

**Partnering to Reduce Waste at Y-12 through Y-12's Multi-Organizational  
Reduce/Reuse/Recycle Team**

J.G. Jackson, A.L. Patterson, M.C. Wiginton, A.L. Yeager  
BWXT Y-12, L.L.C.  
P.O. Box 2009, Oak Ridge, TN 37831-8286  
USA

J.P. Donnelly  
National Nuclear Security Administration, Y-12 Site Office  
P.O. Box 2009, Oak Ridge, TN 37831  
USA

A.P. Ostergaard, S.E. Cornwell  
StrataG, LLC  
2027 Castaic Lane, Knoxville, TN 37932  
USA

**ABSTRACT**

BWXT Y-12, L.L.C., the Maintenance and Operations (M&O) contractor at the Y-12 National Security Complex (Y-12), practices pollution prevention in daily operations because it recognizes that the implementation of pollution prevention (P2) projects impacting all waste types, discharges, and emissions at the complex saves resources across the board. Projects that reduce solid industrial waste save numerous resources, including valuable landfill space. At Y-12, most of the solid industrial waste that is not reduced, reused, or recycled is transported to an industrial waste landfill located on the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR). While the current landfill still has capacity, in the past the industrial waste generation across the ORR was impacted when the new landfill was not available to receive waste, but the old landfill was reaching capacity. The potential of having waste with absolutely nowhere to go is simply not an option for a facility with ongoing operations. Avoiding this potential scenario in the memorable past has made Y-12 very aware of the importance of reducing all waste types.

While Y-12 aggressively pursues pollution prevention implementation on all waste types, this paper will highlight the use of systems, people, and pollution prevention integration in projects used by Y-12 to holistically reduce the amount of industrial waste being sent to the on-site landfill. Specifically, the design and use of Y-12's Environmental Management System (EMS), the creation of a multi-disciplinary team, and the buy-in and creativity of the site project, Infrastructure Reduction (IR), that generates the largest volumes of waste will be discussed.

**INTRODUCTION**

Everyone needs to deal with waste. It can be reduced through source reduction. It can be reused or recycled. It can be sent for disposal. But what happens if the potential for losing the disposal

option is present at an operational facility? The importance of source reduction, reuse, and recycling becomes painfully apparent. Y-12 has lived through this scenario and has reaped the benefit of truly realizing the importance of implementing a strong, integrated pollution prevention program.

Today most of Y-12's solid industrial waste can be sent for disposal at an industrial landfill located on the U.S. Department of Energy (DOE) Oak Ridge Reservation (ORR). However, while this landfill was being constructed, the previously used on-site landfill's capacity was being exhausted. If Y-12 and the other ORR facilities had not taken significant measures to eliminate and divert wastes, projections showed that there would be several months when there would be literally nowhere for the industrial waste to go. Y-12 implemented very aggressive measures at that time and has continued to aggressively pursue additional measures to reduce industrial waste so as to not only extend the life of the current landfill but to save additional resources including funding.

Over time, Y-12 has transitioned to using a holistic approach to implementing solid industrial waste pollution prevention – integrated pollution prevention through systems, team, and personnel commitment. Y-12 uses systems to provide the overarching framework, requirements, and goals so that everyone is “working off of the same page.” Y-12 then uses a complex-wide team approach so as to maximize the use of the talents and expertise of its personnel and to ensure consistent, comprehensive implementation at Y-12. Through these measures, Y-12 reaps the benefits of integrated pollution prevention at the site, project, process, and individual level. However, while integrating pollution prevention by establishing systems and organizational teams provide the framework for success, success cannot be attained without true personnel commitment. This commitment is evinced at all levels at Y-12.

## **SYSTEMS - POLLUTION PREVENTION AND ENVIRONMENTAL IMPACTS**

Y-12 has had a pollution prevention program since 1984. This program has continued to grow and develop driven not only by changes in DOE direction and changes in federal and state environmental programs but by comprehensive integration across complex-wide systems.

