2009 Secretary of Defense Environmental Award
"SUSTAINABILITY – INDUSTRIAL INSTALLATION"
Fleet Readiness Center Southwest (FRCSW), San Diego, CA

1.0 INTRODUCTION

The Fleet Readiness Center Southwest (FRCSW) is an industrial facility providing aviation maintenance, repair and overhaul support to the US and allied warfighters. FRCSW performs a complete range of depot level maintenance and repair on aircraft, aircraft components, aircraft carrier catapult and arresting systems, and marine gas turbine engines. In addition, FRCSW provides acquisition agency engineering services and assists operational commands in the resolution of aircraft maintenance and logistics issues. In FY2008, FRCSW provided 277 aircraft to the fleet, including 122 F/A-18, 46 H-60s, 46 H-1, 15 E-2/C-2, 27 EA-6B and 10 AV-8B**.**

The facility is located on 358 acres in the City of San Diego. It is bordered on the North and East by the San Diego Bay, on the South by the residential neighborhoods of the City of Coronado, and on the West by the Pacific Ocean. The largest of thirty-two tenants of Naval Air Station North Island, FRCSW occupies eighty-one buildings including over two million square feet of workspace, and employs approximately one thousand military, three thousand civilian and nearly five hundred contractors.

2.0 PROGRAM MANAGEMENT

FRCSW operates a multitude of major industrial processes and equipment in a variety of applications including: painting, abrasive blasting, chemical stripping, electroplating, chemical cleaning and degreasing, jet engine testing, machining, non-destructive testing, composite repair, heat treating and a foundry. In addition, there are several hundred minor processes in the shop areas that utilize hazardous materials and generate waste streams as a result of daily repair and manufacturing activities. These industrial activities coupled with strict environmental compliance requirements dictate a proactive forward deployed environmental planning and compliance strategy focused on the challenges of sustainability.

FRCSW has been implementing sustainable practices since early 1999 when it became the first Federal Facility to become registered to the ISO 14001 Environmental Management System (EMS) standard – thus ensuring the effective management of its environmental impacts. This proactive approach for environmental protection enhances FRCSW's relationship with the public, and provides FRCSW a competitive edge in the global marketplace. FRCSW was a member of the Environmental Protection Agency's National Environmental Performance Track program from 2003-2009. This program, which was cancelled by EPA in 2009, recognized and rewarded top environmental leaders. FRCSW has won numerous awards including the 2007 White House "Closing the Circle" award for Environmental Management Systems, the 2008 Department of the Navy Energy Conservation Award, the 2008 CNO Award for Environmental Quality and the Department of Energy's 2007 Federal Energy Management Program Award.

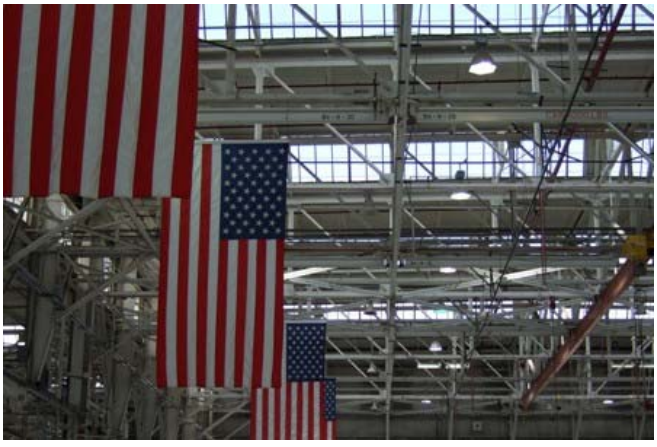
2.1 Environmental Management System. FRCSW utilizes effective strategic planning in conformance with the precepts of the ISO 14001 standard. After nearly eleven years of operating within a registered EMS environment, the system at FRCSW is flying as high as the F/A-18 Hornets that are refurbished at

the Command. Why? Because the EMS has reached sustainability. After years of third party auditors monitoring and measuring environmental performance, they have found FRCSW to be conforming to the ISO 14001 standard. The third party influence has simply made the system better by providing a critical review of all aspects of the EMS and its' procedures. At FRCSW we can honestly claim that we "Say what we do, and do what we say."

The internal audit process is a key factor in the success of the EMS at FRCSW. For many years, FRCSW struggled to maintain a cadre of qualified internal auditors. These auditors often lacked experience and were busy with their primary job functions, and the quality of the internal audits suffered. FRCSW designed a new concept for performing internal audits which addressed this problem. The first step was to hire and train an experienced environmental specialist to become a second party auditor – an auditor who would provide independent objectivity as well as consistency throughout the internal audit process. This eliminated the need to recruit, train and maintain a cadre of internal auditors and reduced overhead expenses.

