

"Sustainability"... Explained and Applied  
***Air Force Guide to Sustainable Operations***



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*Graphics courtesy of Homestead ARB:*

*Photovoltaic panel, Resident Burrowing Owl,  
and the renovated Fire Station designed to  
LEED™ green building standards*



## What Is Sustainability?

The most famous definition comes from the Brundtland Commission's 1987 report to the United Nations: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."



For the Air Force, "sustainability" is the capacity to continue our mission without compromise. It is the ability to operate into the future without decline – either in the mission or the natural and man-made systems that support it.

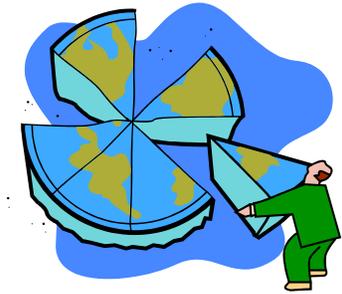


*Sustainability = Ensuring viable missions, while respecting the resources that support them: human, financial, and the natural and built environments*

Many people equate sustainability with "green buildings" or sustainable development. In the Air Force, this is how the concept began. But we now are beginning to understand that sustainability needs to go much further: into all operations and activities at an installation or range.

Sustainability is an expanded, holistic approach to asset management. We typically view assets as only the "hard" infrastructure needed for base operations (runways, buildings, pavement). However, there is a "soft" infrastructure that is just as important. The reality of today's world is that our \$1 billion annual investment in the environmental program has created assets that have a value in today's market and are integral to achieving the required mission capability. We must take a proactive approach to identify all the assets necessary to sustain current and future missions: **natural** assets (pertaining to air, water, and land); **built** assets; and human or **workforce** assets.

Likewise, our approach to environmental management is changing. We have generally viewed our environmental programs as necessary to address “liabilities”, either to conduct cleanups or to maintain compliance. Now, an evolution in our environmental programs is occurring. Sustainability broadens our view beyond our traditional environmental compliance and pollution prevention programs – and focuses on integrating all of our efforts toward resource management that **values our assets** while it **supports** and **enables our mission**.



In a world of decreasing resources and increasing constraints, sustainability is the key to ensuring that the Air Force mission continues for as long as we need it to. The point is that we haven't hit the wall yet – and the right approach now will keep us from hitting one later.

What happens inside our installation fence lines is not the only thing that matters. Obviously, what we do impacts our neighbors and our community, and what happens in the community, impacts the military. Encroachment from various sources is becoming more recognized – some visible, such as urban land development and construction of wind-generated energy facilities; some not as visible, such as radio frequency intrusions, habitat protection requirements and emission discharge limitations. We need to consider the competition for our operational space – for land, air, water, and electromagnetic frequency – and our consumable resources in such a manner as to preserve their availability long into the future.

The Air Force has been successfully running compliance and pollution prevention (P2) programs for years, and USAF environmental regulatory compliance has improved dramatically. Our Environmental Compliance Assessment and Management Program (ECAMP) promotes regulatory compliance, and its focus is expanding to include and integrate Safety and Occupational Health requirements. Going beyond ECAMP, we use P2



assessments and action plans to prevent pollution before it can create compliance issues for our bases. Now it's time for the next step.

The concept of sustainability provides the opportunity to go **“beyond P2 to sustainable operations.”** A tool to help us get there is the Air Force Environment, Safety and Occupational Health Management System (ESOHMS); see AFPD 90-8. The first phase of the ESOHMS is the Environmental Management System, or EMS.

