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THESIS

FINANCIAL MANAGEMENT OF HAZARDOUS WASTE
COMPLIANCE AND MITIGATION COSTS:
CONSTRAINTS AND IMPLICATIONS

by

Jeffrey C. Babos

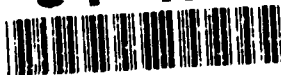
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Financial Management Of Hazardous Waste
Compliance and Mitigation Costs:
Constraints and Implications

by

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B.S.M.E., University of South Florida, 1985

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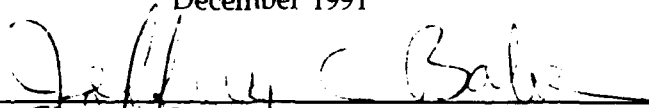
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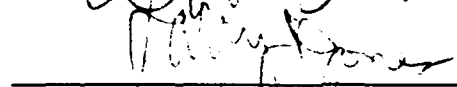
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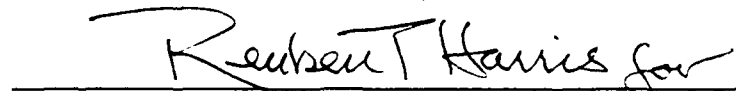
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ABSTRACT

This research investigates financial management and other constraints and implications of hazardous waste disposal and compliance within DoD and DoN. It shows that during contracting fiscal period where there is an environmentally conscious public, the DoD and the Navy have to make trade-offs in funding for hazardous waste management. The study reveals that legislation removing sovereign immunity from the DoD for hazardous waste disposal may not achieve its desired results of reducing pollution. Furthermore, the research concludes that DoD currently lacks an effective method of accounting for hazardous waste generation levels. This affects the interpretation of the data for decision making. An accounting model is presented to address this problem to increase the effectiveness of hazardous waste minimization programs.

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I. INTRODUCTION

It is the continuing policy of the Federal Government . . . to create and maintain conditions under which man and nature can exist in productive harmony . . .

- Section 101(a), National Environmental Policy Act, 1970

Until recently, many laws and regulations concerning the environment disregarded hazardous and toxic waste disposal, storage, treatment, and transportation. As these issues continue at the forefront of environmental policy, one has to be concerned with the funding of any compliance measures, and how these measures affect the mission (goal) of an industry, plant, or installation.

Since, the beginning of the Industrial Revolution, economic progress has produced prosperity. However, it may now be asserted that progress can potentially impair our environmental prosperity. Forecasting the future is not easy, if not impossible, hence looking back retrospectively it is easy to criticize our ancestors for not considering the impact on the environment. It has only been through time, and the accumulation of knowledge on environmental degradation that we see the effects.

The Department of Defense(DoD) is now in an era of both reactive and proactive environmental policy and regulation, attempting to right the wrongs from the past. It must be emphasized that implementing these policies and regulations carry high costs. Congress can pass laws requiring certain actions according to the will of the people in our

democratic process. It is yet another issue to fund and finance implementation of these laws.

Federal agencies, in particular the Department of Defense(DoD), and specifically the Department of the Navy (DoN), have unique funding constraints due to the authorization and appropriation process as compared to the private sector. The burden of funding environmental actions is the responsibility of the Navy financial managers and planners. Trade-offs have to be made between the levels of funding for environmental compliance or weapon system acquisition. Furthermore, decisions must be made between the methods and extent of environmental compliance the Department and Services can afford. This thesis will explore these issues to provide evidence that tougher times lie ahead in budgeting for environmental compliance within federal agencies. Incorporating environmental policy issues in the programming and planning phases of the PPBS may alleviate some of the problems in the budget execution phase. Still, laws and regulations must be met. Commanding Officers can not justify non-compliance because of insufficient funds. Legislative actions have pushed these problems into the laps of budget analysts and financial managers, causing them to have to fund the solution.

A. AREA OF RESEARCH AND RESEARCH QUESTIONS

This thesis will investigate the costs of compliance and mitigation of hazardous wastes within the realm of the environmental laws and regulations that dictate such actions. The questions addressed by this research include: What are the sources of funding available to Navy activities for environmental compliance for hazardous wastes?

To what extent are current funding levels sufficient for compliance? What are the current barriers that the Navy faces in achieving compliance? How effective are current Navy environmental mitigation efforts?

B. SCOPE AND METHODOLOGY

This research will examine the sources and levels of funding available to a claimant for compliance with all applicable environmental laws and regulations imposed upon the individual installations within the claimancy. Research is limited to hazardous and toxic waste compliance within the Pacific Fleet Command (PACFLT). Other environmental issues like Clean Air Act (CAA) and Clean Water Act (CWA) have already received much attention. This study will look at methods for hazardous waste minimization and cleanup methods relative to the level of funding authorized.

Financial and non-financial data have been compiled from the claimant and installations comptroller and environmental engineers. Other data sources for compliance costs and generation volumes by the individual installations have been obtained from the Naval Facilities Engineering Command (NAVFACENGCOM) and the Naval Energy and Environmental Support Activity (NEESA). The data has been interpreted through personal interviews with budget analysts and engineers. Historical cost and volume data are used to focus on methods to mitigate current generation of hazardous wastes.