The second and most important part was the development of the "Audit Sortie" concept. The audit sortie concept has all the components of a complete internal audit: a plan, an execution and the audit report. The difference is the size of the audit – an audit sortie constitutes a much smaller portion of the Command, i.e., a single organizational unit (process shop) at a time. The audit sortie has its own individual audit plan complete with its designated site, time, date, point of contact and selected ISO14001 elements to be audited which are related to that organizational unit's processes. Another aspect of the sorties is the fact that they can be originated from various sources such as a previous environmental or navy inspection. Knowledge and improvements gained during an audit sortie at a particular organizational unit is shared with the next organizational unit. This information is provided via an audit report that is disseminated back to the organizational unit supervisor, as well as forwarded to the Environmental Program Office (EPO) supervisory engineer. The EPO can then evaluate the findings and determine if there is any related training or retraining issues to be resolved. Today, FRCSW's EMS is not only sustaining conformance to the seventeen elements of the ISO 14001 standard, it is moving forward by obtaining valuable corporate knowledge, sharing successful processes and methods with other organizations, and breaking down old internal stove pipes that the Command had experienced in the past. FRCSW is no longer striving to reach conformance, but striving to improve continuously.

In 2009, FRCSW implemented a balanced scorecard approach Command-wide, with the intention of cohesively aligning efforts and projects within the Command as well as providing a dashboard type snapshot of progress on meeting Command goals and objectives.



2.2 Energy and Water Conservation Program. The energy and water conservation program manager is responsible for planning, executing and reporting the organization's use of natural resources. This manager is also responsible for compliance to Executive Orders (EO) 13423 and 13514, and reports to top management regularly on progress. In FY2009, FRCSW entered into a Utility Energy Savings Contract (UESC) with San Diego Gas and Electric through Navy Facilities Command Southwest. The UESC process involves financing the cost of implementing energy projects such as efficient lighting retrofits, HVAC system upgrades and renewable energy technology. The savings on the utility bill resulting from these projects is then used

to pay off the loans. FRCSW currently has approximately $8,000,000 of projects in work, which will result in a savings of over 17,000 MBTU and $800,000 per year, and will earn rebates estimated at $300,000. FRCSW received additional funding from the Energy Conservation Investment Program (ECIP) for two daylight harvesting projects, funding for rooftop photovoltaics is also being pursued.

2.3 Air Quality Management Program. FRCSW, a Clean Air Act Title V facility, has over one hundred eighty permitted processes ranging from jet engine testing, painting, solvent cleaning and paint stripping to stationary combustion sources. Key in air quality management is the fact that California is continuously promulgating new air quality regulations, requiring a constant effort to ensure compliance while containing costs and meeting mission requirements. As an example, in FY2009 three new California Air Toxic Control Measures went into effect regulating off-road diesel vehicles, gas and propane forklifts and chromium electroplating. During this same period, the team produced a greenhouse gas (GHG) inventory in response to California's new AB-32 legislation. Although the results indicate that the facility is well below mandatory reporting thresholds, FRCSW is planning numerous energy efficiency improvements which will further reduce GHG emissions.

2.4 Hazardous Materials and Waste Management Program. FRCSW recycles all feasible hazardous and non-hazardous wastes. The recycled hazardous waste includes batteries, abrasive blast media, mixed oil, solvent, JP-5 fuel, ethylene glycol, and calibration fluids. Recycled non-hazardous waste includes all paper and metals, old appliances and electronic equipment (including computers). In FY2009, FRCSW recycled 935,000 pounds of metal, 157,000 pounds of paper, 4,300 pounds of batteries, 25,400 pounds of JP5, 128,000 pounds of oil, 33,000 pounds of solvent and 177,000 pounds of blast media. In 2009, the EPO streamlined the waste collection and disposal process. The changes include new operational controls, waste consolidation, lighter containers and awareness training deployed plant wide. To ensure proper segregation of hazardous wastes, EPO developed a poster board instruction to aid employees. In addition, EPO inspectors continuously monitor waste containers to ensure proper management. These changes have reduced waste disposal by 50,000 pounds annually.

2.5 Supporting Programs. In addition to the above programs, numerous supporting activities contribute to overall sustainability. The Pollution Prevention (P2) manager addresses sustainability from two perspectives: i) source reduction of materials and energy as necessitated by industrial process and ii) prevention of spills and other pollution. The P2 manager achieves these goals across the broader organization by chairing the Environmental Improvement Team – an internal multi-disciplined team consisting of representatives from various departments. Facilities Management at FRCSW is part of the Industrial Production Support Department and is responsible for all facilities and production equipment – including standard facilities systems as well as production related capital equipment. The EPO ensures that projects take into account the numerous sustainability initiatives underway to include conservation and efficiency improvements as defined by EO 13423 and EO 13514.