## What is an Environmental Management System?

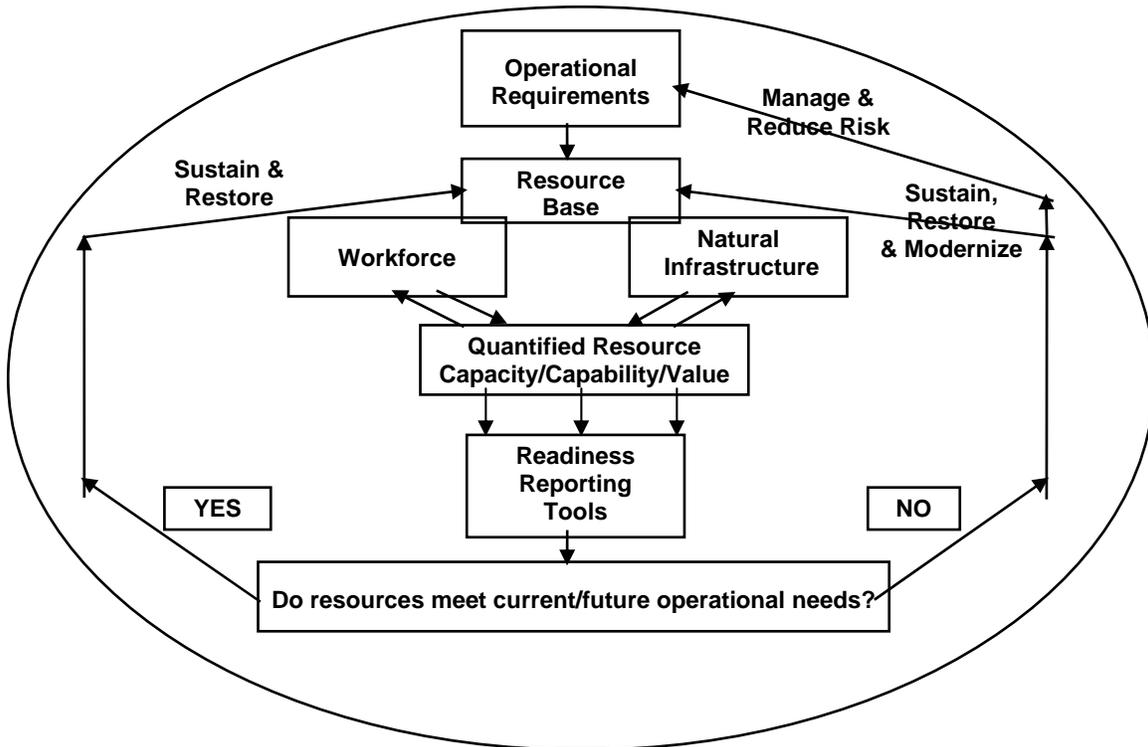
The EMS is a component of a larger ESOHMS, which is the integrated set of policies, plans, processes, resources, and auditing systems to **sustain, restore and modernize (SRM)** the *natural* and *workforce* assets over an installation's perpetual useful life in support of mission capability. Since the EMS includes goals for sustainable development (see page 7), the installation's **built** assets are also supported by EMS (and ESOHMS). Figure 1 on page 4 explains the relationships.



EMS is the first step toward the ESOHMS. The purpose of EMS is to provide a structure for managing the environmental aspects of the mission so that we sustain indefinitely the natural assets necessary for mission accomplishment. EMS guides an installation through:

- ✓ Identifying and evaluating the natural assets needed to perform the mission;
- ✓ Determining these assets' condition, quality, capacity, and value;
- ✓ Conducting management practices to ensure SRM to operational capability in accordance with environmental codes;
- ✓ Evaluating the quality of the environment and determining how it is affected by the organizational mission;
- ✓ Organizing and managing these processes;
- ✓ Conducting a self evaluation of the effectiveness of the EMS in achieving desired levels of environmental and mission performance.

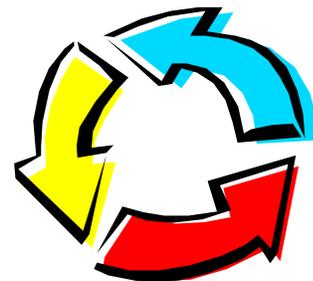
Figure 1: The Operationally-Driven ESOH Management System



The Air Force EMS is ***focused on mission accomplishment*** through management of natural assets in the larger context of the mission, greatly improving the efficiency and effectiveness of operations. Eventually, ESOHMS will extend this management system to support our workforce assets.

EMS is based on a continuous improvement quality cycle (“plan, do, check, act”).

- During the “PLAN” phase, the installation identifies the natural assets needed to support the mission, their availability, and condition – and defines the effects that the mission has on these assets.