C. BACKGROUND

The issue of pollution control and environmental compliance, like any other economic externality in our economy, is a problem that requires the intervention of

government. As microeconomic theory shows, private industry, left to its own, will pursue its best interest. For industry to reduce levels of pollution is financially not efficient, yet they impose this cost as a negative externality on society. Government intervention is required for three reasons: (1) many negative externalities entail the provision of a public good (such as clean air or clean water); (2) government can lower the transaction cost of getting the effected individuals together to internalize these externalities voluntarily; and (3) markets may not deal adequately with externalities without government intervention. [Ref. 1]

The government intervened in the area of environmental regulation by the issuance of Executive Order 11472, 29 May 1969, to establish the Environmental Quality Council and the Citizen's Advisory Committee on Environmental Quality. The two councils drafted legislation that was signed into law on 1 January 1970 as the National Environmental Policy Act (NEPA) [42 USC 4321, 32 CFR 775]. NEPA provided the nation with it's first major statement of environmental policy. NEPA requires federal agencies to consider environmental affects of proposed action in their decision-making process.

Since then many other laws and regulations have been enacted that affect environmental quality and the protection of natural resources. These include: the Clean Air Act (CAA), Clean Water Act (CWA), Solid Waste Disposal Act (SWDA) and Toxic Substance Control Act (TSCA). Two other major pieces of environmental legislation are

the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).¹

The Resource Conservation and Recovery Act, enacted as an amendment to the SWDA, became the first comprehensive federal effort to deal with the safe disposal of all types of solid and hazardous wastes. The Comprehensive Environmental Response, Compensation, and Liability Act (also known as the Superfund Act) deals with the cleanup of toxic and hazardous waste dumps. The fact that disposal practices were legal at the time of disposal does not diminish the requirement to clean up a site. [Ref. 2]

The Department of Defense (DoD) is not eligible to use the funds provided by CERCLA, except for base closures. Thus, in October of 1986, Congress amended 10 USC 2701, which established a DoD program, the Defense Environmental Restoration Program. This program authorized a new appropriation for DoD, the Defense Environmental Restoration Account (DERA), to be centrally managed by the Office of the Secretary of Defense (OSD). It also provided for a position in OSD for a Deputy Assistant to the Secretary of Defense for the Environment (DASD(E)).

Attention to environmental issues has always been important to the federal government to demonstrate initiative to the general public and the private sector. Executive Order 12088, 13 October 1978, requires Federal facility leadership in furthering the purposes and policies of the CAA, CWA, SWDA, TSCA, and NEPA. [Ref. 3]

¹Appendix A lists all applicable acronyms used in this research.

The Services were delegated the responsibility for hazardous waste minimization program by the Deputy Assistant Secretary of Defense (Environment) in 1987. The DASD(E) established a goal of reducing the amount of hazardous waste in DoD by 50 percent by the end of 1992 from the 1987 levels.

The Navy issued guidelines for its formal hazardous waste program in May 1988, delineating the roles and responsibilities of the major commands and activities. This program set the Navy-wide goal of reducing the weight of hazardous waste generated by 50 percent by 1992 as compared with the weight generated in 1987, consistent with the goals of the DASD(E). [Ref. 3]

The General Accounting Office (GAO) has reported that the services will experience difficulty monitoring their progress because hazardous and solid waste generation data are unreliable. The problem is that DoD lacks the means for accurately measuring its generation or disposal rates and who is generating wastes. These rates are important because DoD currently reports only total amount of waste generated and disposed. From existing data it cannot be determined whether a decrease in the reported data is due to a successful minimization program or to a decrease in the work load (activity level). [Ref. 4]

President Bush has indicated that he wants to be regarded as the environment and educational president. To this end the Administration is increasing the pressure for corporations and industry to comply with the environmental laws and regulations. The federal government is not exempt from these requirements. In October of 1989, the

Secretary of Defense issued a policy memorandum on environmental management policy to the service secretaries. Secretary Cheney stated:

This Administration wants the United States to be the world leader in addressing environmental problems and I want the Department of Defense to be the Federal leader in agency environmental compliance and protection . . . The first priority of our environmental policy must be to integrate and budget environmental considerations into our activities and operations. This will decrease our future liabilities and costs for our people.[Ref. 5]

Assistant Secretary of the Navy (Installations and Environment), Jacqueline Schafer stated that:

Leadership in environmental compliance and natural resource conservation is an absolute must for every command in the Department of the Navy. The public, the Congress, and the President expect it. [Ref. 6:p. 2]

Compliance is the first step in achieving the goals set forth by the President, the Secretary of Defense, and the Secretary of the Navy. Minimization of waste and minimization of disposal costs are the next steps. Each step requires financial resources to accomplish its goal. However, the DoD is in an era of fiscal contraction.

Due to public perception of a diminished Soviet threat, the Department of Defense (DoD) budget is declining. In fact, it is projected to decline at an average rate of three percent for the next three years. Due to this enduring reality, budget cuts have been made. Force structure cuts proposed include reduction in the number of ships, the number of fighter aircraft wings, the number of personnel, and the number of bases. As the ASN(I&E) stated:

While we may have fewer ships and aircraft - and fewer bases - in the future, our installation management challenges and environmental responsibilities will not diminish. In fact, they will grow. In spite of reduction in the overall defense budget.[Ref. 6:p. 2]

Despite these budget reductions, the cost of environmental compliance for the Navy is increasing. Each new law or regulation passed at any level of government has associated costs of compliance. Figure 1 shows the complexity of the ever increasing federal environmental laws that are being enacted. In 1990, five new federal

