately 9,000 pounds of ferric chloride solution per year no longer need to be treated and disposed as waste. • The need to purchase new ferric chloride is eliminated. • Recycled copper and the ferric chloride solution can be reused indefinitely.		

Project 15: Steel Fittings Reduce Oil Spills

P2 Applicability: Sites operating heavy equipment with aluminum fittings on hydraulic fluid and oil hoses

DOE Facility: Los Alamos National Laboratory

Project Group: Heavy Equipment Maintenance Shop

Secretarial P2 Goal(s): Hazardous Waste

P2 Method (and Benefit): Source Reduction (Oil-based hazardous waste is reduced through use of improved parts.)

SUMMARY DATA			
Savings:	~$118,000/year in reduced labor and waste disposal.	**Program Office:**	LANL
Lifecycle Waste Reduction:	~13 metric tons/year of New Mexico Special Waste	**Project Contact:**	John Keene, LANL
		Phone:	(505) 667-5934
Useful Life:	Indefinite	**Email:**	keene_john_l@lanl.gov
Original Problem:	Heavy equipment, such as garbage trucks and backhoes, occasionally leaked hydraulic fluid and oil during operations at LANL. The leaks were nearly always caused by failure of the aluminum fittings on the rubber hoses through which the hydraulic fluid and oil flowed. Cleaning up the spills wasted time and increased waste disposal expenses unnecessarily.		
Project Solution:	The Maintenance Shop at LANL invested in a supply of steel fittings and a new machine that could crimp the steel fittings onto rubber hoses. Replacing with steel fittings the aluminum fittings that had the highest risk of being physically damaged or were bent or cracking resulted in almost a 60% reduction in leak rates from hydraulic lines. The reduced leak rate led to a 70% reduction in the generation of oil-contaminated soil thereby saving approximately 13 metric tons of soil from having to be treated as New Mexico Special Waste.		
Value of Improvement:	Savings of $118,000/year result from reduced waste generation, time spent cleaning up spills, and filling out the associated paperwork.		
Other Benefits:	Fewer spills reduced the amount of New Mexico Special Waste generated.		

Project 16: Rebuilt Radio-Frequency Power Tubes Save Money

P2 Applicability: Sites using electron tubes and other electronic devices that are amenable to rebuilding

DOE Facility: Los Alamos National Laboratory

Project Group: Radio-Frequency Technology Group: LANSCE-5

Secretarial P2 Goal(s): Hazardous Waste and Recycling

P2 Method (and Benefit): Re-use (Components are reused, thereby reducing generation of hazardous waste.)

SUMMARY DATA			
Savings:	~$100,000/year in procurement costs.	**Program Office:**	Office of Science/LANL
Lifecycle Waste Reduction:	~500 pounds of hazardous waste per year	**Project Contact:**	John Lyles, LANL
		Phone:	(505) 665-0947
Useful Life:	Indefinite	**Email:**	jtml@lanl.gov
Original Problem:	A variety of unique types and sizes of high-power electron tubes are used by the Los Alamos Neutron Science Center (LANSCE) at LANL to support linear accelerator projects. LANSCE maintains a limited number as replacements but obtaining custom-made tubes can take up to a year which disrupts projects schedules.		
Project Solution:	Many tube manufacturers will accept old tubes that have failed, and rebuild them in about half the time it takes to build a new tube, thereby reducing the potential for project downtime. The presence of silver and other components may render the old tubes a hazardous waste; hence, reuse reduces the rate hazardous waste is generated. Rebuilding tubes avoids the generation of ~500 lb of hazardous waste annually.		
Value of Improvement:	Since rebuilt tubes cost an average of one-third less than new tubes, LANSCE saves an estimated $100,000 annually by having old tubes rebuilt instead of ordering new tubes.		
Other Benefits:	• Materials such as steel, oxygen-free copper, silver, mica, and ceramic may be reused several times in rebuilt tubes. • During the rebuilding process, the manufacturers often can determine the cause of failure; this information is valuable to researchers at LANSCE.		

Project 17: Hot Water Parts Washer at Heavy Equipment Shop

P2 Applicability: Sites that use solvents for washing equipment parts

DOE Facility: Los Alamos National Laboratory

Project Group: Heavy Equipment Maintenance Shop

Secretarial P2 Goal(s): Hazardous Waste

P2 Method (and Benefit): Source Reduction/Recycling (Purchase of cleaning solvents and generation of solvent wastes are avoided through material substitution and improved technology.)