In a “conventional” EMS structure this is where an installation determines how its activities, products, and services might interact with the environment, and the significance of the consequences of these interactions (i.e., **aspect** and **impact** analysis). Under the Air Force EMS we will ensure mission is factored into the equation. The EMS will determine the amount of natural asset sustainment that is required, and identify the management actions that are needed, to **deliver the necessary mission capability** while **following the regulatory requirements** to achieve environmental and human health protection. The actions needed to achieve this capability will be summarized in environmental management plans.

- During the “DO” phase, the installation executes the plans. Roles and responsibilities are delegated, operating procedures are prepared, and training is provided to ensure operators understand the EMS and how to implement it.
- In the “CHECK” phase, the installation assesses the EMS execution and whether or not it is meeting the objectives and targets set in the Planning phase. The Check phase goes beyond reporting performance metrics and identifies the key objectives and targets necessary to ensure mission capability.
- The findings from the “Check” phase may show that adjustments are necessary or that entirely new methods are needed to achieve the EMS objectives. The installation will then “ACT” by modifying the EMS to be more effective.

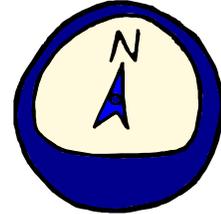
In the end, the success of using an EMS to achieve sustainable operations hinges on the importance of **linking the performance objectives of the EMS to the larger goals of sustainable operations**. These performance objectives are then supported by all the other EMS elements.

## **How is Sustainability Linked to EMS?**

The Air Force EMS could actually be described as a “sustainability management system.” Sustained mission capability is the goal; all activities support the mission and must manage their impacts on the resource base that the mission requires, including natural, built and workforce assets. EMS is a cross-functional sustainability system that

blends and integrates mission, environmental and sustainable development goals - and once ESOHMS is in place, workforce safety/health goals as well.

The EMS is a “roadmap” for installations to SRM their natural assets. Sustainability is the “compass” to guide the installation along that roadmap. The roadmap may have lots of destinations on it and may get turned around over time as it is used, but if sustainability is the compass, the map still points out the right path... mission capability. An EMS that is guided by sustainability goals will focus on mission critical issues and engage all organizations toward a common purpose. The EMS also promotes the Sustainable Development program (for our built assets); and as it evolves toward an ESOHMS (to include workforce assets), it enables SRM of all mission essential assets.



*An EMS is the framework –  
a set of processes and tools for  
effective mission accomplishment.*

*Sustainability is a guiding principle  
to keep us on track as we execute EMS.*

The Air Force is working toward an environmental paradigm shift from just regulatory compliance and P2, to sustaining our resources – to balance mission requirements with human needs, the economy, and the environment.

Anyone that has an impact on the life and activities at an installation or range (and that should be just about everyone) needs to be aware of how they affect their base, their community, and the environment. An EMS guided by sustainability principles gives us the mechanism to get this done. We stop focusing on the environment just for its own sake and start focusing on mission accomplishment without depleting the resources that support it.

An efficient, effective EMS integrates environmental management into all installation operations through awareness training. This training ensures each individual understands his or her role in performing day-to-day mission activities in a manner that supports EMS and sustainability goals. Awareness and understanding of the mission's interactions with the environment is the first step to operating effectively and efficiently with fewest possible constraints. Ultimately, the ESOHMS will address the Triple Bottom Line - "people, planet and profits" - by balancing our management priorities: mission, human, environmental and financial.

The EMS integrates all the needs of all of the stakeholders. By making sustainability the guiding compass for the installation EMS, we will be sure that we are heading for all of the right issues to assure continued mission success – without overlooking anything that could become a "show-stopper." The EMS is a mission enabler, rather than a compliance requirement constraining mission accomplishment.

## What are the Practical Applications of Sustainability?

***Sustainability expresses itself in the Air Force in two ways: through sustainable development, and through planning for long-term operational sustainability.***



*Barksdale Fitness Center  
LEED™ Bronze, Dec 2002*

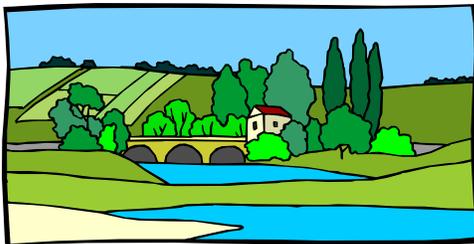
***Sustainable development*** is a life-cycle approach to facility and infrastructure management.

