ENVIRONMENTAL MANAGEMENT SYSTEM (EMS) FOR MILITARY ACTIVITIES – STRATEGIES AND POLICIES FOR AMERICAN, CANADIAN, BRAZILIAN AND NATO ARMIES

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Abstract: Increasing of demand from environmental legislation and public opinion have transformed militaries activities, employees and facilities of Armed Forces all over the world. It became necessary to implement an Environmental Management System (EMS) to guide people to participate on those activities even during peace or war times. It's a common threat among all the armies that military planning documents nowadays have to consider the risks of damaging the environment which can be caused by military operations. This has led to a progressive updated of environmental military legislation in order to be in according to Federal Environmental Laws in each country. The USA Department of Defense (DoD) was the first one to establish a formal structure for this in 1970 and others countries have followed it. The US Army Environmental Strategy into the twenty- first century is a program that shows the guidance for achieving the goal of environmental stewardship. The strategy consists of specific goals, objectives, and an action plan. The strategy has four environmental areas which are compliance, restoration, prevention, and conservation. Each area has an associated objective, which are: 1) give immediate priority to sustained compliance with all environmental laws; 2) continue to restore contaminated sites as quickly as funds permit; 3) focus efforts on pollution prevention to reduce or stop pollution at the source; and 4) conserve and preserve natural and cultural resources so they will be available for present and future generations. The fourth objective is related to the so-called Sustainable Development concept established by Our Future Common from the United Nations World Commission on environment and Development in 1987. The USA Army Strategy for the Environment summarizes a plan to develop a long-term sustainability ethic; strengthen operations; meet testing, training, and mission requirements; mitigate impacts and costs; incentivize innovation; and enhance the well-being of Soldiers, civilians, families, neighbors, and communities. NATO Defense ministries have implemented environmental management systems in a similar manner to other governmental bodies – and this is perhaps the most remarkable and important development in the politicization of such systems. The Pilot Study on Environmental Management Systems in the Military Sector, conducted by the NATO Committee on the Challenges of Modern Society, stated that the sector's environmental impact often outweighed that of most other government departments. The Study recommended that ministries of defense and armed forces should implement an EMS and concluded that such it was the best way to protect the environment and maintain operational readiness, and EMS implementation in the military sector was both possible and desirable. The environment should concern everybody including managers and individual soldiers. It concluded that Any EMS standardization across the NATO countries framework would enhance the integration of sustainable development into military activities. Environmental policy for military operations in

NATO is typically characterized by a code of environmental stewardship or principles for environmental protection which includes the following elements, among others: 1) the principle that environmental protection is a responsibility for everyone; 2) conformity with applicable legal requirements, including international agreements; 3) acceptance of the importance of environmental planning; 4) the objective of mitigating environmental damage in an opportune time. Canadian Army established the Army Environmental Strategy and the Army Environmental Policy where it is recognized the importance of taking account of environmental aspects in all decision making. Canadian Army approved the initial Land Force Command Environmental Action Plan in 1992 and revised it in 1995. It also published the Leader's Guide to the Environment in 1997, and it recently restated its position in the LFC EMS framework paper. Extract from LFC environmental policy shows that the continual improvement is a fundamental aspect to be considered in an EMS process. Canadian Army EMS include: sustainable military training, management of potentially contaminated sites and materials, pollution prevention, management of fuel storage tanks, management of hazardous materials, waste management, and conservation of energy and potable water. Brazilian Army established its EMS in 2001 and updated it in 2011. Brazilian Army EMS describes the importance of the consideration of environmental laws in military activities, pollution prevention, preservation, conservation and recuperation of the environment. The collaboration to other countries in actions as conferences, interchanges and meetings are motivated. The environmental education must be implemented in all levels of Brazilian Army, from commanders to soldiers, mainly with respect to flora, fauna, water resources and biodiversity. The Amazon Region is priority to Brazilian Army. Stimulate the formation and development of environment conscience and researches in order to promote the rational use of environmental resources are goals of Brazilian Army EMS. A key element of this transformation in the armies is the implementation of an Environmental Management System (EMS) as a mission enabler. The purpose of this work is to show and compare strategies and policies acts taken by American, Canadian, Brazilian and NATO Armies in order to adopt and implement their EMS.

