5 Pollution Prevention

The Department of Defense (DoD) created the Pollution Prevention Program to reduce or eliminate the generation of waste, loss of natural resources, and process emissions. DoD also implements energy, water, and fuel efficiency measures that further reduce pollution and better utilize existing resources. The Program is built upon a flexible framework that helps the Department prioritize cost-effective initiatives while it maintains safe, uninterrupted operations and sustains military readiness. DoD uses the Pollution Prevention Program as the cornerstone for compliance with several environmental regulations.

The Pollution Prevention Program's goals and objectives help the Department:

- Comply with existing requirements
- Prevent future contamination at existing sites
- Reduce future environmental liabilities and operational costs
- Reduce life cycle costs in operations and maintenance

The Program also helps to ensure that DoD Components:

- Comply with environmental laws, regulations, and standards
- Accomplish specific environmental objectives associated with an array of pollution prevention activities

In the future, the Department will report the Pollution Prevention Program as part of the Department's Strategic Sustainability Performance Plan, as required by Executive Order 13514.

Pollution Prevention at a Glance:

Fiscal year (FY) 2010 funding: **$91.2 million**, an **18 percent** decrease from FY09

Program Accomplishments

- Diverted **43 percent** of non-hazardous municipal solid waste in FY10
- Reduced hazardous waste disposal by over **6,300 tons** in calendar year (CY) 2009
- Saved **$180.9 million** using integrated solid waste management practices
- Decreased releases of aluminum (fume or dust) by **40 percent** in CY09

Requirements

The Department of Defense (DoD) Pollution Prevention Program includes, but is not limited to, projects implemented to comply with these regulations:

- 10 United States Code §2577
- 2002 Farm Security and Rural Investment Act
- Emergency Planning and Community Right-to-Know Act (EPCRA)
- Federal Acquisition Regulation
- Pollution Prevention Act of 1990
- Resource Conservation and Recovery Act §6002
- Executive Order (E.O.) 13423, "Strengthening Federal Environmental, Energy, and Transportation Management"
- E.O. 13514, "Federal Leadership in Environmental, Energy, and Economic Performance"
- 40 Code of Federal Regulations §261.2
- DoD Instruction (DoDI) 4715.4, "Pollution Prevention"
- DoDI 4715.6, "Environmental Compliance"
- DoD Green Procurement Program Strategy
- DoD Integrated Solid Waste Management (ISWM) Policy
- DoD Strategic Sustainability Performance Plan (SSPP)
- DoD Toxic and Hazardous Chemicals Reduction Plan

Overview

DoD established its Pollution Prevention Program in 1985 under this hierarchy:

- Source reduction
- Reuse
- Recycling
- Composting/mulching
- Waste-to-energy/incineration
- Other forms of volume reduction
- Landfilling

The Department also designed and implemented other initiatives to incorporate pollution prevention into the organization's culture. Some of these activities include the formation of working groups and steering committees, and the development of strategic policies, plans, and training programs. Because of these initiatives, pollution prevention practices are now part of the military's day-to-day activities and operations.

Solid Waste

From FY09 to FY10, DoD diverted:

- ***43 percent** of non-hazardous municipal solid waste, 3 percentage points over the established goal*
- ***73 percent** of construction and demolition (C&D) debris, 23 percentage points over the established goal*
- ***62 percent** of combined non-hazardous municipal solid waste and C&D debris*

Overview

DoD activities generate residential and commercial waste, non-hazardous industrial waste, non-hazardous process waste, C&D debris, yard waste, and logistics waste such as packaging. DoD Components use ISWM techniques to determine the most cost effective, energy-efficient, and environmentally protective methods to manage these solid waste streams.

Many installations establish Qualified Recycling Programs (QRPs) to recover revenue for material diverted from waste, in addition to avoiding disposal costs. QRP managers identify opportunities to sell recyclable material and develop the diversion program based on recycling costs, sales proceeds, and cost avoidance.

Improved management and promotion of additional recycling opportunities support DoD waste reduction goals and lessen future disposal costs. Additionally, installations are better equipped to make good business decisions that reduce waste volume, maximize diversion, and realize potential cost savings.