One of the most recent changes that supported this integration as well as a new DOE requirement is the development and implementation of an EMS. Y-12 recognized the importance of integrating pollution prevention and sustainability requirements in its EMS. The Y-12 Pollution Prevention Program has been heavily involved in the development of the EMS. The EMS is designed with an impact scoring system that not only identifies negative environmental impacts of pollution, wastes and emissions, but also recognizes the positive impacts that pollution prevention activities have on the environment. The impact scoring system has been used as a tool to promote and recognize pollution prevention by placing emphasis on achieving positive environmental impact scores. Organizations receive positive scores for recycling, product substitutions, environmentally preferable purchasing, source reduction, energy conservation and other sustainable environmental stewardship practices.

## **TEAMS - Y-12 POLLUTION PREVENTION PARTNERING OPPORTUNITIES**

In the spirit of continual improvement, Y-12 personnel recognize the value of teams and are always looking for improvements that can be made across Y-12. Y-12 uses the team approach extensively including in the development of its EMS.

In this case, Y-12 personnel examined the established Pollution Prevention Program that addresses all waste types, discharges, and emissions and identified a new area where a team approach would benefit Y-12. They identified several areas in which partnering with other organizations would efficiently facilitate increased source reduction, reuse, and recycle. With strong management support, Y-12 established the multi-organizational Reduce/Reuse/Recycle Team, including business, operations, support, and legal functions. In the past 4 years, the team has had great success in formalizing its mission and responsibilities, defining objectives/targets, and integrating past experiences into continually improving pollution prevention efforts. Y-12 has also integrated this effort with EMS planning activities by reflecting this team's objectives and targets within Y-12's EMS and developing Environmental Action Plans to achieve the targets.

Additionally, the team members are assigned to support Y-12 objectives to minimize waste, improve overall site appearance, and meet state and federal requirements. This responsibility includes providing information about the wastes generated within their respective programs for reporting purposes, ensuring that new projects or changes to existing facilities have considered pollution prevention in design and construction, and submitting ideas or problems for pollution prevention efforts originating within their respective programs to the Y-12 Pollution Prevention Program.

The team communicates to exchange information, discuss problems, receive suggestions, review elements of the Pollution Prevention Program, and facilitate completion of identified opportunities from site activities. All site activities are considered including routine operations, maintenance and other support activities, research and development, construction, and infrastructure reduction.

### **Teaming Results in Reduce/Reuse/Recycle Team Partners**

The Y-12 Reduce/Reuse/Recycle Team is made up of many organizations representing a multitude of interests. These organizations include:

- Pollution Prevention Coordinator and Staff
- Clean Sweep Program
- Environmental Compliance
- Facilities, Infrastructure and Services
- Infrastructure Reduction
- Legal
- Property
- Radiological Control
- Transportation
- Waste Operations
- Y-12 PrYde Program

- Operational Subject Matters Experts, as needed including Fire Protection and Manufacturing.

### **Teaming Results in Y-12 Pollution Prevention Successes**

The success of the partnering of this multi-organizational team has improved operations, reduced waste, and saved resources. In Fiscal Year 2005, just within recycling, Y-12 implemented 70 projects reusing/recycling almost 44 million pounds of materials with an estimated cost avoidance of approximately \$1.67 million. In Fiscal Year 2006, these efforts improved resulting in 65 projects reusing/recycling almost 75 million pounds of materials with an estimated cost avoidance of more than \$2.44 million.

Another key to the success of the Y-12 Pollution Prevention Program has been the development of a tracking system – named the Pollution Prevention Information Management System (P2IMS)[1]. This system is used to track all of the successes of the program including waste stream numbers, waste types, waste reduction amounts by waste stream, cost avoidances, etc.