Keywords: Armed Forces, Environmental Management System, Environmental Policies, Environmental Strategies

INTRODUCTION

An Environmental Management System (EMS) is a systematic approach which allows for environmental considerations to be incorporated into the routine or uncommon decisions of an Organization. It establishes the management framework of an environmental program and provides the directions for the planning, doing, checking, monitoring, evaluation, communication and updating of the environmental program. An EMS is the component of an institution's overall management system (MS) that integrates environmental aspects and issues in its management processes. An EMS is composed of organizational structure, planning activities, matrix of responsibilities, practices, procedures, processes, steps, and resources (material and human) for planning, developing, implementing, achieving, reviewing, and maintaining the environmental policy of the organization. It empowers an institution to control the impact of its activities on the environment, permitting it not only to conform to current environmental requirements, but to identify and proactively manage future sources that might impact the sustainability of the mission. EMS is based on a proven model consisting of four stages – Plan, Do, Check, Act, which is the well-known PDCA cycle. The International Organization for Standardization developed the ISO 14001 [1] standard to establish a set of internationally recognized criteria for EMS. The ISO 14001 model is a global standard that can help the Armies to make their own EMS, adapted to their singular characteristics. ISO 14001 implementation is now growing fastest in the public sector, in special in the military area. Federal and local governments, municipal authorities, city administrations, regional organizations, including the European Commission, Olympic Committees and even the military sector are implementing ISO 14001.

BRIEF HISTORIC

USA Army

The USA Department of Defense (DoD) was the first organization to establish a formal structure in order to implement one Environmental Management System (EMS) in 1970 and others countries have followed it. The US Army Environmental Strategy into the Twenty-First Century is a program that shows the guidance for achieving the goal of environmental stewardship. The strategy consists of specific goals, objectives, and actions plans [2]. It has four environmental areas which are compliance, restoration, prevention, and conservation. Each area has an associated objective: 1) give immediate priority to sustained compliance with all environmental laws; 2) continue to restore

contaminated sites as quickly as funds permit; 3) focus efforts on pollution prevention to reduce or stop pollution at the source; and 4) conserve and preserve natural and cultural resources so they will be available for present and future generations. The fourth objective is related to the so-called Sustainable Development concept established by Our Future Common from the United Nations World Commission on Environment and Development in 1987. The USA Army Strategy for the Environment summarizes a plan to develop a long-term sustainability ethic; strengthen operations; meet testing, training, and mission requirements; mitigate impacts and reduce costs; incentive innovation; and enhance the well-being of Soldiers, civilians, families, neighbors, and communities. In October 2004, the USA Army published *The Army Strategy for the Environment: Sustain the Mission—Secure the Future* (see Figure 1). The strategy establishes a long-range vision, founded on sustainability, that enables the Army to accomplish its mission today and into the future. Figure 2 shows the connection among the mission, the community, the environment and the Army [3].

In December, 2005 it was published *The Environmental Management System – Implementers Guide*, which purpose is to provide Army personnel an easy-to-use, step-by-step tool for implementing the Army's environmental management system (EMS) [4]. It offers guidance for meeting Army and Department of Defense (DoD) requirements but allows installations the flexibility to address different missions and operational readiness requirements. *The Commander's Guide for Mission-Focused Environmental Management System* was published in March, 2007 and has the purpose to give the basic directions to Commanders in order to the implementation of the EMS in military activities [5].

NATO

NATO Defense ministries have implemented environmental management systems in a similar manner to other governmental bodies. The Pilot Study on Environmental Management Systems in the Military Sector, conducted by the NATO Committee on the Challenges of Modern Society, stated that the sector's environmental impact often outweighed that of most other government departments [6]. The Study recommended that ministries of defense and armed forces should implement an EMS and concluded that such it was the best way to protect the environment and maintain operational readiness considering the EMS implementation in the military sector was both possible and desirable. The environment should concern everybody including managers and individual soldiers. It concluded that any EMS standardization across the NATO countries framework would enhance the integration of sustainable development into military activities. Environmental policy for military operations in the NATO is typically characterized by a code of environmental stewardship or principles for environmental protection which includes the following elements, among others: 1) the principle that environmental protection is a responsibility for everyone; 2) conformity with applicable legal requirements, including international agreements; 3) acceptance of the importance of environmental planning; 4) the objective of mitigating environmental damage in an opportune time [7]. In August, 2011 it was published *The AJEPP-3 - Allied Joint Environmental Protection Publication - Environmental Management System in NATO Operations (STANAG 2582- Standardization Agreement 2582)* [8]. The aim of this document is to provide Environmental Protection Officers with an understanding of the NATO planning process and how to integrate an EMS into this process. At the same date, NATO published *The AJEPP-2 - Allied Joint Environmental Protection Publication - Best Environmental Protection Practices for Military Compounds in NATO Operations (STANAG 2582- Standardization Agreement 2582)* which purpose is to be as a best practices handbook for the Combined Joint Task Force (CJTF) Headquarters (HQ) operational and theatre level staff planner [9].