SUMMARY DATA			
Savings:	$280/month	**Program Office:**	LANL
Lifecycle Waste Reduction:	110 gallons of hazardous waste per month	**Project Contact:**	John Keene, LANL
		Phone:	(505) 667-5934
Useful Life:	10 – 15 years	**Email:**	keene_john_l@lanl.gov
Original Problem:	The Heavy Equipment Maintenance Shop at LANL maintains all site vehicles. Shop workers cleaned mechanical parts with a mixture of solvents and caustics that caused skin irritation for some workers. The workers sometimes spent several hours per day standing next to an open drum of solvent solution and scrubbing dirty parts by hand. Fumes from the mixture and the potential for spills created safety and environmental hazards.		
Project Solution:	A hot-water parts washer manufactured by Cuda Cleaning Systems was installed. The team at the Shop concluded that it works more effectively than other hot-water parts washers and that it cleans parts better than the former solvent-based method. The Cuda system automatically separates oil from the water, enabling the water to be reused in the washer. Multiple parts can be washed simultaneously, with each wash cycle requiring about thirty minutes. Instead of cleaning parts by hand and experiencing skin irritation, the workers now spend their time more productively and produce cleaner parts.		
Value of Improvement:	The new parts-cleaning process no longer creates hazardous waste (formerly ~110 gallons per month of waste solvent were generated), resulting in savings of approximately $280 per month in reduced disposal fees.		
Other Benefits:	• The hot-water parts washer decreases the mechanics' exposure to solvents and spills. • The oil collected by the hot-water parts washer is recycled and the water is reused in the washer.		

Project 18: Oven Cleans Lab Glassware

P2 Applicability: Sites that clean laboratory glassware manually

DOE Facility: Los Alamos National Laboratory
Project Group: Applied Chemical Technology Group
Secretarial P2 Goal(s): Hazardous Waste
P2 Method (and Benefit): Source Reduction (Use of chemicals and generation of associated wastes are reduced through improved technology.)

SUMMARY DATA			
Savings:	~100 hours of labor and disposal of ~50 kg of hazardous waste per year.	**Program Office:**	LANL
Lifecycle Waste Reduction:	~50 kg of cleaning solvents and acids annually.	**Project Contact:**	Tom Robison, LANL
		Phone:	(505) 665-7615
Useful Life:	10 years	**Email:**	trobison@lanl.gov
Original Problem:	The Applied Chemical Technology Group (C-ACT) at LANL operates organic synthesis laboratories that generate glassware covered with organic residues. Oxidizing acids and solvents were used to remove the organic residues. Manual cleaning with these chemicals did not always completely remove the residues, resulting in the potential for contaminating experiments. Moreover, workers were exposed to fumes and direct contact with these toxic chemicals during the manual cleaning process. Repeated handling of wet glassware during the cleaning process also increased the risk of breakage and puncture wounds. The spent cleaning chemicals and rinse water were treated as hazardous waste.		
Project Solution:	C-ACT purchased from Tempyrox Company a high-temperature Pyro-Clean® oven that cleans lab glassware using heat. The heat decomposes organic compounds such as polymers, resins, and tars without damaging the glass. Organic vapors in the exhaust are destroyed by a catalytic oxidation system. No liquid hazardous waste is produced. Loading and unloading the oven is a quick process. Cleaning glassware with the oven requires over 50% less rinse water.		
Value of Improvement:	The oven is expected to prevent the generation of about 50 kg of hazardous waste annually and save approximately 100 hours of staff time. The return on investment was calculated as 84%.		
Other Benefits:	• Treatment and disposal of about 50kg/yr of waste cleaning solvents and acids are avoided. • Workers are pleased that the need to manually clean glassware has been eliminated. • The risks of glassware breakage and exposure to toxic chemicals have been reduced.		

Project 19: Nitric Acid Recovery from Metal Plating

P2 Applicability: Sites that use and dispose of spent nitric acid and/or other acids

DOE Facility: Los Alamos National Laboratory
Project Group: MST-7
Secretarial P2 Goal(s): Hazardous Waste and Recycling
P2 Method (and Benefit): Recycle/Re-use (Use of chemicals and generation of associated wastes are reduced by recycling.)

SUMMARY DATA			
Savings:	$81,700	**Program Office:**	LANL
Lifecycle Waste Reduction:	~428 kg of hazardous waste nitric acid per year	**Project Contact:**	Mike Brooks, LANL
		Phone:	(505) 667-9655
Useful Life:	10 years	**Email:**	pbrooks@lanl.gov
Original Problem:	The Polymers & Coatings Group (MST-7) at LANL conducts research in the electroforming and metal plating laboratory where copper-contaminated nitric acid solution is generated. Existing equipment in the laboratory recovers wash water, hydrochloric acid, and sulfuric acid for reuse, thereby providing an incentive to find a method to recover and reuse the nitric acid solution as well.		
Project Solution:	A cold vaporization acid-recovery unit that separates the aqueous nitric acid solution from the residual copper compounds was purchased, allowing the recovered nitric acid solution to be reused directly in the electroforming operation. Although some virgin nitric acid must be added to maintain the required concentration, over 90% of the nitric acid solution is recycled for reuse.		
Value of Improvement:	The acid recovery unit saves about $10,000 per year in disposal and chemical purchase costs. The return on investment was calculated as 28 percent.		
Other Benefits:	The quantity of virgin nitric acid that must be purchased is reduced. The treatment and disposal of over 400 kg/yr of spent nitric-acid hazardous waste are avoided.		