A major contributing factor to the success of the Y-12 Pollution Prevention Program is the internal pollution prevention website that contains information on how to recycle various materials (i.e., lamps, aluminum beverage cans, paper, cardboard, toner cartridges, batteries, etc.), various forms that can be completed on-line to assist in the overall recycling process, information on how to recycle at home, etc.

Figure 1 shows the depth of information provided to all Y-12 employees for both work and home.

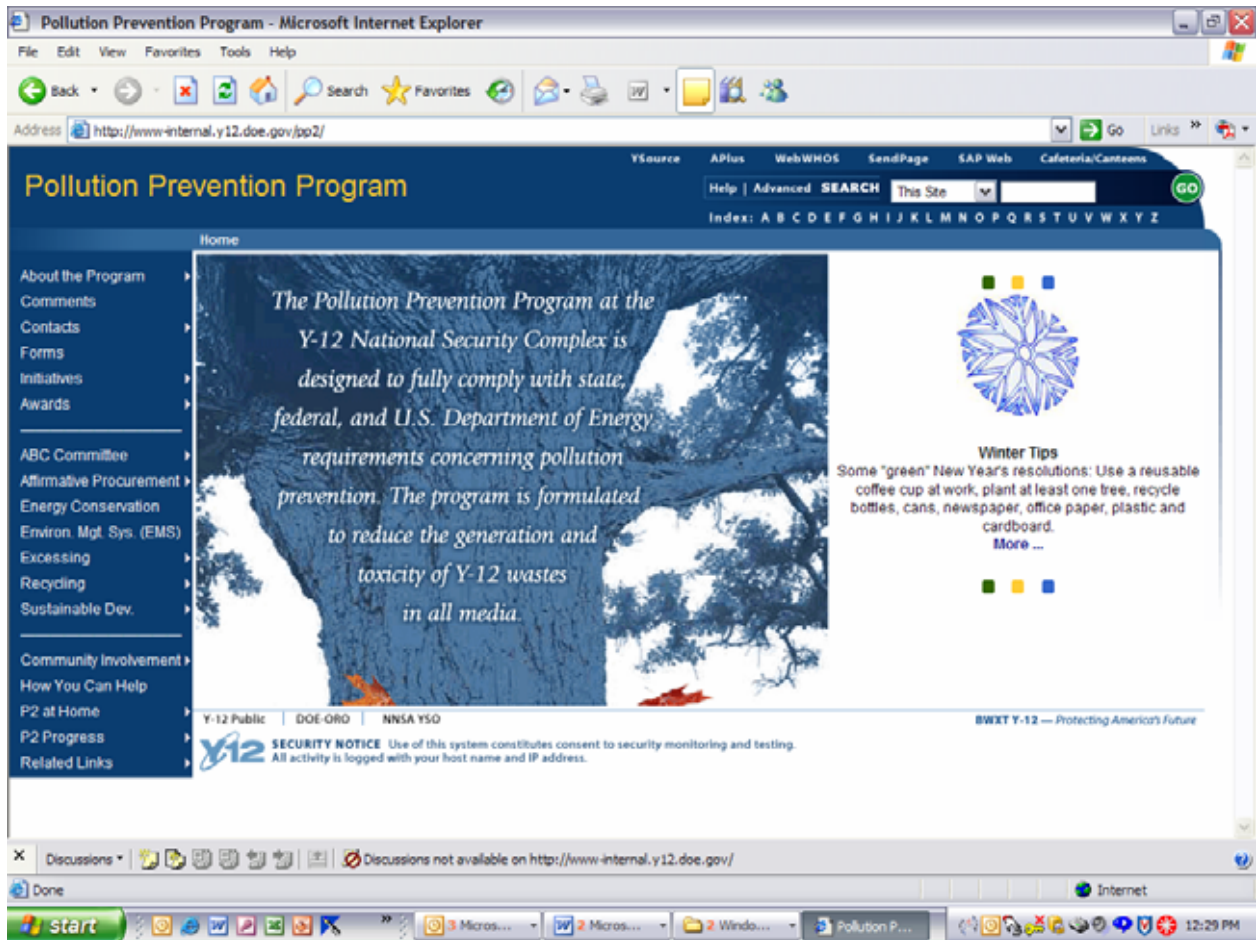


Fig. 1. Y-12 Pollution Prevention Program Website

In the spirit of continual improvement, the Y-12 Pollution Prevention Program was able to develop the infrastructure to be able to add additional recycle streams including plastic drink bottles, plastic 1-liter bottles, red/green plastic coffee containers, and wet ash during fiscal year 2006.