Canadian Army

The Canadian Land Force (CLF) established the Army Environmental Strategy and the Army Environmental Policy where it is recognized the importance of taking account of environmental aspects in all decision making. Canadian Army approved the initial Land Force Command Environmental Action Plan in 1992 and revised it in 1995. It also published the Leader's Guide to the Environment in 1997, and it recently restated its position in the LFC EMS framework paper [10]. Extract from LFC environmental policy shows that the continual improvement is a fundamental aspect to be considered in an EMS process. Canadian Army EMS include: sustainable military training, management of potentially contaminated sites and materials, pollution prevention, management of fuel storage tanks, management of hazardous materials, waste management, and conservation of energy and potable water. In 1995, federal government departments and agencies were directed to develop and implement formal EMS to minimize the negative effects on the environment caused by their activities. This requirement also applies to the Department of National Defense and the Canadian Forces (DND/CF).

Figure 1: The US Army Strategy for the Environment: Sustain the Mission—Secure the Future

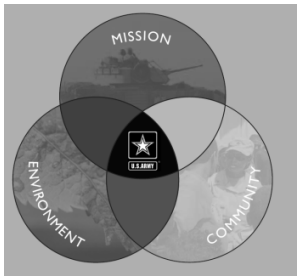

Figure 2: Interaction among Environmental, Mission and Community.

Figure 3: PDCA Cycle

Directions on Greening Government Operations stated that: a properly designed EMS will provide the framework for practices to help a department or agency manage its environmental agenda and document, evaluate, and communicate its environmental performance. In addition, amendments to the Auditor General Act (AGA), which came into effect in December 1995, require departments to prepare sustainable development strategies (SDS) and action plans, and to table them in Parliament at least every three years. On behalf of the Auditor General, the Commissioner monitors departments' progress in meeting their sustainable development objectives and implementing their action plans. The Commissioner has to report the results annually to Parliament. DND/CF recognizes that they have the potential to affect the Canadian environment and are responsible for helping to protect it. They have introduced many programs to limit the impact of their activities and to contribute to the health and well-being of Canadians. These programs range from placing oil-catching drip pans under parked vehicles, to providing emergency aid for flood victims. It incorporates existing initiatives where appropriate, and outlines new objectives to increase National Defense's contribution to sustainable development. In December, 1997 the Department of National Defense and the Canadian Forces (DND/CF) fulfilled this obligation by tabling their first SDS entitled *Environmentally Sustainable Defense Activities – Sustainable Development Strategy for National Defense*. This initial strategy created the master plan for adopting a proactive approach towards environmental protection and property management. The updates of this strategy, SDS 2000, 2003 and 2006 [11], have enabled the DND/CF to renew their commitment to the environment. The Environmental Management System (EMS), based on the principles set out in International Organization for Standardization (ISO) 14001, ensures implementation of the SDS. SDS 2000 prescribed that an EMS be implemented for all Headquarters and Bases. In accordance with *DAOD 4003-0, Environmental Protection and Stewardship*, developing, operating and maintaining an EMS is an obligation. In 1999, Land Force Command (LFC) delivered its first EMS based on the ISO 14000 series and updated in 2008 and 2011 [12]. The EMS must be reviewed every three years.

Brazilian Army

Brazilian Army established its first issue of an EMS by the Ordinances 570 [13] and 571 [14] – Staff Command of the Army which established the Brazilian Army Environmental Policy and Strategic Guide of Brazilian Army Environmental Management System (EMS), respectively, in November, 6th, 2001. The Ordinance 050 - Staff Command of the Army published in July, 11th, 2003, brought the Guidelines to Elaboration of Environmental Basic Plans. The Brazilian Army Environmental Management Policy was updated by the Ordinance 1138 - Staff Command of the Army, in November, 22nd, 2010, in order to follow the continuous improving of an EMS [15].

ANALYSIS OF THE EMS OF EACH ARMY

The International Organization for Standardization developed the ISO 14001 [1] standard as a voluntary set of internationally recognized criteria for the EMS. ISO 14001 describes the 17 elements of environmental management in terms of general management functions: environmental policy, planning, implementation, checking, and management review. The standard does not establish absolute requirements for environmental performance beyond the commitment to regulatory compliance and continual improvement. Instead, it directs organizations to concentrate on systems to achieve the desired performance articulated in their environmental policy and objectives. The ISO 14000 family addresses various aspects of environmental management. The very first two standards, ISO 14001 and ISO 14004 deal with environmental management systems (EMS). ISO 14001 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. The others in the ISO 14000 family address specific environmental aspects, including: labeling, performance evaluation, life cycle analysis, communication and auditing. An EMS is a management tool enabling an organization of any size or type to: (a) identify and control the environmental impact of its activities, products or services; (b) improve its environmental performance continually, and (c) to implement a systematic approach to setting environmental objectives and goals, to achieving these and to demonstrating that they have been achieved.