Project 20: Microbes Help Clean Up Oil Spills

P2 Applicability: Sites using heavy equipment that periodically leaks oil to the ground

DOE Facility: Los Alamos National Laboratory
Project Group: JCNNM
Secretarial P2 Goal(s): Hazardous Waste
P2 Method (and Benefit): Waste Minimization (Contaminated soil waste was avoided by using improved technology.)

SUMMARY DATA			
Savings:	~$15,000/year in avoided waste disposal costs.	**Program Office:**	LANL
Lifecycle Waste Reduction:	~2,500 kg of oil-contaminated soil per year	**Project Contact:**	John Keene, LANL
		Phone:	(505) 667-5934
Useful Life:	Indefinite	**Email:**	keene_john_l@lanl.gov
Original Problem:	Johnson Controls of Northern New Mexico (JCNNM) maintains the fleet of vehicles and heavy equipment used at LANL. Heavy equipment occasionally leaked oil onto the ground. The resulting contaminated soil was removed and disposed of as New Mexico Special Waste.		
Project Solution:	Oil Sponge® was mixed in large metal bins with water and the contaminated soil, which contained over 40,000 ppm of oil. Oil Sponge®, a commercially available product of Fluid Environmental Services, Inc., is a mixture of absorbents and microbes that digest the oil [(1)]. After about six weeks of daily mixing to enhance aeration, the soil contained less than 1ppm of oil. Since the oil in the contaminated soil could be digested so completely by the bacteria in the Oil Sponge®, the soil no longer met the criteria for New Mexico Special Waste. Instead of being treated as waste, the cleaned soil can be used as fill material.		
Value of Improvement:	Approximately $15,000 in waste disposal costs is avoided each year.		
Other Benefits:	New Mexico Special Waste generated from oil spills has been eliminated.		

1. Description of product: “Oil Sponge” is a premium absorbent for the encapsulation and bioremediation of Oils, Greases, Fats and Petroleum Based Liquids. “Oil Sponge” is an all-natural, 100% biodegradable absorbent made from reclaimed cotton fibers with hydrocarbon digesting microbes. “Oil Sponge” passes E.P.A. Paint Filter/TCLP Testing. “Oil Sponge” absorbs up to 8 times more liquid than “clay” type products.

Project 21: Machine Coolant

P2 Applicability: Sites that don't recycle toxic coolants used in their machine shops and other applications

DOE Facility: Los Alamos National Laboratory

Project Group: ESA-WMM

Secretarial P2 Goal(s): Hazardous Waste and Recycling

P2 Method (and Benefit): Recycling/Re-use (Use of chemicals and generation of associated wastes are reduced by recycling.)

SUMMARY DATA			
Savings:	>$100,000/year (estimated)	**Program Office:**	LANL
Lifecycle Waste Reduction:	~14,000 kg hazardous waste per year	**Project Contact:**	Fred Algarra, LANL
		Phone:	(505) 667-2041
Useful Life:	Indefinite	**Email:**	algarra@lanl.gov
Original Problem:	The Weapons Materials & Manufacturing Group (ESA-WMM) at LANL creates precision metal, composite, and plastic components. The Group's main machine shop, formerly the largest generator of waste coolant at LANL, produced approximately 14,000 kg of waste per year.		
Project Solution:	To reduce the generation of spent coolant, the shop devised a coolant treatment system consisting of several components that were implemented sequentially. The former coolant was replaced with a non-toxic, mineral-oil-based coolant supplied by Blaser Swisslube Inc. A Hyde Guardian Coolant Recycling System was installed to remove tramp oil and metal particles from the coolant to enable its reuse. "Cool-Clean" skimmer units on each machine circulate the coolant and prevent most kinds of bacterial growth. An evaporator manufactured by Samsco Inc. was installed to reduce the waste coolant volume by 95% by evaporating the water in the coolant without causing air pollution. After evaporation, the coolant concentrate is recycled. The accumulated tramp oil also is recycled. The shop now expects to generate less than 50 kg of RCRA hazardous waste per year.		
Value of Improvement:	The machine shop saves about $100,000 per year in reduced waste treatment fees and avoided costs of virgin coolant.		
Other Benefits:	• ~14,000 kg less hazardous waste is generated at the machine shop each year. • Employee exposure to the coolant is no longer a health issue since the Blaser Swisslube coolant is non-toxic. • Because the coolant circulation and filtering are automatic operations, the frequency of coolant changes is reduced significantly, thereby reducing workloads.		