For more Solid Waste information, go to *http://www.denix.osd.mil/swr*

Evaluation Criteria

DoD's ISWM Policy Memorandum sets two goals for non-hazardous solid waste:

- 40 percent diversion of non-hazardous municipal solid waste (without C&D debris) by the end of FY10
- 50 percent diversion of C&D debris solid waste by the end of FY10

DoD uses solid waste and recycling metrics to monitor performance against the FY10 diversion goals. These metrics calculate the rate at which installations prevent non-hazardous solid waste from entering a disposal facility. Each year, the percentage of solid waste diverted varies depending on the amount, location, and types of solid waste generated. C&D debris is dependent on the schedule for construction, demolition, and renovation projects at an installation.

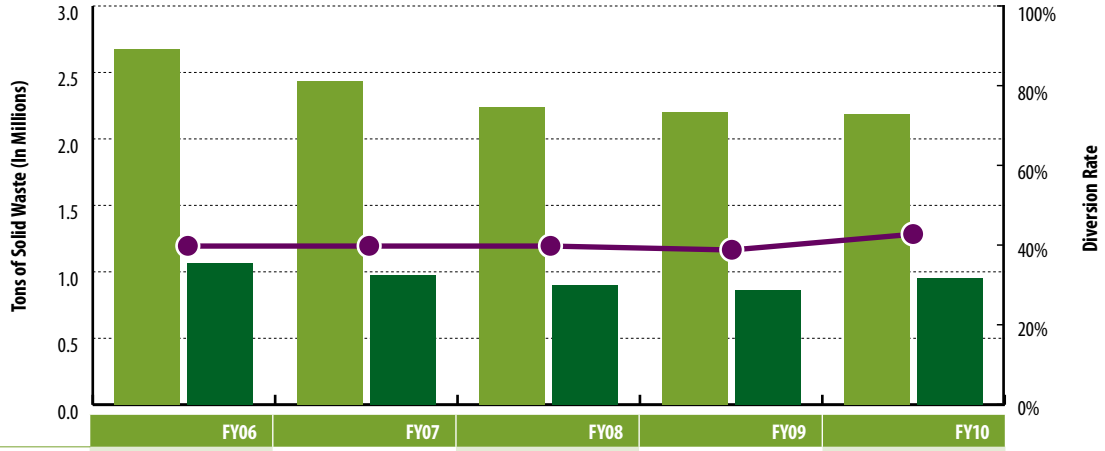
The DoD SSPP will increase diversion goals for non-hazardous municipal solid waste to 50 percent and C&D debris to 60 percent by FY15.

Performance Summary

DoD exceeded agency performance goals for C&D debris diversion. Additionally, the overall implementation of ISWM practices resulted in cost-avoidance of $180.9 million in FY10. This amount represents the associated costs incurred for the disposal and treatment of solid waste and C&D debris.

Since FY06, solid waste generated (excluding C&D debris) decreased by 18 percent. In FY10, DoD generated a total of approximately 6.3 million tons of solid waste, consisting of nearly 2.2 million tons of non-hazardous municipal solid waste (over 15,500 tons less than FY09) and 4.1 million tons of C&D debris. The generation of municipal solid waste equates to 2.9 pounds per DoD person each day. DoD diverted 43 percent of its non-hazardous municipal solid waste, which is the highest diversion rate since FY05 (Figure 5-1). In FY10, DoD's C&D debris diversion rate