The ISO 14000 family is designed to be implemented according to the same Plan-Do-Check-Act (PDCA) cycle underlying all ISO management systems standards (see Figure 3).

Plan

(a) Identify the problem. (b) Analyze the problem.

Do

(a) Develop solutions. (b) Implement the solution.

Check

Evaluate the results. Measure how effective the solution was and analyze whether it could be improved in any way.

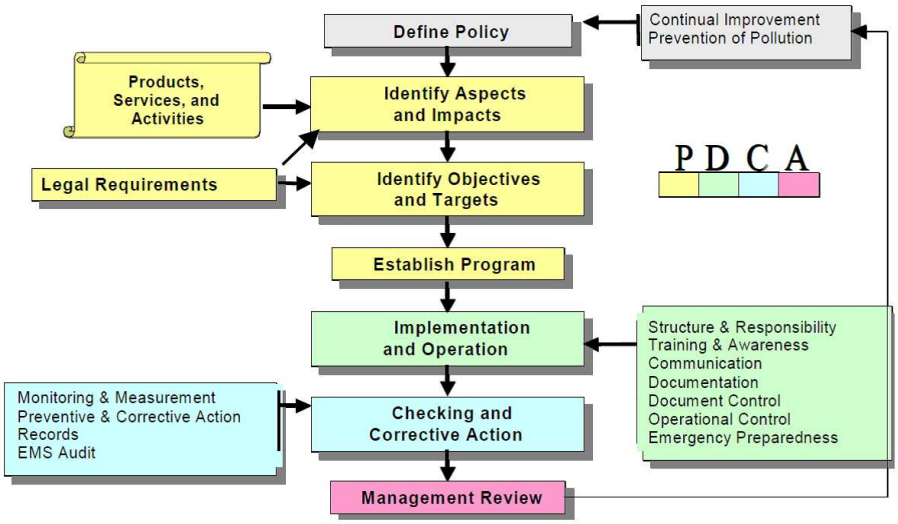

Figure 4: The PDCA Cycle of the US Army EMS.

Figure 5: The Continuous Improvement of the US Army EMS.

Figure 6: NATO Environmental Management System structure.

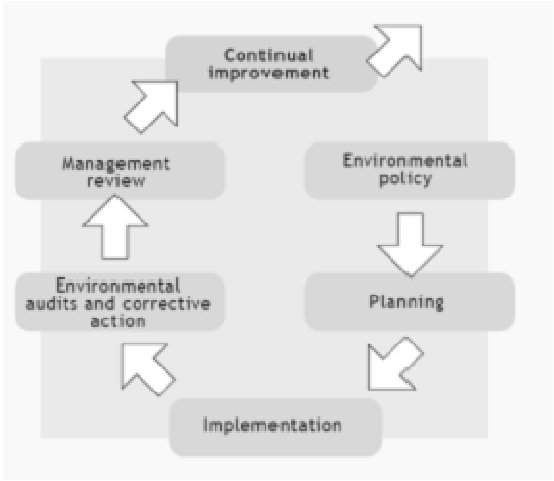

Figure 7: The EMS of Canadian Army.

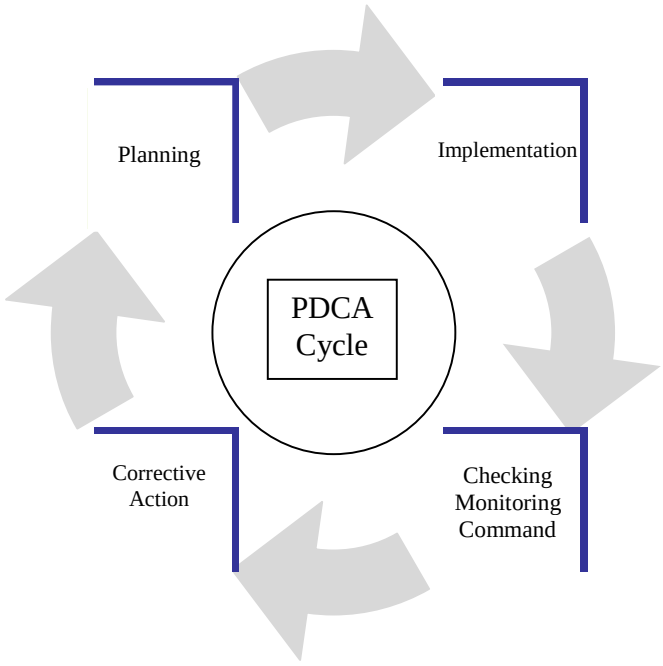

Figure 8: The Brazilian Army EMS Cycle

Act

Standardize the solution and implement it fully.

