Navy Develops Matrix to Rank Environmental Quality Requirements

Program Helps Managers Assess Risks

Shrinking budgets and increasing demands to address environmental issues has left the Navy facing tough decisions as to how to best allocate funding for environmental programs. This state of affairs has prompted the Navy to develop a prioritization process for the Environmental Quality Requirements (EQRs) that meet the needs of the Standard Operating Procedure for the Navy's Shore environmental Research, Development, Test and Evaluation (RTD&E) process. To help environmental managers determine how best to apply these limited funds, the Navy's Collaborative Web Site (CWS) steering committee, an outgrowth of the Navy Shore Environmental RTD&E program, developed a prioritization matrix to rank EQRs.

Prioritization methodologies are decision-support tools and therefore are only a guideline to ranking EQRs. Risk based methodologies cannot account for all of the factors required to completely and comprehensively list priorities without becoming overly complex and unmanageable. Instead, what the risk based prioritization methods provide is a foundation for applying management experience and knowledge into a defensible, consistent and traceable ranking of EQRs.

Development of the EQR prioritization matrix was derived from analysis of existing risk-based approaches for prioritizing environmental spending. Of significant interest are methodologies that are currently being implemented at federal agencies. Generally speaking, prioritization of EQRs require the evaluator to weigh the factors that contribute to the degradation of human health, environment, and readiness, while maintaining regulatory compliance and limiting/reducing cost impacts.

Studies of risked based prioritization methods used at federal agencies have been performed by a limited number of individuals/organizations. A comprehensive analysis of risked-based prioritization methodologies was conducted and presented in the Federal Facilities Environmental Journal

TABLE 1: Criteria Comparison of Federal Agency Environmental Prioritization Methodologies

Organization	Human Health	Ecological Impact	Compliance	Mission Impact	Agency Priorities	Public Priorities	Cost/Investment Impact	Pervasiveness
Environmental Protection Agency	✔	✔	✔	✔	✔	✔	✔	
Department of Energy	✔	✔	✔	✔		✔	✔	
Air Force	✔	✔	✔	✔	✔		✔	
Army Material Command	✔	✔	✔	✔	✔		✔	
U.S. Army Forces Command		✔	✔	✔			✔	
U.S. Army Training Doctrine Command	✔	✔	✔	✔	✔		✔	
Naval Air Systems Command	✔	✔	✔	✔	✔	✔	✔	✔

TABLE 2: Criteria Consolidation

Consolidated Criteria Designation	Individual Criteria Categories
Regulatory Driver	• Compliance
Human Health & Environment	• Human Health • Ecological Impact
Readiness Impact	• Readiness Impact • Public Priorities • Agency Priorities
Cost Impact	• Cost/Investment Impact • Pervasiveness

(Dzuray, E. et. al. (Summer 1999), Assessing the Status of Risked-based Approaches for the Prioritization of Federal Environmental Spending, Federal Facilities Environmental Journal). The methods presented in this article were the basis of the EQR prioritization matrix that was eventually developed. Methodologies developed by the Environmental Protection Agency (EPA), Department of Energy (DOE), Air Force, Army, and Navy were evaluated for relevance, conciseness, and comprehensiveness. A comparison of the list of criteria/attributes used to rank environmental requirements for a variety of federal agencies is represented in Table 1.