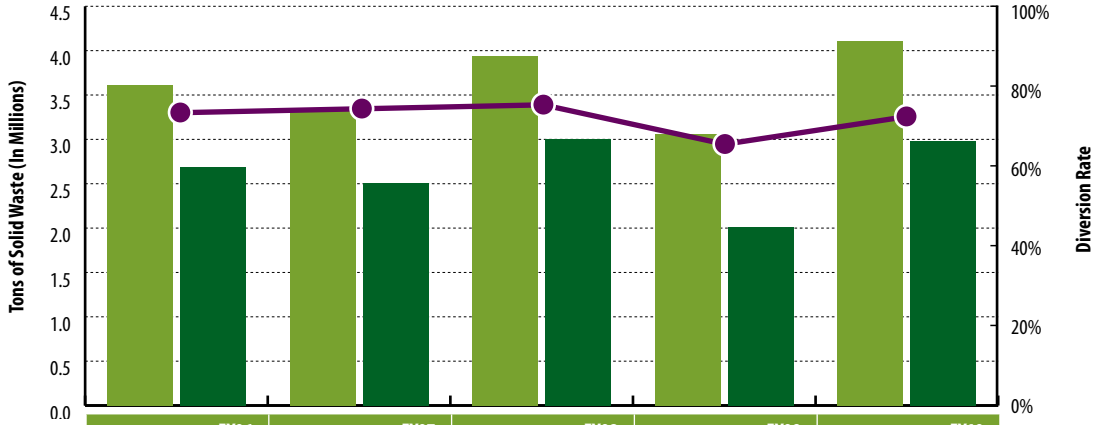
Figure 5-1 DoD Non-Hazardous Solid Waste Progress, Excluding C&D Debris (Millions of Tons) (U.S. and Territories & Overseas)



	FY06	FY07	FY08	FY09	FY10
Solid Waste Generated	2.67	2.44	2.24	2.20	2.19
Solid Waste Diverted	1.06	0.98	0.90	0.86	0.95
Diversion Rate (Diverted/Generated)*	40%	40%	40%	39%	43%

*Diversion rates are calculated from exact numbers.

Figure 5-2 DoD C&D Debris Solid Waste Progress (Millions of Tons) (U.S. and Territories & Overseas)



	FY06	FY07	FY08	FY09	FY10
C&D Debris Generated	3.62	3.35	3.94	3.06	4.11
C&D Debris Diverted	2.69	2.51	3.01	2.01	2.98
Diversion Rate (Diverted/Generated)*	74%	75%	76%	66%	73%

*Diversion rates are calculated from exact numbers.

was 73 percent (Figure 5-2), well above the 50 percent diversion goal for C&D debris.

Appendix D, Section 5 contains solid waste diversion data by DoD Component.

Hazardous Waste

During CY09, DoD reduced:

- *Hazardous waste disposal by **8 percent** since CY08*
- *Hazardous waste disposal by **10 percent** since CY05*

Overview

DoD's goal is to efficiently manage hazardous waste. Hazardous waste is a subset of solid waste that is potentially harmful to human health or the environment. The Department is successfully implementing major pollution prevention efforts to reduce hazardous waste disposal. In January 2008, DoD deployed the agency-level Toxic and Hazardous Chemicals Reduction Plan. The Plan outlines the programs, initiatives, and actions necessary to meet E.O. 13423 reduction requirements for toxic and hazardous chemicals. The Plan follows three principles:

- Identify the major DoD programs and initiatives relevant to toxic and hazardous chemicals
- Build upon existing DoD programs and initiatives relevant to toxic and hazardous chemicals
- Use the DoD environmental management system (EMS) framework as a tool for achieving continual improvement in toxic and hazardous chemical management in DoD

Evaluation Criteria

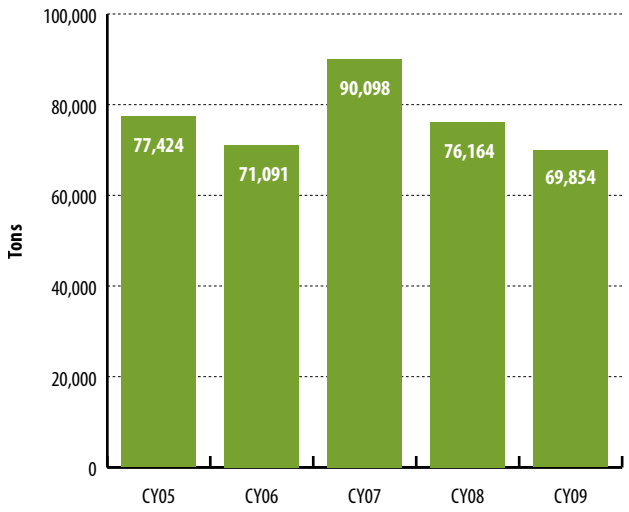
DoD calculates the hazardous waste reduction rate on a calendar year basis and includes hazardous waste treated on-site and shipped off-site in the United States, its territories, and overseas. In 2005, DoD revised the hazardous waste metric to include hazardous waste treated on-site among certain waste categories targeted for reduction. Before CY05, the metric included mainly hazardous waste shipped off-site (both treated and disposed).