US Army EMS

The purposes of the American Army Environmental Strategy are to [2]: (a) Strengthen the Army contribution to joint operational capability; (b) Meet current and future training, testing, and other mission requirements; (c) Improve the ability to operate installations, to include growing joint interdependency; (d) Reduce costs and minimize impacts so the Army can do more, and does it better; (e) Enhance human health, safety, and well-being; and (f) Be an active citizen within the communities, as well as a good neighbor.

It has been adopted six goals in order to achieve an enduring Army enabled by sustainable operations, installations, systems, and communities. These are the building blocks of Army sustainability, and they spring from the internal processes in the Army's Strategic Readiness System. These goals formulate the structure to provide a linkage between the Army's strategic objectives and the actions needed to achieve those objectives as envisioned and directed under the Government Performance and Results Act and the Chief Financial Officers Act. They involve policy, planning, programming, implementation, and time to bring the promise and benefits embodied herein.

Goal 1: Foster a Sustainability Ethic

Foster an ethic within the Army that takes beyond environmental compliance to sustainability.

Strategically, a sustainable Army is an innovative Army that can rapidly adapt to challenges, and has the support of the Nation it defends, whether in war or peace times. Achieving and maintaining this ethic of sustainability requires that Army leaders foster a climate in which the Army community incorporates the fact that the Earth's resources, while essential to military operations, are not limitless. Such a mind-set protects military readiness, advances sustainability, and builds trust. The Army has to provide the training in sustainable environmental principles and practices to better use natural resources. The EMS must comply with all laws and continually build the trust of the community by responsibly addressing past and present contamination resulting from unsustainable practices.

Goal 2: Strengthen Army Operations

Strengthen Army operational capability by reducing the environmental footprint through more sustainable practices. The Army has to adopted sustainable

practices such as water conservation and fuel and energy efficiency to minimize the logistical tail. Zero emissions – heat, light, and noise, waste – reduce the operational signature. Situational awareness includes human health and environmental conditions on and beyond the battlefield. The EMS has to have the capability to assess the total environment before deployment, to monitor and protect during deployment, and to leave a positive legacy upon redeployment. Protecting the Soldiers from environmental harm is a vital component of protecting the force.

Goal 3: Meet, Test, Training and Mission Requirements

Meet current and future training, testing, and other mission requirements by sustaining land, air, and water resources.

The Army has to sustain its ranges so that they are always available to achieve the current mission requirements, the test and training lands' natural resource base in quantity, quality, and configuration to meet current and future requirements. The Army will manage range activities to maintain the resiliency and buffering needed to protect the environment and the surrounding communities from impacts of training and testing. It will apply an ecosystem-based approach to manage natural resources.

Goal 4: Minimize Impacts and Total Ownership Costs

Minimize impacts and total ownership costs of Army systems, materiel, facilities, and operations by integrating theprinciples and practices of sustainability.

The Army will reduce impacts on the environment. The life cycle costs, which include impacts on resources and the environment, happen from perception through use to regeneration or disposal. It will be better manage by integrating sustainable practices into the systems, materiel, facilities, and operations, into all activities The Army can weight its purchasing power to favor environmentally sustainable products that lower total ownership costs, and apply other tools to continually improve effectiveness and better environmental management.

Goal 5: Enhance Well-Being

Enhance the well-being of the Soldiers, civilians, families, neighbors and communities through leadership in sustainability.

The Army has to sustain the natural resources for the Soldiers, their families, Army civilians, contract workforces, and neighbors. It will celebrate the heritage through responsible management of cultural resources. The public has a collaborative role to play in the decision as partners in sustainability and environmental stewardship.. The Army needs strengthen and build new community partnerships to achieve sustained and sound environmental stewardship and a ready military force through communication, coordination, consultation, and collaboration.

Goal 6: Drive Innovations

Use innovative technology and the principles of sustainability to meet user needs and anticipate future Army challenges.

The Army must match its capability to innovate and adapt with its need to do so in order to train, equip, sustain, and operate. It has to seek solutions and tools that improve efficiency and reduce cost while protecting human health and the environment. To achieve this goal, the Army needs professionals in all fields who are familiar with the principles of sustainability. It is necessary to develop partnerships with other government agencies, the private sector, academia, and international organizations to further leverage our environmental science and technology base to mitigate current and future impacts on the Army.

The Army adopted the ISO 14001 model because it is by far the most widely used and internationally recognized standard. ISO 14001 allows the Army to align with best management practices and offers a common framework by which all Army programs can be structured. Its standardized elements will aid in interoperability and integration as the Army transforms and realigns its installations.