TABLE 3: Environmental Quality Requirement (EQR) Priority Matrix

Criteria	High Priority 3	Medium Priority 2
Regulatory Driver	Funding is critical to achieve compliance schedules mandated by laws and regulations or for inventories, assessments, surveys, and studies necessary to define critical programs required by new laws and regulations.	Addressing the issue is required by laws/regulations, but could be postponed without the facility going out of compliance. Addressing the issue is for proposed regulations that yet to be promulgated.
Human Health & Environment (Ecological)	Potential human health (cancer/non-cancer) and/or ecological risk is high. Population death or permanent disability (loss of life, limb, or function-eyesight, hearing). Irreplaceable property loss or listed species/critical habitat impact. Significant permanent/semi-permanent ecological damage (permanent damage is greater than 30 years).	Potential human health and/or ecological risk is medium. Permanent minor disability or temporary major disability such as cumulative trauma disorders. Limited exposure to carcinogens. Major ecological damage such as long term damage to Earth's atmosphere, exposures having an adverse or widespread impact on flora or fauna, and significant but reversible loss of surface water, groundwater, or land resources. Major property loss or physical damage to listed species, critical habitat or resources.
Readiness Impact	Failure to act will significantly affect a facility's ability to perform its assigned or projected mission. Complete mission failure or loss of system. Immediate action needed to avoid confrontation with federal/state/local regulatory officials or the public.	Failure to act may degrade a facility's ability to perform assigned or projected missions. Major mission degradation or major system damage. Some action needed to avoid confrontation with federal/state/local regulatory officials or public.
Cost Impact	• Significant cost impact if not addressed. • High cost process, operation, or issue is less than $2M/year Navy-wide. • High cost to address issue with current methods (greater than $10M total Navy-wide). • Potential for significant savings if problem is addressed is greater than $2M/year or $10M total.	• Majority of Navy shore facilities impacted. • Cost of process, operation, or issue is between $500K and $2M/year Navy-wide. • Cost to address issue with current methods is between $2M/year & $10M total. • Full potential of cost savings if problem is addressed is up to $2M/year or $10M total.

The EPA developed a two-step prioritization method, known as FEDPLAN, that was used to develop the EQR prioritization matrix. The first step of the FEDPLAN process, EQR classification, had limited applicability to what was considered necessary to develop the EQR prioritization matrix. It was judged that step two of the FEDPLAN method addressed the parameters and a format that best met the users of the EQR prioritization effort. The FEDPLAN method lists 11 attributes/criteria (several of which are represented in Table 1), each ranked by a scoring choice of "High Priority", "Medium Priority" and "Low Priority". The 11 listed attributes represented a wide range of risks. Each risk had an associated set of explicitly detailed ranking descriptions delineating the differences between the rankings of high, medium and low.

One of the primary goals identified in the development of the EQR prioritization matrix was the creation of a robust yet user-friendly tool. A tool with such properties would promote its continued application by busy environmental managers who are unable to spend a lot of time ranking EQRs. The FEDPLAN approach was determined to be too intricate in its delineation of risks. Many of the risks presented in the FEDPLAN were consolidated or removed to eventually comprise the list of criteria developed for the EQR prioritization matrix as depicted in Table 2. For instance, criteria such as "Human Health" and "Ecological Impact" were combined into one criteria designation "Human Health & Environment".

Criteria consolidation necessitated a consolidation of the ranking matrix criteria descriptions to maintain a desired level of comprehensiveness. To promote the priority matrix's user-friendliness, the consolidated criteria descriptions (Table 3) were written in a concise, yet detailed manner to provide the evaluator a straightforward yet powerful method to choose between scores of 3 (High Priority), 2 (Medium Priority), and 1 (Low Priority).

The CWS Steering Committee EQR has developed what it believes to be a robust yet user-friendly tool, the EQR Prioritization Matrix, to assist the Environmental manager in the process of evaluating and ranking EQRs. The ranked EQRs will in turn provide justification for the expenditure of funds supporting the Navy's Shore environmental RTD&E process. The EQR Priority Matrix is scheduled for implementation by end of FY'04. It is expected that the process of EQR evaluation and ranking will continue on an annual basis until the time it is considered appropriate to do otherwise. ⚓

Low Priority 1
Addressing the issue is not currently required, but may be needed to avoid possible non-compliance in the future.
Potential human health and/or ecological risk is low. Temporary discomfort, occupational illness, minor injury, or no effect on health. Minor property loss or physical damage to listed species, critical habitat or resources. Cultural or natural resources site damage is easily repaired/restored.
Failure to act will not degrade a facility's ability to perform assigned or projected missions. Minor mission degradation or minor system damage. Public and regulatory perception is not an issue.
• Few or local Navy installation(s) impacted. • Cost of process, operation, or issue is less than $500K/year Navy-wide. • Cost to address issue with current methods is less than $500K and $2M/year total. • Full potential of cost savings if problem is addressed is up to $500M/year or $2M total.

CONTACT

Andrew Drucker
Naval Facilities Engineering Service Center
805-982-1108
DSN: 551-1108
andrew.drucker@navy.mil

If you would like to share your pollution prevention success stories, or would like additional information on the Navy's technology transfer program, contact Kurt Buehler at 805-982-4886, DSN: 551-4886, or kurt.buehler@navy.mil.