According to the USAF Civil Engineering Sustainable Development Policy, 19 Dec 2001: "It is Air Force policy to apply sustainable development concepts in the planning, design, construction, environmental management, operation, maintenance and disposal of facilities and infrastructure projects, consistent with budget and mission requirements."

The “green building” movement has been gaining momentum since the U.S. Green Building Council (USGBC) was formed in 1993. The USGBC “Leadership in Energy & Environmental Design (LEED™) Green Building Rating System” is the Air Force metric for success in green building. The CE Sustainable Development Policy states: ***“The goal is to have all MILCON projects in the FY09 program capable of achieving LEED™ certification.”*** The process began in FY04 with 20% of all MILCON projects designated for sustainable design, and an increase of 20% each year until full compliance is achieved in FY09. (It should be noted that actual LEED™ certification is at MAJCOM discretion; the project must be designed to be certifiable, but the expense of documentation and certification is not mandatory.)

The LEED™ for New Construction (LEED-NC), Version 2.1 rating system offers a menu of “credits” in six general areas. The total amount of points that is possible in Version 2.1 is 69 points. To be certifiable a project must meet the prerequisites in all areas, and then achieve enough additional credits in any of the six areas so that a total of 26 points is earned. Besides the prerequisites, none of the credits are mandatory. ***The project team selects the credits that are most applicable and cost effective for their particular project.***

The six credit areas in LEED-NC are:



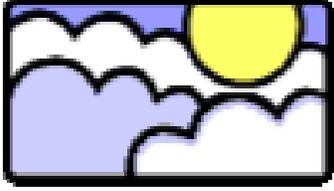
### **Sustainable Sites**

(site selection, site resource protection, development density, transportation, landscaping, and storm water management issues) – 14 possible points



### **Water Efficiency**

(water efficient landscaping, water conservation, and innovative technologies) – 5 possible points



### **Energy and Atmosphere**

(building commissioning, energy performance, renewable energy, elimination of HCFC's and Halons, and performance monitoring) – 17 possible points



### **Materials and Resources**

(recycling, building material reuse, construction waste management, recycled content materials, local/regional materials, rapidly renewable materials, and certified wood) – 13 possible points



### **Indoor Environmental Quality**

(tobacco smoke control, carbon dioxide monitoring, ventilation effectiveness, construction indoor air quality management plan, low-emitting materials, chemical and pollutant source control, controllability of systems, thermal comfort, and access to daylight and views) – 15 possible points



**Innovation and Design Process** (use of LEED™ certified design personnel, and innovation credits for exceptional performance beyond the LEED requirements) – 5 possible points

The use of LEED-NC helps us to create a building inventory that offers high performance while respecting the environment and the quality of life of the occupants.

The USGBC has recognized that design and construction are a good start, but don't ensure continued success. USGBC is responding by developing a new rating system called "LEED™ for Existing Building

Operations (LEED-EB).” The pilot version is being tested and the final version should be launched in late 2004. LEED-EB is a set of performance standards for the sustainable operation of existing buildings. The LEED-EB criteria cover building operations and systems upgrades in existing buildings where the majority of interior or exterior surfaces remain unchanged. It is designed to complement the LEED-NC rating system for new construction and major renovations.

USGBC is also developing other new LEED™ rating systems to meet the specific requirements of different building types. These will be tested and released in the 2005-2006 time frame:

- LEED for Commercial Interiors (LEED-CI)
- LEED for Core & Shell (LEED-CS)
- LEED for Neighborhood Developments (LEED-ND)
- LEED Homes

## **Beyond Green Buildings to Sustaining Operability**

Green construction is a good start, but buildings are only part of the sustainability story. To move toward operational sustainability in the long term we will take a broader view of the issues. As discussed earlier, the built infrastructure is not the only “infrastructure” necessary for mission accomplishment. As Bill Nye the Science Guy would say, “Consider the following” --



*What could happen if an installation or range did not consider trends in:*

- Availability of waste management and disposal services
- Water quality and availability
- Energy supply
- Endangered species population and distribution
- Land use and growth in the surrounding communities
- Transportation systems

- Radio-frequency spectrum allocation
- Airspace
- Air emission limits

These are examples of resources and constraints that may impact an installation's ability to effectively perform its mission. And these are cross-cutting issues that involve many different organizations on an installation. They transcend traditional environmental management programs that are focused on legal compliance. Installations can utilize their GeoBase platforms to assist in visually identifying these resources and potential constraints.