Project 22: Caustic Stripper Reuse

P2 Applicability: Sites generating and individually treating acidic and basic wastes that are amenable to neutralization by blending

DOE Facility: Los Alamos National Laboratory

Project Group: Detonation Science and Technology Group /Radioactive Liquid Waste Treatment Facility

Secretarial P2 Goal(s): Low-Level Radioactive Waste and Hazardous Waste

P2 Method (and Benefit): Source Reduction/Re-use (Use of chemicals and generation of associated waste are reduced through process improvements.)

SUMMARY DATA			
Savings:	~$18,000 annually.	**Program Office:**	LANL/DOD
Lifecycle Waste Reduction:	~1,200 gallons of hazardous liquid waste per year	**Project Contact:**	Joe Bonner, LANL
		Phone:	(505) 665-5053
Useful Life:	Indefinite	**Email:**	jbonner@lanl.gov
Original Problem:	The Detonator Technology Group (DX-1) at LANL uses sodium hydroxide solution to remove film from copper cables after etching. Over time, the sodium hydroxide solution becomes diluted and accumulates solid particles that can clog small nozzles of the equipment. Approximately 1,200 gallons of spent sodium hydroxide solution were generated each year.		
Project Solution:	The Radioactive Liquid Waste Treatment Facility (RLWTF) at LANL was identified as a potential user of this waste since sodium hydroxide is routinely purchased at the RLWTF to neutralize acidic waste. After review to ensure that this waste solution was suitable for neutralization at the RLWTF, DX-1 sent the waste solution to the RLWTF as a replacement for virgin sodium hydroxide.		
Value of Improvement:	LANL saves approximately $18,000 annually, which includes avoided waste disposal costs of $17,000/year and reduced purchases of sodium hydroxide of $1,000/year.		
Other Benefits:	• About 1,200 gallons/year of caustic solution are reused instead of sent away as hazardous waste to be treated and disposed. • Since the solution is not being sent far away, the plastic drums used to store and transport the waste solution can be reused indefinitely.		

Project 23: Electronic Pest Control

P2 Applicability: Sites that control pest infestations with chemicals

DOE Facility: Yucca Mountain Project
Project Group: RW
Secretarial P2 Goal(s): Hazardous Waste
P2 Method (and Benefit): Source Reduction (Use of chemicals is avoided through use of improved technology.)

SUMMARY DATA			
Savings:	$20,000 (first year of use)	**Program Office:**	RW
Lifecycle Waste Reduction:	0.27 metric tons	**Project Contact:**	Lee Bishop, YMP
		Phone:	(702) 794-5558
Useful Life:	Indefinite	**Email:**	Lee_Bishop@ymp.gov
Original Problem:	The Yucca Mountain Project employed a costly pest-control system that used non-hazardous chemicals for controlling ant infestations in the interiors of buildings. A less-costly method was sought.		
Project Solution:	The solution was Pest OFFense®, a technology that plugs into a 110-volt outlet and uses the electrical wiring in walls to irritate the nervous systems of pests, thereby driving them away. Seven test units were plugged into a building having the worst ant-control problem. The ant infestation was successfully controlled. 200 additional units were ordered for installation in the 16 buildings on the Summerlin campus. The results have been positive, with many employees purchasing devices for home use.		
Value of Improvement:	The cost of pest control services was approximately $25,000 per year. The 200 additional Pest OFFense® units were purchased at a cost of approximately $5,000. The net savings for this effort were $20,000 in the first year, with greater savings expected each year thereafter.		
Other Benefits:	• Employee concerns over the use of a chemical-based pest control method have been eliminated. • The purchase and use of chemicals is avoided.		

Project 24: Solar-Powered Barricade Flashers

P2 Applicability: Sites that use battery-powered barricade flashers

DOE Facility: Strategic Petroleum Reserve Project Management Office

Project Group: FE

Secretarial P2 Goal(s): Affirmative Procurement and Hazardous Waste

P2 Method (and Benefit): Source Reduction (Battery waste is avoided through improved technology.)

SUMMARY DATA			
Savings:	$3,370 (2-year life cycle)	**Program Office:**	FE
Lifecycle Waste Reduction:	~200 pounds of batteries	**Project Contact:**	Kathy Batiste, DOE SPR Teresa Heaton, SPR
		Phone:	(504) 734-4400 (504) 734-4387
Useful Life:	2 years	**Email:**	Katherine.Batiste@spr.doe.gov Teresa.heaton@spr.doe.gov
Original Problem:	At the Strategic Petroleum Reserve, Bryan Mound used barricade flashers powered by two 6-volt batteries. The batteries were being replaced each month on average.		
Project Solution:	SPR-Bryan Mound replaced the six-volt battery-operated barricade flashers with solar-powered flashers, thereby eliminating battery wastes. The solar-powered option provides sufficient lighting and has a life-expectancy of 2 years.		
Value of Improvement:	The replacement of 34 batteries with solar-powered units resulted in a net cost savings of $3,370		
Other Benefits:	Disposal of ~200 pounds of batteries was avoided.		