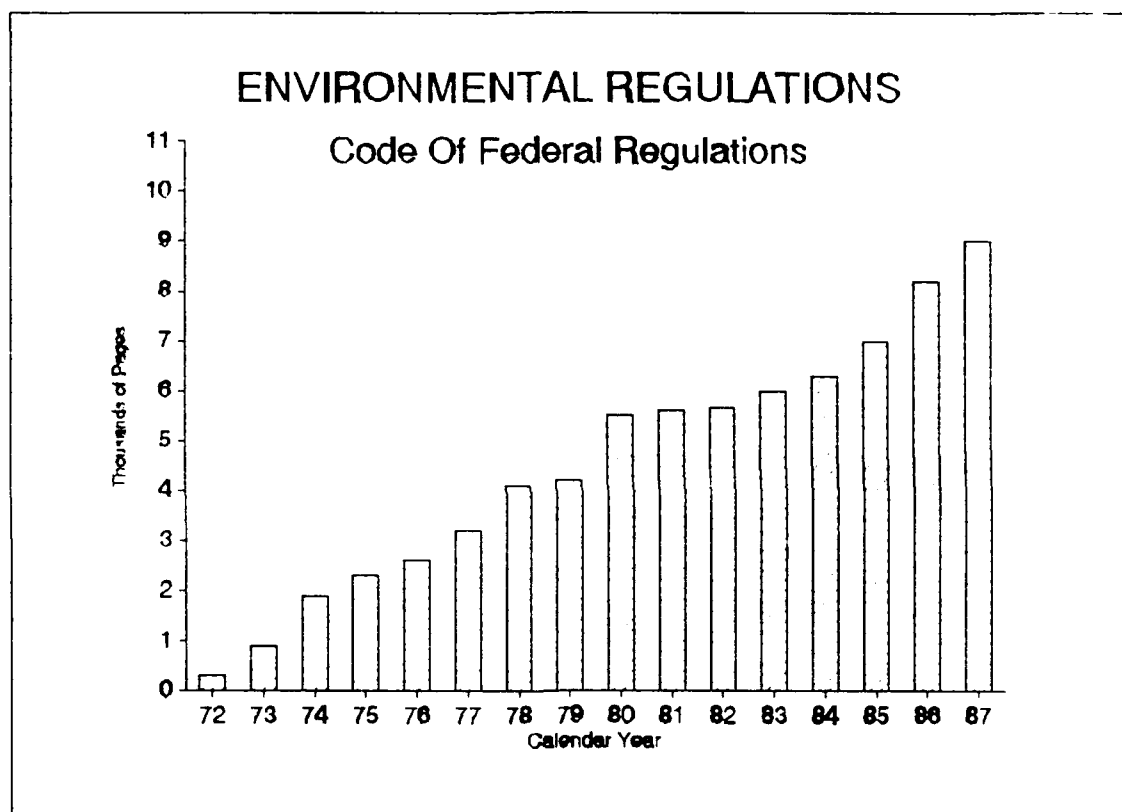


Figure 1 Source: Overview of DoD Environmental Activities, H.A.S.C. No. 101-27;p. 16.

environmental laws were enacted. New state and local laws or ordinances are developed constantly. Furthermore, hazardous wastes continue to be generated by the Navy. A 1989 report by the General Accounting Office reported that DoD generates approximately

400,000 tons of hazardous wastes each year. The Navy is responsible for about 183,000 tons of this amount. [Ref. 4]

In this era of declining defense funding as a percentage of the Federal budget, fiscal constraints placed on the DoD with regard to environmental compliance have attracted high attention in Congress. The Defense Department has requested a 34 percent increase in funding for environmental compliance and restoration above the 1991 budget levels. Furthermore, DoD reports that it must spend an additional \$1.3 billion to comply with federal, state, and local environmental laws. [Ref. 7]

The Navy budget for Fiscal Year 1991 for environmental compliance and restoration is \$408 million. It should be noted that \$100 million of that is funded through the O&M,N appropriation. However, \$444.8 million were required to ensure adequate funding for environmental compliance and restoration, thus the unfunded requirements list for Fiscal Year 1991 is \$36.8 million. [Ref. 3]

Waste minimization programs can assist the Navy in mitigating compliance and cleanup costs in two ways. First, with a successful minimization program an activity will generate less waste; thus there will be a decreased need for spending from the operating budget for disposal and/or storage. Secondly, if an installation has a Qualified Recycling Program, up to 50 percent of the revenues from this program can be used to offset the costs of the program, and to subsequently offset the costs of any other environmental, energy or related resource program.

Sound financial management in budget preparation and execution is, therefore, becoming more crucial in the area of hazardous waste compliance and mitigation costs.

The net financial impact on individual activities continues to increase. SURFPAC is so constrained by requirements that it has distributed an issue paper for the 1992 POM on the costs associated with the disposing of and storing of hazardous and toxic waste. This calls attention to the needs of the commands in the fleet. As sovereign immunity protection for the federal government and DoD has all but disappeared, activity commanding officers have to be concerned about personal liability as well as potential fines and taxes to commands from regulatory agencies.

As the defense budget contracts and environmental costs increase, mitigation and wise spending at the base operating level becomes more important. However, in a contractionary fiscal environment cuts are made quickest and easiest from short term appropriations, specifically from O&M.N. A staff member from the Office of the Assistant Secretary of Defense for Program Analysis and Evaluation (ASD(PA&E)), noted on 15 May 1991, in a speech at the Naval Postgraduate School, that OSD was planning for the O&M.N budget to decrease \$1.4 billion between 1994 and 1995. Better tracking and control of money for environmental compliance and mitigation is warranted for Navy financial managers, environmental engineers, and planners in the current fiscal climate.