The US Army Environmental Management System – Implementers Guide [4] describes 30 EMS implementation steps that lead to a mission focused, which are: *Step 1:* Designate the EMS-MR (Management Representative) *Step 2:* Coordinate with senior leaders and select the CFT (Cross-Functional Team) *Step 3:* Orient and train the CFT in EMS implementation *Step 4:* Conduct a self-assessment *Step 5:* Meet with the EQCC (Environmental Quality Control Committee) *Step 6:* Prepare an EMS implementation plan *Step 7:* Obtain CDR (Commander) approval of the EMS implementation plan *Step 8*: Hold an EMS kickoff meeting *Step 9*: Identify mission focus *Step 10*: Revise and sign installation environmental policy statement *Step 11:* Establish and implement awareness training procedures *Step 12:* Initiate EMS documentation *Step 13:* Develop EMS Document Control Procedures *Step 14:* Establish communications procedures *Step 15:*Compile legal and other requirements *Step 16:* Identify all mission and installation activities, products, and services *Step*

17: Identify the environmental aspects of your installation's activities, products, and services that can be controlled or influenced *Step 18:*Identify the environmental impacts of each aspect *Step 19:*Identify significant environmental aspects *Step 20*: Establish environmental objectives and targets *Step 21:* Determine the need for, and scope of, EMPs (Environmental Management Programs) *Step 22:* Describe resources, roles, responsibility, and authority *Step 23:* Develop operational controls (Standard Operating Procedures-SOPs) and work practices for activities associated with significant aspects *Step 24:* Identify and fulfill environmental competency-based training requirements for installation personnel (garrison and tenants) *Step 25*: Establish monitoring and measurement procedures *Step 26:* Establish procedures for maintaining EMS records *Step 27:* Develop and review emergency preparedness and response documents and procedures *Step 28:* Establish procedures for nonconformance and preventive and corrective actions *Step 29:* Conduct periodic audits *Step 30:* Conduct periodic EMS management reviews

After the implementation of the basic elements of the EMS (see figures 4 and 5) the Army can focus on continual improvement, continuing to operate and examine the EMS and its procedures, finding ways to make diagnostics of the EMS to increase both effectiveness and ease of use.

NATO EMS

The Environmental Policy (EP) for military operations (by a troop contributing nation, UN, NATO, or other) is typically characterized by a code of principles for environmental protection which often includes the following elements: (a) The tenet that environmental protection is responsibility of everyone; (b) Compliance with applicable legal requirements, including international agreements; (c) Recognition of the importance of environmental planning; (d) The goal of minimizing environmental damage; (e) A respect for local and regional environmental standards; (f) The minimization of waste streams by wisely using raw materials, hazardous substances, energy, water, etc; (g) Effective handling and storage of hazardous substances; (h) Timely response to environmental incidents to mitigate impacts; and (i) Minimizing noise and other safety hazards.

Force Commanders and unit leaders should therefore be aware of all applicable policy, and should define the policy requirements through a memorandum of intent, published Standard Operating Procedures (SOPs), or other similar directive. Consideration should be given to troop contributing nation (TCN) requirements, multilateral or coalition policy, or force-specific directives. References to all relevant policy should be included in the Operations Plan (OPLAN). Environmental Officers need to: (a) Know and understand the mission objectives; (b) Work effectively within the established chain-of-command; (c) Understand all applicable legal and policy requirements; (d) Be familiar with general and specific environmental and health protection standards; (e) Study prior lessons learned; (f) Lead the environmental planning for mission sustainability; (g) Ensure initial, current, and final site conditions are accurately and correctly assessed and documented; (h) Establish and implement an Environmental Management Plan (EMPs); (i) Collaborate with other staff, support agencies, stakeholders, and experts; (j) Maintain and archive pertinent documents and records; (k) Plan for mission completion and base camp closure; and (l) Know where to get help.

The key features and proposed structure of the NATO EMS [7] are described in Figure 6.

Some important considerations should be given to the roles, implications and consequences of contracting activities in regards to environmental management.

Information Gathering

The gathering of environmental data has to be aspects and associated impacts identified and addressed early in the planning process. It is therefore crucial that Environmental Protection Officers engage fully in the NATO OPP (Operational Planning Process), and develop close working relationships with other areas such as Engineering and Logistic staffs.