Project 25: SPR Paint Waste Minimization Team

P2 Applicability: Sites that have not recently evaluated their painting requirements and paint inventory controls

DOE Facility: Strategic Petroleum Reserve Project Management Office
Project Group: FE
Secretarial P2 Goal(s): Hazardous Waste
P2 Method (and Benefit): Source Reduction (Paint waste is minimized through source controls.)

SUMMARY DATA			
Savings:	~$1,500/year (waste only, labor not included)	**Program Office:**	FE
Lifecycle Waste Reduction:	~1,200 pounds	**Project Contact:**	Kathy Batiste, DOE SPR Teresa Heaton, SPR
		Phone:	(504) 734-4400 (504) 734-4387
Useful Life:	7-15 years	**Email:**	Katherine.Batiste@spr.doe.gov Teresa.heaton@spr.doe.gov
Original Problem:	During 1998, paint and paint-related wastes represented 89% of the total hazardous waste generated on the Strategic Petroleum Reserve.		
Project Solution:	A Continuous Quality Improvement team consisting of maintenance, property, and environmental personnel from all SPR sites implemented paint-product-substitution, process-modification, and waste-minimization procedures in an effort to reduce paint-related wastes. Storage areas, paint scheduling, and ordering practices were evaluated to determine contributing factors to paint waste generation. Paint shelf-life was evaluated and, subsequently, paint inventories were adjusted to ensure a minimal source of future paint waste. Outside industries were contacted and their processes were studied and benchmarked. The former three-coat painting system was replaced with a new two-coat/one touch-up coat system. Paint handling and storage practices were improved and implemented consistently across all locations. Paint waste was reduced to near zero by implementing the new procedures.		
Value of Improvement:	FY 2001 cost savings were $1,200 based on a reduction of 1,200 pounds of waste paint. Future-year savings are expected to average approximately $1,500/year. Additional savings will accrue through reduced labor requirements.		
Other Benefits:	Less paint is purchased and wasted, and painting labor is reduced.		

Project 26: You've Got Recyclable Mail

P2 Applicability: Sites that have not implemented comprehensive recycling systems for office wastes

DOE Facility: Los Alamos National Laboratory
Project Group: Materials Management Group
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Recycling/Re-use (Office waste is reduced through recycling.)

SUMMARY DATA			
Savings:	~$120,000/year	**Program Office:**	LANL, Office of Science
Lifecycle Waste Reduction:	~120 metric tons per year	**Project Contact:**	Patricia Gallagher, LANL
		Phone:	(505) 667-2278
Useful Life:	Indefinite	**Email:**	wastenot@lanl.gov
Original Problem:	Although a system was in place at LANL to recycle white copier paper, a large quantity of colored paper and other incompatible material was being disposed as sanitary waste.		
Project Solution:	A new recycling program (the Mail Stop A1000 program) was implemented to enable the recycle of colored paper, magazines, junk mail, phone books, used toner cartridges, transparencies, binders, and moving boxes. The MS A1000 materials are gathered in the mailroom of every building where they are picked up by mail carriers when they deliver the mail. The collected MS A1000 materials are then sorted at the mail center. The mixed paper is baled and sold to recyclers, the used toner cartridges are returned to the manufacturers for refilling, the used transparencies are sent to 3M Company for recycling, and the binders are donated to local schools. About 300 moving boxes are reused each week. Participation in the program has been increasing every year.		
Value of Improvement:	The associated cost savings of the MS A1000 program are about $120,000 annually in avoided landfill fees. Much of these savings arise from the efficiency of using the mail carriers to transfer the MS A1000 materials to the mail center. However, the estimated cost of the service would be ~$104,000 annually if a separate collection service for this material had to be established.		
Other Benefits:	About 120 metric tons of mixed office waste is recycled annually instead of being disposed as solid sanitary waste.		

Project 27: Concrete Recycling

P2 Applicability: Sites that generate concrete demolition wastes

DOE Facility: Pantex Plant
Project Group: NNSA
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Recycling (Concrete waste is reduced through recycling.)

SUMMARY DATA			
Savings:	$26,700	**Program Office:**	NNSA
Lifecycle Waste Reduction:	861 metric tons in 2001 and 2002	**Project Contact:**	Craig Snider, Pantex
		Phone:	(806) 477-5906
Useful Life:	Indefinite	**Email:**	csnider@pantex.doe.gov
Original Problem:	An unattractive pile of waste concrete from multiple demolition projects was accumulating for several years in one area at the Pantex Site.		
Project Solution:	861 metric tons (950 US tons) of this concrete were trucked to a local recycler who turns the material into usable aggregate using a rock crusher. All contracts involving disposal of waste concrete now are written with the requirement that the concrete is sent to the recycler.		
Value of Improvement:	The cost to transport the material to the recycler was $5.95 per US ton. The cost is low because the recycler charges only for transportation, and he retains the crushed material for resale. The cost to dispose of concrete at the Amarillo landfill was $19.00 per U.S. ton in calendar year 2001, and $21.00 per U.S. ton in calendar year 2002. This yields a net savings of $13.05 per US ton ($14.39 per metric ton) for calendar year 2001, and $15.05 per US ton ($16.59 per metric ton) by recycling instead of disposal. By recycling 950 tons of concrete, Pantex saved over $26,000 in 2001 and 2002.		
Other Benefits:	The pile of accumulated waste concrete has been eliminated.		