Figure 2 exhibits the cumulative cost avoidance attributed to Pollution Prevention projects since 2001.

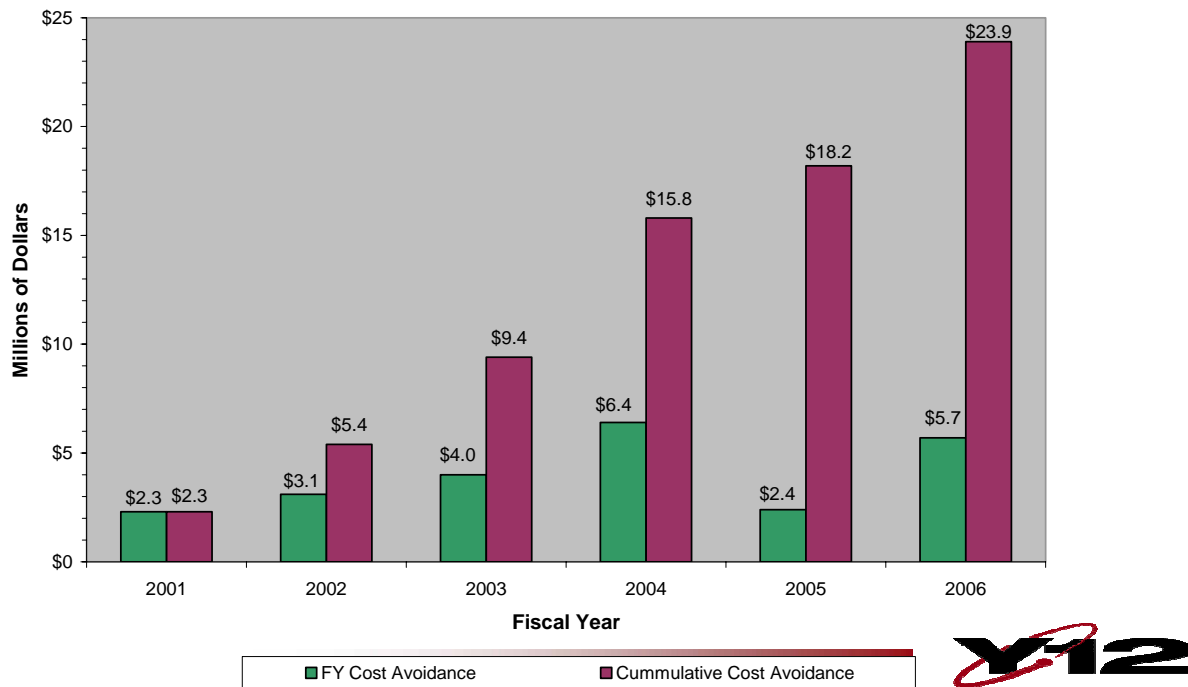


Fig. 2. Fiscal Year Cost Avoidance (Millions of Dollars) as Reported in P2IMS and Cumulative Cost Avoidance and Pollution Prevention Budget