D. BENEFITS OF RESEARCH

The purpose of this research is to highlight the concerns and issues faced by all federal agencies and particularly DoD and the Navy as they are confronted with environmental problems. These problems include compliance funding, public image, regulatory oversight, and constraints due to mission. These problems are unique to public

sector and defense agencies and consequently, many traditional regulatory enforcement mechanisms may not have their desired effect, and may in fact have the complete opposite effect on agency behavior. The majority of the literature on environmental regulation and regulatory enforcement pertains to the private sector. Therefore, more research is needed on public sector and DoD environmental policy and regulatory responsiveness.

Thus the benefit of this research is to outline the compliance problems that federal and defense agencies encounter. This research will be of benefit to those who make environmental policy and to those who must carry out the policy with the limited financial resources allotted to them.

The next chapter will explain the various funding sources available for environmental compliance.

II. FUNDING ENVIRONMENTAL COMPLIANCE

With the growing complexity of environmental legislation, laws, and regulations, one may wonder how the DoD and Navy activities are supposed to understand what to do and how to finance the measures required for compliance. Furthermore, as the number of laws and regulations increase so too do the costs associated with compliance.

The sources of funding available to the Navy financial manager or the activity commanding officer include: the Environmental Protection Agency's Superfund, the Defense Environmental Restoration Account (DERA), the Navy Environmental Compliance Account (NECA), and the activities' own base operating budget accounts (O&MN, OPN, MILCON). However, there are requirements and limitations on eligibility for each source as well as some policy and administrative requirements associated with each account.

This chapter will first investigate the origins of selected major environmental laws, and how these laws affect DoD compliance costs and funding. Then, it explains eligibility requirements, limitations on the use of funds, and the funding levels available in each account for the DoD and Navy.

A. ENVIRONMENTAL LAW: HISTORICAL PERSPECTIVE

DoD and the Navy must comply with a wide variety of environmental laws and regulations, from federal and state to local government laws. The military installations

are required to comply with all of these laws. This is a major challenge to the Department of Defense which has over 900 installations in 49 states, as well as to the Navy, not including any overseas sites.

Promulgation of most Federal environmental regulations is in response to legislation passed by the U.S. Congress. This section will describe some of the relevant federal laws and regulations that apply to hazardous waste and hazardous waste disposal. A brief description of other environmental laws and regulations is provided in Appendix B.

1. National Environmental Policy Act

The nation's "environmental movement" had its 'Official kickoff' on 29 May 1969 via Executive Order 11472, which established the environmental Quality Council and the Citizen's Advisory Committee on Environmental Quality. This action was closely followed by congressional legislation, the National Environmental Policy Act of 1969 (NEPA). [Ref. 8]

NEPA, signed into law on 1 January 1970, one year prior to the creation of the EPA, provided the nation with it's first major statement of environmental policy. It was heralded by many to be the beginning of an environmentally oriented legislative decade. A major portion of the policy requires federal agencies to give appropriate pre-decision consideration to the environmental impacts of their proposed actions. Projects that affect the environment could include interference with the reasonable, peaceful enjoyment of property or use of property, interference with the visual or auditory amenities, danger to the health, safety, or welfare of human life, or irreparable harm to animal or plant life in the area. [Ref. 2]

NEPA provides for a national environmental policy committed to use all practicable means to conduct federal activities in a way that will promote general welfare in harmony with the environment. It requires federal agencies to address the environmental consequences of their actions through preparation of an Environmental Impact Statement (EIS). The act also created the Council on Environmental Quality (CEQ).

NEPA unlike any other subsequent environmental regulations does not prohibit any activities. It merely requires a documented evaluation of the potential impacts of actions which come under its regulation (EIS). Major actions significantly affecting the environment require the preparation of an Environmental Impact Statement. NEPA requirements apply to all decisions, not just military construction. [Ref. 8]

Agency decisions under NEPA are subject to review by the courts. If NEPA procedures haven't been followed or if the decision is considered unreasonable, a court may issue an injunction to stop work until the procedures have been complied with. Many recent court decisions which have been unfavorable to the Navy can be traced to a failure to follow NEPA procedures [Ref. 8].

2. Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act (RCRA) enacted as the 1976 (October 21, 1976) amendment to the Solid Waste Disposal Act (SWDA), became the first comprehensive federal effort to deal with the safe disposal of all types of solid and hazardous wastes. One of the original goals was to tap the hidden resources available in material that has been discarded.

RCRA regulates the handling of hazardous wastes at currently operating or future facilities and is intended to provide for the environmentally sound disposal of waste materials. It addresses the gap left by the CAA and CWA which only require that industry remove hazardous substances from air emissions and water discharges. [Ref. 2]

RCRA established 5 major elements characterizing the federal approach to hazardous waste management [Ref. 2]:

1. Classification of hazardous wastes.
2. Cradle to grave manifest system
3. Standards for generators, transporters, and facilities which treat, store, or dispose of hazardous waste.
4. Enforcement through a permitting system.
5. Authorization of state programs to operate in lieu of the federal programs, if more restrictive.