3.0 TECHNICAL MERIT

3.1 Program Summary. Sustainability encompasses a multitude of existing functions and programs within the Command. To ensure all elements are considered, FRCSW has adopted a balanced scorecard

approach which includes improved financial performance, improved environmental stewardship and improved community and stakeholder relations. See Table I below.

Table I – Sustainability Scorecard

Strategy	Objective	Target	Results
Environmental Stewardship	1. Maintain conformance to the ISO14001 Standard 2. Maintain compliance with all regulations	1. No major non-conformances 2. No environmental Notices of Violation	1. Zero non-conformances (FY08-09) 2.. Zero Notices of Violation (FY08-09)
Community and Stakeholder Relations	1. Reduce environmental Impacts 2. Broad-based community involvement	1. Reduce energy and water consumption, reduce industrial waste water, hazardous waste and hazardous air pollutant emissions 2. Active participation in various community events – see Section 4.5	1. See Figures I and II for energy and emissions reductions. 2. Water consumption reduced 10% in FY09 3. Industrial waste water reduced 18% in FY09 4. Hazardous waste reduced 7% IN FY09
Financial Performance	1. Reduce overall operational costs to the Command 2. Execute the environmental program within financial goals	1. Reduce environmental program costs by 10% 2. Execute the environmental program budget to ±2%	1. FY09 costs were 16% below FY08 2. FY09 executed to 99.7% of plan

In addition, the sustainability scorecard dovetails into FRCSW's broader strategic planning and resultant initiatives to ensure that sustainability factors are included at the corporate decision-making level. The resultant strategy and EMS program elements are routinely communicated to executive management.

3.2 Accomplishments. Environmental quality is monitored with specific metrics designed to measure success relative to the sustainability scorecard objectives and targets. Figures I and II depict the results for energy and air pollution reductions. Additional metrics are displayed in Tables I and II.

Figure I - Energy Reduction

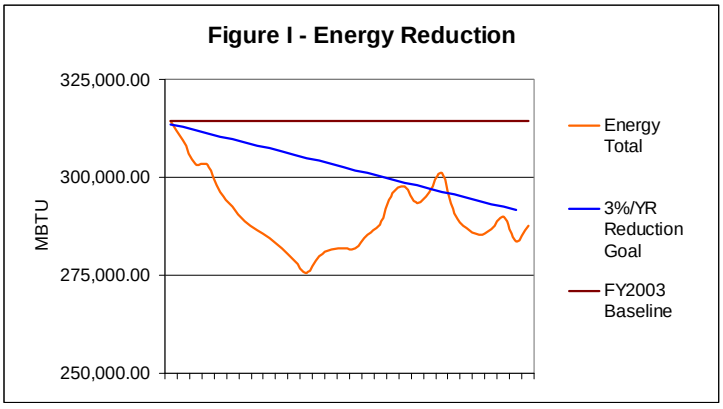
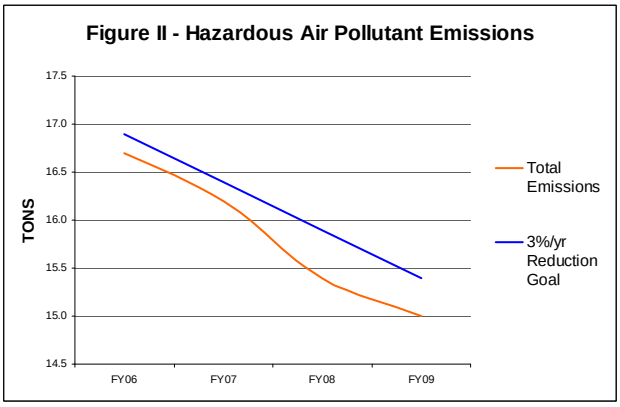


Figure II - Hazardous Air Pollutant Emissions



3.3 Executive Order Compliance. FRCSW has made substantial progress towards meeting the goals of EO 13423 and EO 13514 for reductions in energy, water and petroleum usage. The table below lists projects supporting FRCSW sustainability goals and the Executive Orders.