Performance Summary

In CY09, DoD disposed of almost 70,000 tons of hazardous waste, 8 percent less than CY08 (Figure 5-3), and 10 percent less than CY05. This decrease was largely because DoD generated less hazardous waste.

Appendix D, Section 5 contains hazardous waste performance data by DoD Component.

Figure 5-3 DoD Hazardous Waste Disposal (U.S. and Territories & Overseas)



Toxics Release Inventory (TRI)

In CY09, DoD:

- *Decreased releases of aluminum (fume or dust) by **40 percent***
- *Decreased releases of ethylene glycol by **25 percent***

Overview

DoD implements EPCRA §313 TRI requirements pursuant to E.O. 13423. Each year, DoD facilities that meet the reporting requirements submit chemical reports to the U.S. Environmental Protection Agency (EPA) that summarize the release and transfer of EPCRA §313 toxic chemicals. These reports contain detailed emissions, transfers, and waste management data. EPA makes the data available to the public via TRI Explorer (*www.epa.gov/triexplorer*). DoD uses the submitted TRI toxic chemical data to identify:

- Processes that produce DoD TRI chemical releases and off-site transfers
- Procedures that require the use of TRI toxic chemicals
- Pollution prevention opportunities

For more TRI information, please go to *http://www.denix.osd.mil/epcratri*

Evaluation Criteria

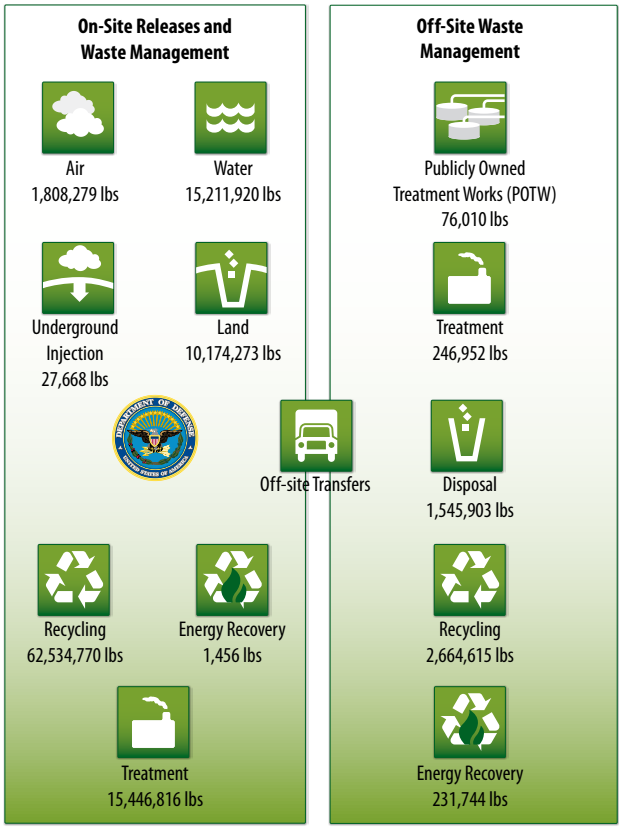
DoD facilities that have 10 or more full-time employees and that manufacture, process, or otherwise use a TRI-listed toxic chemical in quantities greater than the established reporting threshold over the course of a calendar year, evenly, intermittently, or in a single event, must report all releases and waste management activities on a TRI chemical inventory form (Form R). The TRI reporting period for this Annual Report to Congress is CY09. A facility may revise its TRI-reported data if new information becomes available, even if this occurs after the reporting deadline has passed. Enabling facilities to revise historical data encourages review and recalculation of original data submissions to improve accuracy.