Planning for the sustainability of all of these resources is generally not an integrated effort at AF installations. One possible solution is the approach that Air Force Reserve Command (AFRC) has taken at two pilot installations, Homestead ARB and March ARB. AFRC recognized the opportunities inherent in the rebuilding of Homestead ARS after Hurricane Andrew, and the beddown of the new C-17 mission at March ARB, and decided to integrate sustainability initiatives into their new mission goals.

## Sustainability Action Plans

Homestead ARB and March ARB now have integrated programs in place that include an installation sustainability policy and a Sustainability Action Plan. AFRC's sustainability planning process followed these steps:



- **Develop base-specific sustainability goals** related to eight "operational categories". For March ARB these included Air Quality; Building Systems; Energy; Land Use; Materials, Wastes and Services; Natural and Cultural Resources; Transportation; and Water.
- **Baseline** previous sustainability successes.
- **Identify projects** needed to meet the sustainability goals.

- **Prioritize projects** based on cost, feasibility, potential benefits (considering “people, planet, and profits”).
- **Develop an action plan** to execute the top-tier projects.
- **Identify appropriate sustainability indicators and metrics** to track progress.
- **Write a sustainable operations policy statement** that is applicable to all base operations.
- **Engage local stakeholders** in the community and regulatory agencies.

The process and the results are similar to the Pollution Prevention Opportunity Assessments and Action Plans that the Air Force put in place during the 1990’s – only broader in scope. The Sustainability Action Plans for these two bases are able to draw on the process and the knowledge created by the P2 program, but also are able to take the effort to the next level – ensuring they move steadily toward a sustainable future.

***The sustainability planning process and Action Plan development has uniquely positioned Homestead ARB and March ARB to meet the upcoming Air Force EMS requirements.***

The process of identifying base-specific operational categories, constraints, goals, and actions helps installation personnel to identify the EMS-required environmental aspects and impacts at their bases. To meet another EMS requirement, the projects identified in the Sustainability Action Plans can also serve as “Environmental Management Plans.” And by applying internal metrics, the installation can measure how well it is progressing toward achieving its sustainability goals.



Unlike the Sustainability Action Plans for Homestead ARB (2002) and March ARB (2003), an Action Plan being developed in a follow-on project at Youngstown ARS will be integrated into the base General Plan.

This final step will “close the loop” and completely integrate sustainability into the existing Air Force comprehensive planning process.

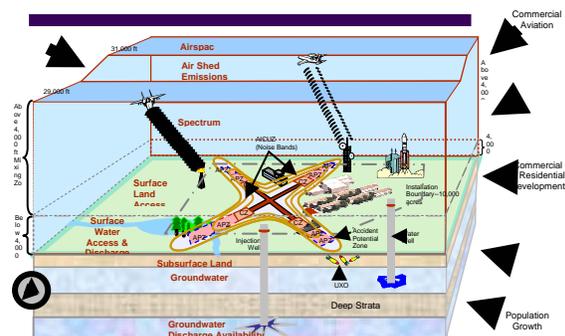
## The Resource Capability Model and Asset Valuation

The Resource Capability Model, or RCM, provides a framework to measure the availability of resources (e.g. air, land, water, and frequency spectrum) that are required to meet current operational requirements, and determine the potential for future mission capabilities, at an installation or range.

RCM is a tool for identifying, quantifying, and assessing **resource limitations** (i.e., encroachment) and **resource opportunities** at Air Force installations. It was pilot tested by ACC in 2003, and is now being implemented at fifteen ACC installations.

RCM compares operational resource requirements against resource availability for each resource category using a set of defined metrics. The resource categories are:

- Airspace
- Air Shed Emissions Availability
- Off-Base Surface Land
- On-Base Surface Land
- Water Supply
- Water Discharge Availability
- Frequency Spectrum



The installation's capability for each category is measured. A score is assigned to each category, ranging from "less than 60% availability" to "greater than 140% availability." A 100% score represents full mission capability for that resource category. A score less than 100% is a resource deficiency and indicates that constraints exist, while a score over 100% shows a resource opportunity.