Environmental Management Board (EMB) and Environmental Baseline Studies (EBS)

It is recommended that an Environmental Management Board (EMB) will be formed to manage and coordinate the Environmental Protection management effort. During the information gathering process, a stage will be reached where it will be necessary to carry out an EBS. The EBS determines the extent of any environmental aspect that may be present. The scope of the EBS will vary depending on the nature and duration of the operation and the purpose of the study. The record and documentation of all material are essential. A report must be produced and include at the minimum the aim, scope, findings, and recommendations of the EBS. To keep sufficient information has been gathered to make informed decisions on the environmental threats, aspects, and impacts

Commander's Intent

According to STANAG 7141, the commander should provide clear guidance on environmental protection for the military activities in the planning process. It has to be included in the Commander's Intent or in

the Commander's Planning Guidance, officers will realize that there is an over-arching document as an Annex of the OPLAN and details how the EMS is to be managed during the deployment. It also sets out the Commander's commitment to Environmental Protection and sustainable development (SD) from which the Environmental Protection Officer will derive his authority to enforce the EMS.

Organization

Management of Environmental Protection on deployments entails a range of responsibilities distributed through the Chain of Command from Environmental Protection Officers in the JTF HQ (Joint Task Force Headquarter) to unit commanders and down to the individual soldier. This structure has to be contained in the Commander's Intent. Proper consideration and effort should be made to ensure that the appropriate training and qualifications are provided to the personnel managing the EMS at the site.

Control Measures

Many control measures can be integrated into the design of temporary field accommodation, such as water treatment plants and field incinerators. This will require close liaison with the Engineering Field Infrastructure specialists. When advising camp design staff and quantifying control measures, the Environmental Protection Officer should take account of the related Best Environmental Protection Practices for Military Compounds in NATO Operations (AJEPP-2) [9] in developing control measures for an EMS including: physical control, monitoring, record keeping, procedures. The responsibility for control measures goes from HQ JTF down to individual soldiers.

Setting Objectives

The process of setting objectives and targets indicated by Performance Indicators (PIs), is a way of improving environmental performance and achieving continuous improvement. Environmental objectives and Decision Points (DPs) should follow the SMART (Specific, Measurable, Agreed upon, Realistic, Time based) process detailed below: (a) Specific: well defined and clear to those responsible for meeting and monitoring the objectives; (b) Measurable: to determine whether Objectives and DPs have been attained they must be measurable. This also applies when setting PIs to determine Continuing Improvement of the EMS; (c) Agreed Upon: agreement with all the stakeholders on what objectives are to be achieved are vital; (d) Realistic Objectives must be within the availability of resources, knowledge and capability of the Force; and (e) Time Based Environmental objectives must be appropriate to the stage of the operation.

Measuring Performance

The environmental performance evaluation is a process designed to provide the Force Commander that the Force is meeting its environmental responsibilities effectively, and that the environmental aspects in the OPLAN are being followed. This is a requirement of STANAG 7141. The performance evaluation consists on a structured, documented, periodic and objective evaluation of the effectiveness of the EMS. It establishes the performance benchmarks that allow both unit commanders and the Environmental Protection Officer to identify points of improvement and to ensure that the EMS is working optimally.

Review and Continuous Improvement

The EMS is a dynamic system and throughout the operation it will require reviewing and developing as conditions change. Much of this will be based on the results of the Environmental Protection evaluations. Therefore the Force Commander's HQ is responsible for developing a set of protocol to facilitate a mission-wide Environmental Protection performance evaluation. Troop Contributing Nations (TCN) are responsible for consistent application of the protocol. The data obtained as a result of the questions has to be forwarded to the Force Commander's HQ. TCNs are required to evaluate and review their national Environmental Protection performance and take necessary action accordingly [16]. It is the Continuous Improvement Process.

Canadian Army EMS

It is written in the Canadian Environmental Policy [17] that "The mission of Canada's Army is to generate and maintain combat capable and multi-purpose land forces to achieve the nation's defense objectives. To accomplish this mission, the military's main peacetime task is operational training. Its garrisons, firing ranges and training areas are therefore essential resources that must be maintained and preserved."

The World Commission on Environment and Development (the Bruntland Commission) delivered its final report, *Our Common Future*, to the United Union with the concept of sustainable development. This principle has been adopted and incorporated into the *Auditor General Act*. One of the updates made to the *Act* is the creation of the position of Commissioner of the Environment and Sustainable Development. The Commissioner's duty is to monitor the progress made by federal departments in the area of sustainable development. *The Federal Sustainable Development Act (2008) – Formerly the Auditor General Act* – established that every department has to submit a Sustainable Development Strategy (SDS) in the House of Commons every three