Table II – Completed and Ongoing Projects

Project Description	Status	Sustainability Scorecard Accomplishments		
		Financial	Environmental	Stakeholder
Environmental Management System sustainment	Ongoing	Investment in sustainability	Ensures continual improvement and 3rd party verification of all program elements	
Community outreach	Ongoing	Investment in sustainability	Community education	Substantial presence in local community

Table II – Completed and Ongoing Projects, Continued				
Project Description	Status	Sustainability Scorecard Accomplishments		
		Financial	Environmental	Stakeholder
Remediation of contaminated piping	Completed FY09	Investment in sustainability	Prevent contamination of soil and groundwater	
Removal of Underground Storage Tanks	Completed FY09	$5,000/yr cost avoidance	Prevent contamination of soil and groundwater	
Mini-max waterless steam cleaning system	Completed FY09	$25,000/yr cost avoidance	Industrial waste water reduction of 20,000 gal/year	
Low water steam assist rinse bldg 472	Completed FY09	$50,000/yr cost avoidance	Industrial waste water reduction of 40,000 gal/yr	
Low volume water hose retrofits for aircraft washing	Completed FY09	$60,000/yr cost avoidance	Industrial waste water reduction of 50,000 gal/yr	
Hexavalent Chromium free primer for aircraft	Demonstration completed FY09	Investment in sustainability	Less toxic substance	
Dolphin non-chemical treatment for cooling tower water	Installed pilot system FY09	$20,000/yr cost avoidance	Eliminate 1.7 million gal/yr of wastewater	
Augment two battery powered electric carts with PV recharging systems	Completed FY09	Investment in sustainability	Electric power demand reduction of 75KWH/yr from grid	
Convert paint removal blast system from plastic media to Bio-media (corn starch)	Demonstration completed FY09	$500,000/yr cost avoidance; incr. throughput	Green Procurement; reduction of 20,000 lbs Hazardous waste via re-use of Blast Material	
Substitute QSOL 300 for Stoddard in solvent cleaning operations	Completed FY09	Investment in sustainability	Elimination of 400 lb/yr VOC emissions	
Install low flow faucets, 128 units in 10 buildings	Completed FY09	$17,000/yr cost avoidance	895,050 gal/yr water saved	
Hazardous waste consolidation	Completed FY09	$100,000/yr cost avoidance	Reduce hazardous waste by 50,000 lb/yr	
Steam study for usage baseline and potential technology and process alternatives	Study completed FY10	Potential $500,000/yr cost avoidance	Reduce energy consumption by 13,000 MBTU/yr	
Greenhouse gas inventory	Completed for FY08 and FY09	Investment in Sustainability	Operational Transparency	
Laundered rags/paper rags	Demonstration to be completed in FY10	Investment in sustainability	Potential hazardous waste reduction	
Retrofit or replacement of gasoline and diesel powered forklifts	Planned for FY10-FY13	Investment in sustainability	Reduce fleet average emission rate from 8 gm-bhp/hr to 2 gm-bph/hr	
High bay lighting replacement with occupancy controls	To be completed in FY10	$7,000/yr cost avoidance	Reduce energy consumption by 145 MBTU/yr	
High bay lighting replacement with day lighting controls	To be completed in FY10	$108,000/yr cost avoidance	Reduce energy consumption by 2290 MBTU/yr	
High bay lighting replacement with day light harvesting	To be completed in FY10	$46,000/yr cost avoidance	Reduce energy consumption by 1000 MBTU/yr	
Heating, ventilation and air conditioning upgrades	To be completed in FY10	$600,000/yr cost avoidance	Reduce energy consumption by 10,000 MBTU/yr	
N-methyl-2-pyrrolidone substitute for Methlyene Chloride used in paint stripping tank	To be completed in FY10	Investment in sustainability	Reduce hazardous air pollutant emissions by 2 tons/yr	

4.0 ORIENTATION TO MISSION

4.1 Continuous Process Improvement. Continuous process improvement is ingrained in the culture of FRCSW. Employees and managers receive regular training on LEAN manufacturing, Six Sigma and Theory of Constraints. At any given time there are a significant number of process improvements ongoing throughout the plant as individual departments host continual LEAN and Six Sigma events to realize operational efficiencies. The production shops at FRCSW use Kaizan charts which are actively worked by managers and artisans alike.

These activities result in reduce costs, reduced direct energy demand, reduced pollution and ensures that the organization remains economically competitive as well as being a viable employer in the region.

In 2009 FRCSW achieved third-party registration to AS9100 and AS9110 Quality Management System (QMS) standards. This was a significant accomplishment as the standards provide a systematic framework for ensuring product quality and continual process improvements plant wide as well as establishing the respected aerospace industry credentials necessary to compete for additional work load.