Performance Summary

Figure	Facility Type	Type of Analysis	Topic
5-4	Installations and Ranges	CY09 Total Releases and Transfers	CY09 Total On-site and Off-site Releases and Transfers
5-5	Installations only	CY05–CY09 percent change	DoD TRI Reportable Releases and Transfers
5-6	Installations and Ranges	CY05–CY09 percent change	DoD TRI Reportable Releases and Transfers
5-7	Installations and Ranges	CY08–CY09 percent change	CY09 Top 10 Chemicals with Greatest Releases and Transfers; includes primary sources of each chemical's releases and transfers
5-8	Installations only	CY08–CY09 percent change	CY09 Top 10 Chemicals with Greatest Releases and Transfers; includes primary sources of each chemical's releases and transfers
5-9	Installations and Ranges	CY05–CY09 percent change	CY05 Top 10 Chemicals with Greatest Releases and Transfers
5-10	Installations only	CY05–CY09 percent change	CY05 Top 10 Chemicals with Greatest Releases and Transfers
5-11	Installations and Ranges	CY08–CY09 percent change	CY09 Top 10 Installations with Greatest Releases and Transfers; includes primary sources of each installation's releases and transfers
5-12	Installations and Ranges	CY05–CY09 percent change	CY05 Top 10 Installations with Greatest Releases and Transfers

In CY09, the majority of DoD's TRI on-site releases were released into the water and onto the land (Figure 5-4). TRI chemicals entering into the water on-site are primarily from nitrate compounds, which are released as a result of propellant manufacturing operations and wastewater treatment operations. TRI chemicals released on-site to the land are mainly from heavy metals like lead and copper which are the result of munitions either used on training ranges or treated/demilitarized during open burning and open detonation operations.

Figure 5-4 CY09 DoD TRI Releases and Transfers, Including Ranges



In CY09, TRI chemical releases and off-site transfers from DoD facilities (excluding operational range activities) totaled 20.1 million pounds, a 10 percent decrease from the previous year, and a 9 percent increase from CY05 (Figure 5-5). DoD uses the total TRI chemical releases and off-site transfers (excluding range releases) to measure progress in reducing overall chemical releases. The Department does not include releases from operational range activities as part of the reduction efforts.

DoD's range facilities reported 9.0 million pounds of DoD TRI chemical releases and off-site transfers. Range releases accounted for 31 percent of the total DoD TRI chemical releases and off-site transfers.

DoD reported 29.1 million pounds of TRI chemical releases and off-site transfers from its facilities (Figure 5-6). This represents an 8 percent decrease from the previous year and a 13 percent increase from CY05. In CY09, the largest decrease of reportable quantities from the previous year was from chemicals sent off-site to a publicly operated treatment work.

Appendix D, Section 5 contains TRI performance data by DoD Component.

Figure 5-5 DoD TRI Reportable Quantities, Installations Only, U.S. and Territories (Pounds Released or Transferred)

Category	CY05	CY06	CY07	CY08	CY09	CY05–CY09 Percent Change
On-site to Water	14,131,901	15,626,580	15,537,100	16,460,754	14,108,670	0%
On-site to Air	2,149,466	2,073,081	1,630,607	1,663,090	1,752,560	-18%
On-site Underground Injection	0	34,877	34,508	40,606	27,668	--
On-site to Land	874,138	1,023,989	1,686,317	2,059,685	2,396,730	174%
Off-site to POTW	111,007	211,994	130,725	135,605	75,971	-32%
Off-site Treatment	681,889	689,221	193,278	227,713	246,952	-64%
Off-site Disposal	569,423	1,050,545	1,171,158	1,782,719	1,517,921	167%
Total	**18,517,823**	**20,710,288**	**20,383,693**	**22,370,172**	**20,126,472**	**9%**

Figure 5-6 DoD TRI Reportable Quantities, Installations and Ranges, U.S. and Territories (Pounds Released or Transferred)