Hazardous waste classification is a major element of RCRA, as in order to be regulated, a waste must be both a solid waste and a hazardous waste. The actual physical state of the waste means little according to the act as liquids, sludges, or contaminated gasses are also considered solid wastes by RCRA definitions. [Ref. 2]

RCRA is intended to be administered at the state level, under final authorization by EPA, and permits are issued by state regulatory agencies. RCRA's requirements concerning hazardous waste, apply to those who generate, handle, transport, treat, store, or dispose of hazardous waste. Permits are required for treatment, storage or disposal on-site. Cleanup of contamination from past, as well as current operations, called

as corrective actions, may be required as a condition of a RCRA treatment, storage, or disposal permit. Waste generated by activities associated with recycling, reuse, or reclamation is RCRA exempt. Waste generators are required to ship their wastes off-site within 90 days after beginning accumulation or they must have a storage permit and comply with applicable storage standards. [Ref. 2]

Common discrepancies by Navy Commands to the requirements of the Act include improper labeling and storage, unapproved storage sites, excessive storage times (>90 days), failure to perform inspections, poor contingency plans, and inadequate training. [Ref. 8]

A solid waste is usually subject to hazardous waste regulations if it exhibits any of the four RCRA- defined characteristics of a hazardous waste, if it is specifically listed in the act as being a hazardous waste, or is a mixture of a listed hazardous and non hazardous waste. (See Figure 2)

RCRA hazardous waste characteristics are as follows:

- Ignitable: Flash point > 1400 F
- Corrosive: $\text{pH} \leq 2$ or $\text{pH} \geq 12.5$
- Extraction Procedure (EP) Toxicity: 100 X Selected Drinking Water Standards
- Reactivity: Gives off fumes, is explosive, or reacts violently with water.

RCRA was reauthorized in 1984 through law titled as Hazardous Solid Waste Amendments Act of 1984 (HSWA). HSWA added 72 specific provisions to RCRA of which 58 were directed to be enacted by 1986. RCRA/HSWA states that EPA may take

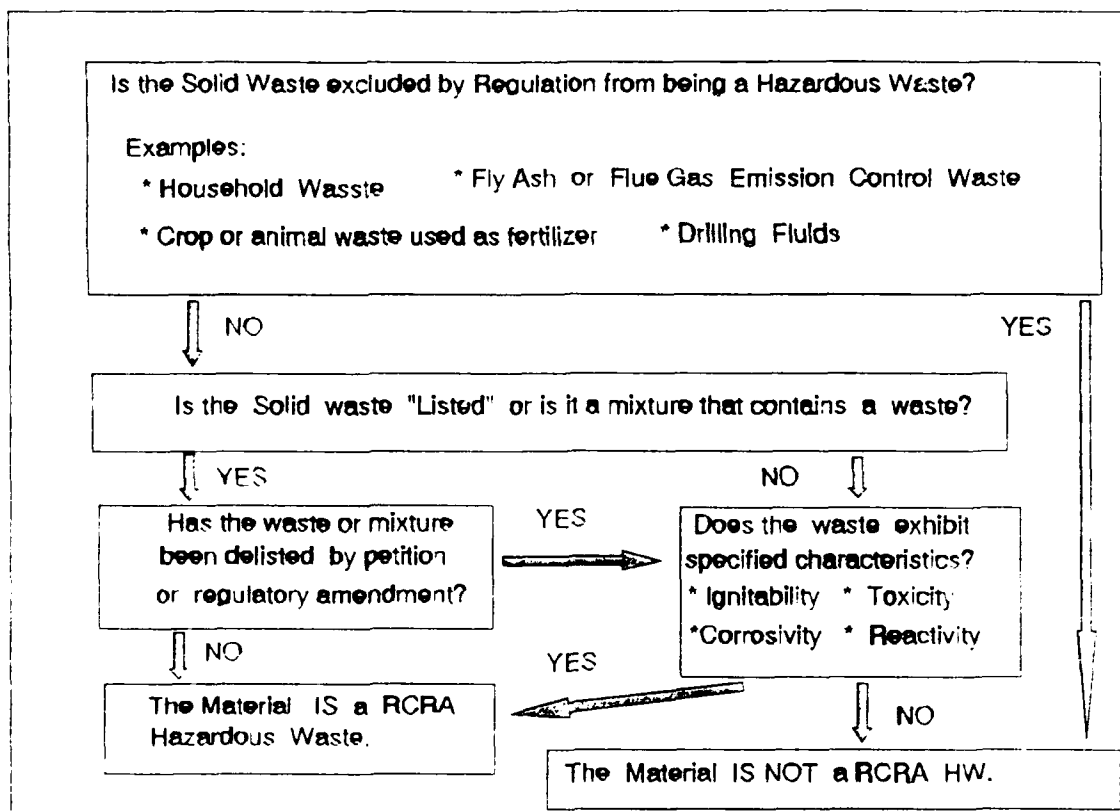


Figure 2

action against persons whose actions, past or present, create an imminent or substantial endangerment to health or to the environment. [Ref. 2]

RCRA enforcement provisions, which are numerous and substantial, include the definition of "knowing endangerment," which is a felony. This offense can result in fines up to \$250,000 for individuals and up to \$ 1 million for corporations, in addition to imprisonment for up to 5 years. Other RCRA violators are subject to civil penalties up to \$25,000 per day, and criminal offenders are subject to \$50,000 per day and two year imprisonment. [Ref. 2]

Requirements for Underground Storage Tanks (USTs) were included in the 1984 Hazardous Substance waste Amendment (HSWA) to RCRA. Owners and operators

are required to register tanks, provide secondary containment, monitor and clean up contamination from their tanks. [Ref. 3]

3. Comprehensive Environmental Response, Compensation, and Liability Act

While RCRA regulates the current practices of handling hazardous waste, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) deals with the cleanup of toxic and hazardous contaminants at closed or abandoned waste dumps. CERCLA was signed into law 11 December 1980 for a five year period unless reauthorized. The major provisions of CERCLA address the following: response actions, liability, financing response actions, and notification requirements.