4.2 Training and Operational Controls. The EPO program elements are designed to sustain environmental compliance and provide for continuous improvement for all media programs. The EPO programs are linked to the environmental requirements (drivers) and significant aspect criteria to design effective operational controls to sustain environmental compliance and improvement projects with metrics to monitor specific and overall performance. Operational Controls are deployed through a multitude of mechanisms at FRCSW. All the line organizations receive annual environmental bulletin training and updates, as well as specific training targeted toward the environmental requirements of the process or operation being performed. Each production shop has an environmental representative who acts as the subject matter expert for his or her shop and receives additional training of four hours annually. In addition, all employees are provided with basic environmental awareness training.

4.3 Sustainable Substitutions. Corn Hybrid Polymer media was identified and tested as a drop in replacement for Plastic Media Blast media, with the potential of removing coatings from parts now undergoing chemical stripping or hand sanding. This bio-media replacement utilizes renewable materials and reduces waste by up to 20,000 pounds per year. Additionally, an increase in throughput will result in a potential cost savings of up to $500,000 per year. Other substitutions actively in work include the use of less toxic non-chromium primer on the E-2/C-2 line, N-methyl-2-pyrrolidone (NMP) versus methylene chloride paint stripper and lower VOC solvents in non-aerospace applications

5.0 TRANSFERABILITY

The balanced scorecard is a documented methodology which is transparent, repeatable and institution-alizes environmental continuous improvement. Throughout the Navy FRCSW serves as a benchmark for implementing and sustaining an EMS. In 2009, FRCSW was asked to share lessons learned with other fleet level organizations including the Naval medical community at Balboa Hospital. The CNO and SECDEF have also sent senior executives to review progress and share lessons learned.

In addition, FRCSW's AS9100 and AS9110 QMS was parallel deployed using best practices from the EMS to ensure increased operational efficiencies – including the use of the internal audit sortie approach and the same collaborative database management system – where projects and findings are comingled to further promote integrated sustainability.

Beyond specific programs, such as those identified in Table II, which are transferable, the balanced scorecard and audit sortie management tools are directly applicable to any organization seeking continuous improvement.

6.0 STAKEHOLDER INTERACTION

6.1 Environmental Challenges. FRCSW operates in one of the most stringently regulated areas of the United States. The City of Coronado is an influential resort and retirement community with citizens who have the time, resources and knowledge to involve themselves in community issues. As a result FRCSW receives a fair amount of scrutiny and works diligently to incorporate community concerns into the planning process. FRCSW is inspected semi-annually by the San Diego Air Pollution Control District, annually by the San Diego County Department of Health Services and randomly by the California Department of Toxic Substances Control, the Environmental Protection Agency, the Regional Water Control Board, the San Diego Metropolitan Industrial Waste Program and the California Air Resources Board.

6.2 Education, Outreach and Partnering. FRCSW's cultural tradition includes the long term participation and support of numerous community organizations and groups. The EPO has partnered with San Diego State University in the *Math Engineering and Science Achievement* program which encourages and supports underrepresented students going into the fields of science, math and engineering. Every year the EPO sponsored two engineering student interns, and participates in Shadow Day, where students spend the day shadowing a working engineer. In addition, FRCSW provides tuition reimbursement for those employees who seek college degrees.

FRCSW has actively supported the *San Diego Regional Sustainability Partnership* since its inception. The partnership is a coalition of local City, County, State and Federal agencies as well regional businesses, industry, non-profits and others which develop sustainability goals and metrics with the intent of improving overall regional sustainability. The *Restoration Advisory Board* is a Coronado citizens group concerned with environmental remediation projects at NAS North Island and their impact on the community. FRCSW participates in this group to maintain and foster community support for compliance driven reportable projects. The annual *San Diego Earth Works' EarthFair* event draws over 50,000 San Diegans and area visitors. FRCSW sponsors a booth highlighting the Command's environmental achievements for sustainability in order to share successes directly with the public. The annual *Coronado Flower Show* is held right outside the NAS North Island fence line and provides additional opportunities for exchange of information with our Coronado neighbors.

FRCSW sponsors a booth at the *Energy Awareness Week* to highlight the Command's energy and water conservation programs. This Navy event in San Diego County draws approximately 10,000 employees from the region. *Employee Appreciation Day* is attended by FRCSW personal and the EPO provides information about its programs and environmental improvement projects. EPO also provides useful employee information for households concerning energy conservation and recycling. FRCSW is considered a leader in EMS implementation and is a founding member of the *EMS Practitioners Forum*. In this role FRCSW assists both government and industry in their implementation efforts. FRCSW is a member of the *Federal Government Green Chemistry Committee* which identifies and plans the actions necessary to satisfy the EO 13423 green chemistry requirements.