## INTEGRATION - IR'S POSITIVE ENVIRONMENTAL IMPACTS

The Infrastructure Reduction (IR) Program allows Y-12 to be more efficient by minimizing Y-12's facility footprint and reducing long-term solid waste generation and energy consumption. However, IR activities generate a significant amount of material from clean out and building demolition. It is a common misperception that there is little or no opportunities for preventing pollution when tearing down facilities. Through the integration of pollution prevention and the commitment of BWXT Y-12 personnel, Y-12 has proved that this is not true. BWXT Y-12 has demolished more than 1 million square feet of space from 2002 to 2006. At the same time they have recycled more than 3.93 million pounds of metal. Overall since 2002, IR has completed 33 pollution prevention projects including on-going recycling projects that resulted in the elimination of more than 7.35 million pounds of waste at an estimated cost avoidance of more than 989 thousand dollars. This is in addition to the significant cost avoidances and waste reduction amounts for the various ongoing Y-12 Complex recycling initiatives such as lamp recycling, ballast recycling, and furniture recycling that are supported by IR. All of these successes were accomplished with little or no added cost to the project and actually resulted in large cost savings. It may seem implausible to recycle materials from 60 year old facilities;

however, it can be done as demonstrated by these results. Many organizations have partnered together to garner this success.

### **Integration Complements Infrastructure Reduction's Characterization Efforts**

It would have been easy to deem all of the scrap metal from the IR activities as industrial or low level radioactive waste; however, due to BWXT Y-12's global commitment and dedication to preventing pollution; filling the landfill with these valuable resources was unacceptable. BWXT Y-12's Infrastructure Reduction characterization plans included researching the history of the facilities scheduled for demolition and performing characterization surveys to verify that the metals were in fact not part of the moratorium. BWXT Y-12's Legal Staff, BWXT Y-12 Radiological Control, and the Y-12 Site Office Environmental Representative were instrumental in the development and overall success of these plans.

### **Integration Incorporates Scrap Metal Moratorium**

The Department of Energy has been living under the scrap metal moratorium since July 12, 2000. Millions of pounds of scrap metal have been disposed of across Department of Energy sites as industrial waste or low level waste during this time therefore forever losing these valuable resources. BWXT Y-12 made the extra effort to search the historical records to determine that these facilities were in fact not impacted by the moratorium, performed the characterization surveys to confirm their research, and successfully recycled more than 3.93 million pounds of scrap metal.

Figure 3 exhibits just two examples of the volume of scrap metal recycled by the Infrastructure Reduction Program instead of disposing of the metal in the onsite landfill.



Fig. 3. Examples of Scrap Metal Recycled by the Infrastructure Reduction Project Instead of Landfill Disposed

## **Integration Addresses Detectable Polychlorinated Biphenyls (PCBs) in Paint**

Another legacy issue that many of the DOE sites face is historical PCB contamination. Y-12 has discovered that many of the painted facilities at Y-12 are contaminated with PCB detectable (< 50 ppm) paint. Partnering with BWXT Y-12's legal staff, the Y-12 Site Office, and Environmental Protection Agency Region IV allowed BWXT Y-12 to recycle thousands of pounds of painted scrap metal that would have otherwise been destined for the landfill.

## **CONCLUSION**

BWXT Y-12 uses a combination of systems, teams, and personnel commitment to address challenges and as part of continual improvement across the complex. Past experiences with limited landfill space has made Y-12 acutely aware of the importance of reducing, reusing, and recycling materials that would otherwise be solid industrial waste. In this case, BWXT Y-12 has substantially increased the volume of material being recycled through implementation of an EMS, the creation of a multi-disciplinary team, and buy-in by the site project generating the largest volumes of waste. In general, the Y-12 Pollution Prevention Program would not be successful without the support and participation from all employees and subcontractors from the company president to the building services employees. By partnering together, Y-12 is saving valuable landfill space, avoiding waste disposal costs, recycling materials with value, and providing a cost-effective service to the customer. Teamwork is the key to success. These successful, proven approaches can be tailored for use by any site.

## **REFERENCES**

1. Y-12 Complex, 2005. *Y-12 Pollution Prevention Information Management System (Y-12 P2IMS)*, Rev. 2, September.