As changes are made to the installation's capability score – either through mission changes, or resource gains resulting from proactive management – the RCM will be reevaluated. This iterative process blends well with the cyclical, continuous improvement nature of the EMS. For example, an installation that uses pollution prevention to reduce its air emissions from stationary sources may then discover that it has enough air permit "headroom" to support additional aircraft. The new mission baseline would then be evaluated against other RCM resource categories to ensure they can also support this capability. Any required SRM actions would be identified, and the EMS plans would be updated.

The short-term objectives of the Resource Capability initiative are to develop a capability-based model to quantify the adequacy or "readiness" of air, land, water, and frequency spectrum resources to meet operational requirements. The long-term objectives are to link RCM with quantification of impacts to training and operations, to incorporate resources and RCM into the readiness reporting process, and to deploy the RCM across the Air Force so that it can be used in support of SRM and initial basing decisions.

Future plans for RCM include application at ACC locations; briefings to other Major Commands; completion of a Four-Plane Study to quantify resource requirements; and linkage of RCM with training/operational impacts and risk management decisions. RCM will be mainstreamed into the SRM process so that all opportunities and deficiencies are reported and addressed.

In order to make informed, business-based decisions on resource capability, commanders must not only have an understanding of the quantity of natural assets that are available/needed, but must also understand their value. Knowing the value of the natural asset (for



example, the worth of permitted air emissions or a groundwater recharge zone) will ensure commanders have visibility into the total cost of mission sustainment. Natural resource asset valuations are underway and will establish the framework for installations to factor “value” into the RCM.

## Summary

This guide has described how the Air Force’s ESOHMS will be used to achieve sustainable operations, and how ongoing efforts -- such as the development of Sustainability Action Plans and the Resource Capability Model -- go well beyond traditional environmental compliance management to consider the full range of resources that are necessary to sustain the mission.

***Sustainability Action Plans and the Resource Capability Model are complementary tools for identifying and managing the potential constraints at an installation or range.***

Each of these tools has great strengths:

- ✓ The RCM pinpoints an installation or range’s resource strengths and opportunities with respect to mission accomplishment.
- ✓ The Sustainability Action Plan identifies the actions to take to improve mission sustainability, and ties these actions into the overall planning and management systems at the installation or range.

If the RCM and Sustainability Action Plans were applied together, and the results integrated into the EMS, mission support plans, and funding systems, sustainable operations would be guaranteed.



**The Air Force installations of the future will be strong, capable, and certain of their continued success,** due to the commitment of today's commanders to ensuring that their operations are sustainable. "Green building" is just the beginning.

The RCM can provide the tools and data for mission-focused decision making. Sustainability Action Plans can define and map our progress. An EMS that is guided by sustainability concepts provides the framework and tools to balance human needs with economic and environmental resources for sustained and successful mission accomplishment. These tools and approaches will require us to reframe our thinking about how we approach environmental and installation management and base comprehensive planning.

**"We can't solve our problems with the same level of thinking that caused the problems in the first place."**

**-- Albert Einstein**

**"Resolve to be a master of change rather than a victim of change."**

**-- Brian Tracy**

**"Shoot for the moon. Even if you miss it, you will land among the stars."**

**-- Les Brown**



**"The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased and not impaired in value."**

**-- Teddy Roosevelt, "The New Nationalism" (1910)**

## Acknowledgements

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## For More Information

Sustainable Operations at Homestead ARB:

<http://www.afrc.af.mil/482fw/MSG/SUSOPS/soindex.htm>

HQ AFRC Sustainability Program Special Focus Items:

<https://wwwmil.afrc.af.mil/HQ/CE/cev/cevq/Sustainability/Sustainability.htm>

Sustainable Development/Green Building page on AFCEE's web site:

<http://www.afcee.brooks.af.mil/eq/programs/progpage.asp?PID=27>

Sustainable Planning page on AFCEE's web site:

<http://www.afcee.brooks.af.mil/ec/planning/sustain/sustain.asp>

EMS policy and guidance on the HQ USAF/ILEVQ web site:

<https://www.il.hq.af.mil/ile/ilev/ilevq.cfm?osymbol=ilevq>

Sustainable Operations page on AFCEE's web site:

<http://www.afcee.brooks.af.mil/products/so>