Category	CY05	CY06	CY07	CY08	CY09	CY05–CY09 Percent Change
On-site to Water	14,132,130	15,628,423	15,539,126	16,463,639	15,211,920	8%
On-site to Air	2,205,025	2,142,410	1,843,543	2,194,852	1,808,279	-18%
On-site Underground Injection	0	34,877	34,508	40,606	27,668	--
On-site to Land	7,740,930	10,559,615	9,100,333	10,769,029	10,174,273	31%
Off-site to POTW	221,007	211,994	130,725	135,664	76,010	-66%
Off-site Treatment	681,889	689,221	193,723	227,713	246,952	-64%
Off-site Disposal	651,428	1,160,777	1,188,412	1,824,040	1,545,903	137%
Total	**25,632,409**	**30,427,317**	**28,030,370**	**31,655,544**	**29,091,006**	**13%**

Figure 5-7 CY09 Top 10 DoD TRI Chemicals, Installations and Ranges (U.S. and Territories)

Name of Chemical	Pounds Released or Transferred	CY08–CY09 Percent Change	Primary Sources
1. Nitrate Compounds	15,430,610	-8%	Energetics manufacturing operations, wastewater treatment operations
2. Copper	4,807,553	-6%	Operational range activities
3. Lead Compounds	2,720,446	8%	Operational range activities
4. Lead	1,849,156	-4%	Operational range activities
5. Ethylene Glycol	737,909	-25%	Vehicle maintenance
6. Aluminum (Fume or Dust)	448,808	-40%	Operational range activities
7. Hydrochloric Acid (1995 and after "Acid Aerosols" only)	444,885	66%	Co-manufacturing byproduct from wastewater treatment operations
8. Dichloromethane	376,615	-23%	Aircraft and vehicle maintenance
9. Xylene (Mixed Isomers)	242,118	-8%	Surface coating and ship preservation
10. Toluene	215,168	-4%	Painting operations

Figure 5-8 CY09 Top 10 DoD TRI Chemicals, Installations Only (U.S. and Territories)

Name of Chemical	Pounds Released or Transferred	CY08–CY09 Percent Change	Primary Sources
1. Nitrate Compounds	14,327,753	-15%	Energetics manufacturing operations, wastewater treatment operations
2. Copper	1,016,096	22%	Destruction and disposal of munitions
3. Ethylene Glycol	737,909	-25%	Vehicle maintenance
4. Hydrochloric Acid (1995 and after "Acid Aerosols" only)	444,885	66%	Co-manufacturing byproduct from wastewater treatment operations
5. Dichloromethane	376,615	-23%	Aircraft and vehicle maintenance
6. Aluminum (Fume or Dust)	342,200	139%	Destruction and disposal of munitions
7. Lead Compounds	326,813	53%	Destruction and disposal of munitions
8. Lead	370,815	-41%	Destruction and disposal of munitions
9. Xylene (Mixed Isomers)	242,118	-8%	Surface coating and ship preservation
10. Toluene	215,155	-4%	Painting operations

Figure 5-9 Change in CY05 Top 10 DoD TRI Chemicals, Installations and Ranges, U.S. and Territories (Pounds Released or Transferred)

Name of Chemical	CY05	CY06	CY07	CY08	CY09	CY05–CY09 Percent Change
1. Nitrate Compounds	14,512,774	16,003,171	15,970,190	16,822,155	15,430,610	6%
2. Copper	3,821,405	5,759,548	4,477,646	5,112,625	4,807,553	26%
3. Lead Compounds	1,699,037	1,917,832	1,676,646	2,525,775	2,720,446	60%
4. Lead	1,141,699	2,101,936	2,071,587	1,923,104	1,849,156	62%
5. Dichloromethane	479,107	422,350	314,490	489,807	376,615	-21%
6. Aluminum (Fume or Dust)	382,249	325,231	296,786	748,497	448,808	17%
7. Ethylene Glycol	373,216	339,673	586,115	982,567	737,909	98%
8. Hydrochloric Acid (1995 and after "Acid Aerosols" only)	342,039	370,873	336,130	267,597	444,885	30%
9. Zinc (Fume or Dust)	311,654	323,281	238,333	519,700	113,888	-63%
10. Xylene (Mixed Isomers)	268,319	241,992	177,288	263,573	242,118	-10%
Total	**23,331,499**	**27,805,888**	**26,145,211**	**29,655,400**	**27,171,989**	**16%**