Project 28: Materials Recovery Facility (MRF)

P2 Applicability: Sites that have not implemented comprehensive recycling systems for solid waste

DOE Facility: Los Alamos National Laboratory
Project Group: NNSA
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Recycling (Solid waste is reduced through recycling.)

SUMMARY DATA			
Savings:	$139,000/year	**Program Office:**	LANL
Lifecycle Waste Reduction:	192 metric tons	**Project Contact:**	Mark Waterman, LANL
		Phone:	(505) 665-6153
Useful Life:	Indefinite	**Email:**	waterman@lanl.gov
Original Problem:	Cardboard, wood, and other recyclable materials at LANL were not being effectively removed from the solid waste stream for recycling.		
Project Solution:	Workers at the Materials Recovery Facility (MRF) at LANL now inspect, sort, and segregate LANL- generated dumpster trash and remove materials that can be recycled.		
Value of Improvement:	Workers at the MRF annually recover for recycling an estimated 170 metric tons of cardboard, 10 metric tons of metal, 12 metric tons of wood and various other materials, achieving a cost savings of $139,000/year. The cost to operate the MRF is $1.6 million per year, which includes the cost of collecting waste, sorting the recyclables, staffing the facility, and other expenditures.		
Other Benefits:	By establishing the MRF, LANL is recovering 170 metric tons of recyclable materials each year that otherwise would be disposed as sanitary waste.		

Project 29: Diskette Recycling Project

P2 Applicability: Sites with used unclassified computer data storage media

DOE Facility: Strategic Petroleum Reserve Project Management Office
Project Group: FE
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Recycling/Re-use (Computer diskettes are re-used.)

SUMMARY DATA			
Savings:	minor	**Program Office:**	FE
Lifecycle Waste Reduction:	285 lb first year, 18 lb/year thereafter	**Project Contact:**	Kathy Batiste, DOE SPR Teresa Heaton, SPR
		Phone:	(504) 734-4400 (504) 734-4387
Useful Life:	Indefinite	**Email:**	Katherine.Batiste@spr.doe.gov Teresa.heaton@spr.doe.gov
Original Problem:	The Strategic Petroleum Reserve (SPR) generated a substantial volume of used computer diskettes for disposal.		
Project Solution:	A diskette-recycling project was implemented as part of the site's recycling initiative to reduce sanitary waste. The SPR teamed with its security contractor and utilized Information Services equipment to securely clean data from the used diskettes.		
Value of Improvement:	The SPR retained approximately 800 cleaned diskettes for reuse on location. It also donated 6,400 diskettes weighing 285 pounds to 'Floppies for Kiddies', a recycled diskette project that distributes recycled floppies to public schools and non-profit organizations.		
Other Benefits:	Approximately 7,200 diskettes were reused onsite or donated to public schools and non-profit organizations, thereby reducing the need for disposal as sanitary waste.		

Project 30: Construction and Demolition (C&D) Waste Recycling

P2 Applicability: Sites that do not currently employ tools for tracking recyclable materials during demolition activities

DOE Facility: Argonne National Laboratory - East (ANL-E)
Project Group: SC
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Recycling (Demolition-derived waste is reduced through recycling.)

SUMMARY DATA			
Savings:	$80,000	**Program Office:**	Office of Science
Lifecycle Waste Reduction:	7,270 metric tons	**Project Contact:**	Kaushik Joshi, CH
		Phone:	(630) 252-4226
Useful Life:	Indefinite	**Email:**	Kaushik.joshi@ch.doe.gov
Original Problem:	Construction and demolition wastes generated at Argonne National Laboratory-East (ANL-E) would otherwise be treated as sanitary waste if no recycling option existed. Significant landfill space would be consumed by demolition wastes disposed as sanitary waste.		
Project Solution:	The Construction and Demolition Recycling Program implemented at ANL-E is an integrated management system that tracks and documents the amounts of waste and recycled materials generated by the construction and demolition projects. As part of the standard construction process, all construction contractors are required to report waste stream generation and recycle waste materials at feasible levels. The cost for data tracking is shared by the construction project budget and the Laboratory overhead (P2 Program).		
Value of Improvement:	Roughly 7,270 metric tons of construction and demolition material were recycled during FY 2002, resulting in combined revenues and cost avoidances estimated at $80,000.		
Other Benefits:	Construction and demolition material were recycled, thereby avoiding disposal as sanitary waste.		