CERCLA grants the federal government the authority to undertake activities under the directives of a National Contingency Plan (NCP) in order to clean up dangerous, inactive disposal sites and emergency spill situations. It also includes the authority to conduct investigations, testing, and monitoring of disposal sites, in addition to implementing remedial measures. [Ref. 2]

Responsible parties (e.g. owners, operators, previous landowners, generators, handlers, disposers, etc.) are expected to clean up waste sites. CERCLA (Superfund) was legislated for situations where environmental damage has already occurred and responsible parties are unidentifiable, or lacking in funds to clean up a site. [Ref. 2]

The fact that disposal practices were legal at the time of disposal does not diminish the requirements to clean up a site. This portion of CERCLA is likened to a

"skeleton in the closet." Since, even if you are currently complying with all environmental laws and regulations, you are liable for future changes in the legislation. [Ref. 8]

As provided by CERCLA, the Navy may clean up its own sites provided it follows procedures consistent with the National Contingency Plan (NCP). Although, the Navy, and for that matter any federal agency, may not use 'Superfund dollars' the Department of Defense has established the Defense Environmental Restoration Account according to legislation provided by Congress, in the provisions from the reauthorization of CERCLA. The Navy, in some instances may even be liable to pay for investigations and cleanups at off-base sites where our wastes were dumped. [Ref. 8]

CERCLA was reauthorized in 1986 under the Superfund Amendments and Reauthorization Act of 1986 (SARA). Although reauthorization proved to be extremely controversial, Congress approved another five year Superfund extension in late 1986. This reauthorization bill provided \$ 9 billion over the five year period to cleanup abandoned hazardous waste sites. [Ref. 2]

The principal SARA requirements (section 120 and 211) having the greatest effect on activities conducted at DoD hazardous waste sites are in Section 211 (amends 10 USC 160). Congress established a program entitled the Defense Environmental Restoration Program (DERP), which has the following goals: [Ref. 9]

1. Identification, investigation, research and development, and cleanups of contamination from hazardous substances, pollutants, and contaminants. (IRP)

2. Correction of other environmental damage (such as detection and disposal of unexploded ordnance) which creates an imminent and substantial endangerment to the public health or welfare or to the environment. (OHW)
3. Demolition and removal of unsafe buildings and structures. (BD/DR)

Since 1987, the Building Demolition and Debris Removal is no longer a part of the DERP.

SARA effects on the operations of the Installation Restoration Program (IRP):

[Ref. 10]

1. All DoD installations must abide by rules and regulations for hazardous waste cleanup established by the public sector in general and federal facilities in particular.
2. The OSD is responsible for administering the DoD remedial action program.
3. U.S. EPA has a much stronger influence (relative to original CERCLA statute) on DoD installation remediation programs by having concurrence authority for planned remedial actions at sites on the NPL. Executive Order 12580 gives OMB authority to settle disagreements between EPA and DoD.
4. State and local governments and local citizens have a legal right to be informed and to review and comment on DoD implementation of the National Contingency Plan.

Information flow is the central responsibility of the DoD installations under the provisions of SARA Sections 120 & 211, DoD is required to provide information to the Congress and the EPA (via the OMB A-106 program). [Ref. 10]

B. EPA SUPERFUND

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), was signed into law December 11, 1980, for a five year period unless reauthorized. It further established the Hazardous Substance Response Trust Fund, a no-year appropriation to provide the financial support for CERCLA, centrally managed by the Environmental Protection Agency (EPA). CERCLA was reauthorized after much controversy in late 1986 by the Superfund Amendments and Reauthorization Act of 1986 (SARA).

This act provides authority for responding to and cleaning up hazardous substance emergencies and abandoned uncontrolled hazardous waste sites. Financial responsibility for the program will be shared by the Federal and State governments as well as by companies or individuals determined to be responsible for the contamination. CERCLA was legislated for situations where environmental damage has already occurred and responsible parties are unidentifiable, unavailable, or lacking in funds. [Ref. 2]

CERCLA provides monies to finance response actions through the Hazardous Substance Response Trust Fund, funded by taxes on crude oil, certain petroleum products, chemical feedstocks, and appropriations from Congress. Hence, the term Superfund. The 1986 reauthorization (SARA) legislation included clauses which call for a collection of \$1.4 billion from taxes on chemical feedstocks, \$2.75 billion from a two-tiered tax on crude oil, \$2.5 billion from a new corporate income tax, and \$600 million from interest and cost recoveries.

Superfund response begins with some type of discovery or notification. This is followed by a preliminary assessment (PA) to determine if further action is required. If a site remains in the Superfund response process, then a site inspection (SI) is conducted. Data is reviewed and evaluated to determine the potential hazards presented by a specific site relative to others. The site is then ranked in accordance with the Hazardous Ranking System (HRS). A HRS rating gets your site on the National Priority List (NPL). This is a double-edged sword. Once a site is on the NPL, Superfund monies can be allocated; however, there is increased oversight by the EPA and Congress. [Ref. 2]

Budget authority for the Superfund appropriation since 1988 (in thousands of dollars) [Ref. 11] is shown below:

1988	1989	1990	1991	1992(est)
1,128,000	1,410,000	1,530,135	1,616,228	1,750,000

This account has grown at a rate of approximately 5-8 percent per year. The growth rate of this appropriation is approximately the same as the inflation rate, thus there is little increase in funding corresponding to the magnitude of the increase of the problem that exist. Figure 3 shows the relationship between budget request and what was authorized.

The Superfund Amendments and Reauthorization of Act of 1986, authorized another trust fund, the Leaking Underground Storage Tank (LUST) Trust Fund. To finance this, the \$500 million trust fund will be funded by a 0.1 cent per gallon tax on motor fuels.