years. This strategy must contain objectives, targets and an action plan for achieving sustainable development. Different environmental aspects must be integrated into routine management of the Army, programs have been implemented to achieve the objectives defined in the Department of National Defense's (DND's) SDS. Some examples of environmental programs within the Army include: sustainable military training, management of potentially contaminated sites, pollution prevention, management of fuel storage tanks, management of hazardous materials, waste management, and conservation and saving of energy and potable water. There are Environmental Officers working in the Army, and a specific budget has been set aside to remedy environmental problems stemming from past activities. New Unit Environmental Officers must be trained each year. The participation of all DND and Canadian Forces (CF) members is essential if the various environmental programs are to succeed. An environmental audit program for Army bases was introduced in 1997, which involves auditing the environmental management on the bases and at various LFC levels of command, and consequently diagnosing any needed improvements, identifying information on lessons learned and measuring the degree of success of the various projects. An annual review of environmental performance permits to evaluate EMS, thereby ensuring its effectiveness and needed improvements. A comprehensive review of the EMS will be conducted every three years (see figure 7).

The main topics of the Canadian EMS are listed below.

Planning

(a) Section 1- Environmental Aspects (b) Section 2- Legal and Other Requirements (c) Section 3- Objectives and Expected Results (d) Section 4- Environmental Management Plans and Programs

Implementation

(a) Section 1- Structure and Responsibilities (b) Section 2- Priorities (c) Section 3- Resources (d) Section 4- Training and Skills (e) Section 5- Communication and Awareness (f) Section 6- EMS Documentation (g) Section 7- Document Control (h) Section 8- Operational Control (i) Section 9- Emergency Preparedness and Response

Checking and Corrective Action

(a) Section 1- Monitoring and Measurement (b) Section 2- Non-compliance and Corrective and Preventive Actions (c) Section 3- Records (d) Section 4- Environmental Management System Audits

Management Review

(a) Section 1- Progress of the Environmental Program (b) Section 2- Review and Updating of the EMS

This EMS helps the Canadian Army to incorporate environmental values into its operational policies and to display due diligence in pursuing all its activities while at the same time maintaining its operational capability.

Brazilian Army EMS

Brazilian Army EMS describes the importance of the consideration of environmental laws in military activities, pollution prevention, preservation, conservation and recuperation of the environment. The collaboration to other countries in actions as conferences, interchanges and meetings are motivated. The environmental education must be implemented in all levels of Brazilian Army, from commanders to soldiers, mainly with respect to flora, fauna, water resources and biodiversity. The Amazon Region is priority to Brazilian Army. Stimulate the formation and development of environment conscience and researches in order to promote the rational use of environmental resources are goals of Brazilian Army EMS [18], [19], [20].

The main topics of the Brazilian Army Environmental Management System are shown following: (a) Section I – Planning (b) Section II – Implementation and Operation (c)Section III – Checking, Corrective Actions, Critical Analysis and Continuous Improvement (d) Section IV – Emergency Actions

At the Planning step the significant environmental aspects and the legal requirements must be identified, and defined the objectives and goals to be achieved. They include all real or potential environmental impacts related to military activities and products. At the Implementation and Operation step the powers and responsibilities must be established, the environmental capacitating, training and a communication plan implemented and the main documents defined. The Checking, Corrective Actions, Critical Analysis and Continuous Improvement step is characterized by the continuous improvement of the proposed actions, evaluation of the environmental projects made by the Military Organizations and of the Environmental Diagnosis Indicators generated annually. The Environmental Diagnosis is the main instrument in order to improve the Brazilian Army EMS (see Figure 8). The commanders, chiefs and directors have the responsibility of planning, coordinating and controlling the military activities and all the members of Brazilian Army are in charge to obey the legislation. The Brazilian Army has adopted environmental aspects into its activities to: (a) obey

and execute the Constitutional Mission; (b) promote the Environmental Sustainability at training and logistic areas; (c) promote the Environmental Education; and (d) improve the Quality of the Life of the community.

CONCLUSIONS

The present work shows that all the Armies have adopted an EMS based on the ISO 14001 Standard. Although there are some differences among those EMS, because of the particularities of each country and OTAN, the similarities are evident. The USA and Canada have their own EMS, even being a NATO member. This is because some Military Operations are executed only by the army of one that countries, USA or Canada. When the Military Operation is driven by NATO, both NATO and each country EMS must be obeyed. Its common sense in all EMS that the Environmental aspects must to be considered in the Operational Plans and in the routines of Military Organizations. Every member of all the armies are responsible to take care of the environment and stimulate other people to do the same. The concept of Sustainable Development is alive in all people on the military in the USA, Canada, Brazil and in the NATO, even during peace or war times. The Continuous Improvement process is fundamental for the success of an EMS, as established in the PDCA cycle and all the Armies and the NATO have considered and implemented it on their plans in order to better management the environmental aspects of military activities.

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