Project 31: Styrofoam Reuse

P2 Applicability: Sites that dispose of styrofoam packing materials

DOE Facility: Yucca Mountain Project
Project Group: RW
Secretarial P2 Goal(s): Sanitary Waste and Recycling
P2 Method (and Benefit): Re-use (Styrofoam is reused.)

SUMMARY DATA			
Savings:	$6,400 to $11,400	**Program Office:**	RW
Lifecycle Waste Reduction:	56 cubic meters	**Project Contact:**	Lee Bishop, YMP
		Phone:	(702) 794-5558
Useful Life:	Indefinite	**Email:**	Lee_Bishop@ymp.gov
Original Problem:	Thousands of linear feet of earthen core materials generated by drilling activities at the Yucca Mountain Project (YMP) are stored on specially designed styrofoam cradles inside cardboard boxes. The styrofoam cradles protect the cores during storage and shipping. The Sample Management Facility (SMF) manages all aspects of geologic sample collection, storage, packaging and shipment.		
Project Solution:	The SMF converts excess and scrap styrofoam to peanut-sized cubes for reuse as packing material. The peanut-sized cubes are produced using a "Dicer" which uses crossed hot wires, similar to those in a toaster, to cut the styrofoam. Approximately 12 to 24, 40-gal bags of styrofoam cubes are generated during each run. The cubed styrofoam is then placed in a large hopper and used as packaging material for rock, soil, water, and gas samples. Excess styrofoam cubes are stored in an onsite transportainer for periodic collection by Las Vegas vendor who reuses the styrofoam as packing materials for industrial equipment.		
Value of Improvement:	Through reuse of the cubed styrofoam as a replacement for more-costly bubble wrap, the YMP has saved between $5,000 and $10,000 in packing material costs. Reusing the styrofoam also has avoided over $1,400 in landfill disposal costs.		
Other Benefits:	Approximately 2,000 cubic feet of styrofoam has been shipped offsite for reuse.		

Project 32: The Recycling of Building 913 at Sandia/CA

P2 Applicability: Sites that do not currently employ specifications for recovery of recyclable materials during demolition activities

DOE Facility: Sandia National Laboratories/CA

Project Group: Albuquerque Operations Office (ALO)

Secretarial P2 Goal(s): Sanitary Waste and Recycling

P2 Method (and Benefit): Recycling/Re-use (Demolition-derived wastes were reduced and useful components recycled.)

SUMMARY DATA			
Savings:	$289,000	**Benefiting Group:**	ALO
Lifecycle Waste Reduction:	7,510 metric tons	**Project Contact:**	Laurie Farren
		Phone:	(925) 294-2573
Useful Life Years:	1	**Email:**	ljfarre@sandia.gov
Original Problem:	Traditionally, construction debris from a demolished building at Sandia National Laboratories/CA ended up in a landfill. Building 913, a large single-story building with a footprint of approximately 84,500 square feet, was slated for demolition. It housed a variety of machine shops, materials research laboratories, and offices.		
Project Solution:	The Sandia/CA's construction master specifications had been revised to incorporate the recycling of construction debris; deconstruction was encouraged and emphasized to the bidding contractors. Following the guidelines in Sandia/CA's master specifications, the selected demolition contractor included recycling in its bid for deconstruction of Building 913. The potential income from the sale of the recycled debris enabled the contractor to submit the lowest bid. The amount of construction debris generated totaled 7,500 metric tons, of which 91.5% was recycled.		
Value of Improvement:	Had the building been demolished and all the debris taken to the landfill as sanitary waste, the contractor would have paid over $289,000 (at $35/ton) in disposal fees. By segregating and recycling, the contractor realized proceeds of over $20,000. Other recycling and waste-reduction actions included inventorying and recycling more than 30 tritium-containing exit signs. Approximately $200,000 worth of equipment from Building 913 was either reused at new locations on site or sent to other Department of Energy facilities. Some salvaged equipment was sold, and the proceeds of $35,000 funded new technology replacements. Also, 244 salvaged high-efficiency fluorescent light fixtures were relocated for reuse in Buildings 914 and 972.		
Other Benefits:	• Over 6,800 metric tons of construction materials were recycled. • Two fume hoods, with a total volume of about 500 cubic feet, were decontaminated by dismantling and removing the affected components. This effort reduced the volume of Low-Level Radioactive Waste by 98% to less than 8 cubic feet.		

Project 33: Perseverance over Resistance: ORO Recycling of Excess Zinc Bromide

P2 Applicability: Sites storing waste zinc bromide and/or other slightly contaminated chemical wastes

DOE Facility: East Tennessee Technology Park

Project Group: OR

Secretarial P2 Goal(s): Low-Level Mixed Waste, Hazardous Waste, and Recycling

P2 Method (and Benefit): Re-use (Chemical waste treatment and disposal were avoided.)