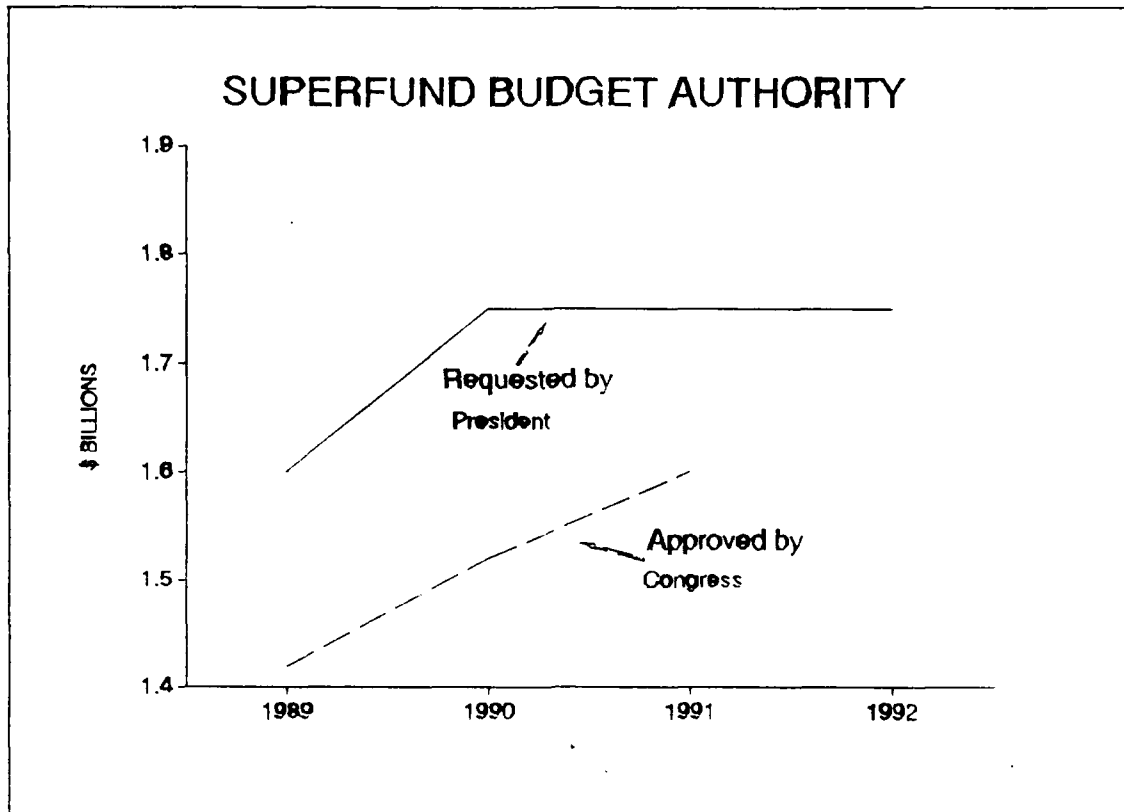


Figure 3 Source: The Budget for Fiscal Year 1992, Part Two-p. 96.

It became effective January 1, 1987. Although proposed, there is no tax on hazardous wastes or materials. [Ref. 2] It provides funds for responding to releases from leaking underground petroleum tanks or tanks containing hazardous substances. Budget authority for the LUST Trust Fund since 1988 (in thousands of dollars) [Ref. 11]:

1988	1989	1990	1991	1992(est)
14,400	50,000	74,097	65,000	85,000

Thus, the Superfund is a source of financing, however, there are restrictions on its use, i.e. base closures. Furthermore, the enactment of SARA, further restricted the use of funds for military installations (owner of property is known and finances are available). Finally, competition for Superfund dollars is extremely difficult with the increasing number of non-military sites.

C. DEFENSE ENVIRONMENTAL RESTORATION ACCOUNT

The Superfund Amendments and Reauthorization Act of 1986 (SARA), amended 10 USC 160 to provide continuing authority for SECDEF to carry out the Defense Environmental Restoration Program (DERP). The Defense Environmental Restoration Program was established in 1984 to promote and coordinate efforts for the evaluation and cleanup of contamination at DoD installations. The program consists of the following two major elements [Ref. 12]:

1. The Installation Restoration Program (IRP), where potential contamination at DoD installations and formerly used sites is investigated and, as required, site cleanups are conducted.
2. Other Hazardous Wastes (OHW) Operations, through which research development, and demonstration programs aimed at reducing DoD hazardous waste generation rates are conducted. [DOD Annual Report to Congress on DERP]

To finance this program the Defense Environmental Restoration Account (DERA) was established. Congress established an appropriation: Environmental Restoration, Defense (ER,D) under the Defense Appropriations Act. All sums are appropriated to carry out the functions of the Secretary of Defense relating to environmental restoration

under any provision of law. This has allowed the Department to accelerate the work and add research and other components to DERP. [Ref. 9]

The amounts in the DERA (a transfer account) shall be available to be transferred by the Secretary of Defense (SECDEF) to any appropriation account or fund of the Department of Defense for obligation from that account or fund. Funds which have been transferred are merged with and available for the same purposes and for the same period as the account to which it was transferred. In other words, the transferred money has the same obligational availability period (OAP), expenditure availability period (EAP), and dollar limit restrictions as the account with which it was merged. Congress stipulated that the funds which were transferred may only be obligated or expended from the account in order to "carry out the function of the Secretary with regards to environmental restoration." [Ref. 9]

DERA funds are made available to installations for the following types of actions [Ref. 13]:

- a. management/review of Installation Restoration (IR) reports, studies, contracts, field inspections, etc.
- b. Development and printing of brochures/pamphlets describing the IR effort.
- c. Development and execution of community relations plans and support of the technical review committee.
- d. Other efforts directly related to the IR program, including salaries.