Figure 5-10 Change in CY05 Top 10 DoD TRI Chemicals, Installations Only, U.S. and Territories (Pounds Released or Transferred)

Name of Chemical	CY05	CY06	CY07	CY08	CY09	CY05–CY09 Percent Change
1. Nitrate Compounds	14,402,774	16,003,171	15,970,190	16,822,155	14,327,753	-1%
2. Dichloromethane	479,107	422,350	314,490	489,807	376,615	-21%
3. Ethylene Glycol	373,216	339,673	585,096	982,567	737,909	98%
4. Hydrochloric Acid (1995 and after "Acid Aerosols" only)	342,039	370,873	336,130	267,597	444,885	30%
5. Zinc (Fume or Dust)	311,654	323,281	238,333	519,700	113,888	-63%
6. Toluene	271,639	197,357	218,722	223,648	215,155	-21%
7. Xylene (Mixed Isomers)	268,268	241,938	163,683	263,573	242,118	-10%
8. Copper	210,061	387,796	608,863	831,034	1,016,096	384%
9. N-Butyl Alcohol	152,358	112,951	97,041	124,656	146,761	-4%
10. Methyl Isobutyl Ketone	134,638	154,024	159,038	127,105	93,583	-30%
Total	**16,945,754**	**18,553,416**	**18,691,586**	**20,651,843**	**17,714,763**	**5%**

Figure 5-11 CY09 Top 10 DoD TRI Facilities (U.S. and Territories)

Name of Installation	Pounds Released or Transferred	CY08–CY09 Percent Change	Primary Sources
1. Radford Army Ammunition Plant	12,571,331	-12%	Energetics manufacturing operations
2. Fort Bragg Range	1,330,821	143%	Operational range releases
3. Anniston Army Depot	615,395	-2%	Heavy tracked vehicle maintenance operations
4. Red River Army Depot	570,558	-40%	Wheeled and tracked vehicle maintenance operations
5. MCB Camp Lejeune	503,659	12%	Wastewater treatment operations
6. NSWC Crane Division	486,177	59%	Open burning/open detonation activities
7. Fort Still Field Artillery Range	482,566	148%	Operational range releases
8. MCB Camp Lejeune Range	470,789	-18%	Operational range releases
9. Fort Benning Range	463,340	91%	Operational range releases
10. Fort Knox Range	450,610	75%	Operational range releases

Figure 5-12 Change in CY05 Top 10 DoD TRI Facilities, U.S. and Territories (Pounds Released and Transferred)

Name of Installation	CY05	CY06	CY07	CY08	CY09	CY05–CY09 Percent Change
1. Radford Army Ammunition Plant	11,704,540	13,757,844	13,919,076	14,318,846	12,571,331	7%
2. Anniston Army Depot	694,698	624,530	546,475	625,637	615,395	-11%
3. Twentynine Palms Range	622,052	353,074	148,573	204,598	81,331	-87%
4. Pearl Harbor Naval Complex	517,958	329,226	377,068	552,279	269,943	-48%
5. MCB Camp Lejeune	504,922	537,250	432,333	448,296	503,659	0%
6. Fort Bragg Range	459,717	555,636	329,769	547,599	1,330,821	189%
7. Fort Still Field Artillery Range	454,457	543,358	335,276	194,444	482,566	6%
8. PSNS & IMF – Bremerton Site & Naval Base Kitsap*	377,515	203,751	154,638	251,210	232,923	-38%
9. Fort Benning Range	371,939	410,604	339,667	243,108	463,340	25%
10. Air Defense Artillery Center & Ranges Fort Bliss	360,820	134,069	236,146	226,227	214,426	-41%
Total	**16,068,617**	**17,449,342**	**16,819,019**	**17,612,244**	**16,765,735**	**4%**

* As a result of regionalization efforts, Puget Sound Naval Shipyard began reporting as PSNS & IMF – Bremerton Site & Naval Base Kitsap beginning in CY04.