SUMMARY DATA			
Savings:	$311,000	**Program Office:**	Office of Science
Lifecycle Waste Reduction:	~37 metric tons	**Project Contact:**	Ana Gonzalez, ORO
		Phone:	(865) 241-4212
Useful Life:	Indefinite	**Email:**	gonzalezal@oro.doe.gov

Original Problem:	Approximately 37 metric tons (4,000 gallons) of zinc bromide solutions (77% pure) were in storage at East Tennessee Technology Park (ETTP) since 1998. The solutions had been used for neutron shielding in hot cell windows but became clouded due to iron corrosion. The solutions could not be clarified easily and therefore were declared a mixed RCRA waste. Subsequent testing of the solutions showed that they were a borderline RCRA waste and that radioactive contamination was negligible.
Project Solution:	A potential buyer of surplus zinc bromide (Tetra Technologies, Inc. of Galveston, TX) was identified. Tetra Technologies produces a low-purity zinc bromide product and sells it to the oil and gas industry. Tetra Technologies determined that a commercial-grade zinc bromide product could be produced by blending the surplus zinc bromide with lower-quality zinc bromide in a 50,000 gallon batch. RCRA contaminants were barely over detection limits in some of the surplus zinc bromide solutions, and would be far below the limits in the final blended product. The exceptional purity of the surplus zinc bromide solution at the ETTP was higher than that of the commercial zinc bromide used by Tetra Technologies. While trace radionuclides were found in the surplus zinc bromide solutions, only carbon-14 exceeded detection limits in samples of new commercial-grade zinc bromide obtained from Tetra Technologies. Tetra Technologies reviewed the analyses and expressed interest in purchasing the surplus zinc bromide solutions at ETTP.
Value of Improvement:	In 2001, the site contractor (Bechtel Jacobs Company) avoided $315,000 in shipment and disposal costs for the 37 metric tons of zinc bromide by selling the material to Tetra Technologies for $2,000. The net cost avoidance associated with this project is $311,000
Other Benefits:	• Avoided continued storage, and treatment and disposal of this material as a declared waste; • Complied with DOE commitments to the Tennessee Department of Environment and Conservation (TDEC) for waste disposition under the Site Treatment Plan.

Project 34: Deconstructing and Recycling of Building 8-8

P2 Applicability: Sites that employ a "demolition and disposal" strategy versus "deconstruction and recycling"

DOE Facility: BWXT Pantex Plant

Project Group: EM

Secretarial P2 Goal(s): Sanitary Waste

P2 Method (and Benefit): Recycling/Re-use (Demolition-derived wastes are reduced and useful components recycled.)

SUMMARY DATA			
Savings:	$17,000	**Program Office:**	EM
Lifecycle Waste Reduction:	~890 tons	**Project Contact:**	Craig Snider, Pantex
		Phone:	(806) 477-5906
Useful Life:	1 year	**Email:**	csnider@pantex.doe.gov
Original Problem:	Building 8-8 at Pantex was a 100 ft. by 100 ft. timber-framed, corrugated-steel-clad, single-story building constructed on an elevated concrete pad 4 feet above grade in 1945. A decision was made to remove the building and return the site to "greenfield conditions." The original plan was to bulldoze the building and dispose of all demolition waste at a landfill.		
Project Solution:	The Pantex Pollution Prevention (P2) Group changed the objectives of the plan from "Demolition and Disposal" to "Deconstruction and Recycle." All recoverable metal was removed as scrap metal. The large wooden timbers that framed the building were disassembled and recovered. The concrete slab was removed and crushed to generate reusable aggregate. Lead-headed nails popped off as the siding was removed. The soil was later sifted to remove the lead, avoiding the generation of 60 tons of lead-contaminated soil. The project started in September of 2001 and was completed in January 2002. The final phase in the process included filling and leveling the work site, and planting native grass seed. Over 90% of the waste has been recycled or reused.		
Value of Improvement:	By removing the steel siding along with all conduit, light fixtures, cable and lightning rods, 8,320 pounds of scrap metal were recovered and sold for recycling as mixed metal scrap at $20.00 per ton. The timber framing was then disassembled, producing 52, 6"x10"x24' yellow pine timbers for auction. The concrete pad and piers were then broken up and crushed into 826 tons of concrete aggregate at a cost of $4,910. Total savings were approximately $17,000.		
Other Benefits:	• This project prevented 4.1 tons of scrap metal, 826 tons of concrete, 6,240 board feet of timber, and 60 tons of lead-contaminated soil from entering landfills. • Recovered materials were recycled or reused. • The site has been returned to natural conditions that are indistinguishable from the surrounding landscape.		