The following items are emphasized [Ref. 13]:

1. DERA requirements must compete for funding each year in the DoD priority model. Hence, funds may not be available every year, requirements should be identified and funds requested as soon as possible to ensure greatest probability of receiving funds.
2. The Navy's IR program has a large backlog and will continue to increase in the next few years as cleanup projects come on line and funding does not increase enough. Thus, only minimum installation support requirements will be funded. However, financial managers and commanding officers are reminded that there is a "worst first" policy.
3. DERA funds to assist an installation are only available until the IR work on base is completed.

More than 84 percent of DERA funds have been allocated to the IRP since FY 1984. In FY 1990, 96 percent was expended in the IRP portion of the program. This heavy emphasis is expected to continue in the future because of the growth in these high-priority requirements (see Figure 4). Amounts available in the Environmental Restoration, Defense (ER,D) Appropriation from 1989-1993, are shown below [Ref. 14]:

1989	1990	1991	1992(est)	1993(est)
\$500M	\$601M	\$1.06B	\$1.25B	\$1.45B

The Navy's salary requests for Fiscal Year 1991 from the DERA are [Ref. 13]:

Request..... \$ 5,071,000

Authorized.... \$ 3,688,000

Allocated..... \$ 2,297,000

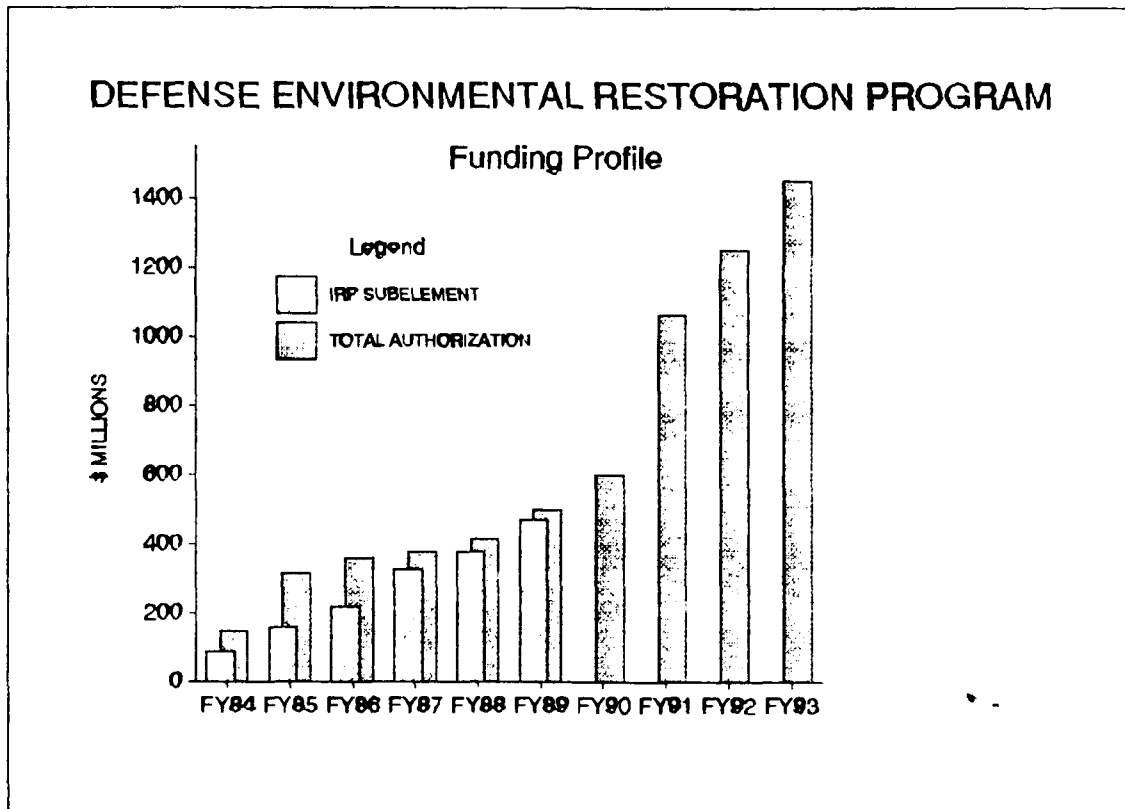


Figure 4

Thus, after the Defense Authorization Act was approved, the Navy had 27 percent of their salary requests for DERA unfunded. Because of this fact the CNO set a maximum cap of \$60,000 per installation, regardless of their request, to assure compliance with the \$ 3.68 billion which was authorized. After, the Defense Appropriation was enacted, however, the Navy had 54 percent of their requests unfunded. It is these problems that create headaches for the Navy financial managers.

PACFLT's DERA salary requests and authorizations for FY91 were:

Request..... \$ 1,059,000

Authorized.... \$ 850,000

When compared to the Navy as a whole, PACFLT had 20 percent of it's requests unfunded.

Except for base closure cleanups, cleanups at active DoD installations and Formerly Used Defense Sites (FUDS) are funded by the Defense Environmental Restoration Account. DERA funding has grown from \$150 million in fiscal year 1984 to over \$1 billion in fiscal year 1991, with the fiscal year 1992 and 1993 requests increasing DERA to \$1,253 million and \$1,450 million respectively. Thus, in less than a decade, there has been more than a ten-fold increase in DOD environmental cleanup funding. [Ref. 14]

Furthermore, the National Defense Authorization Act for Fiscal Years 1992 and 1993 explicitly prohibits the use of Fiscal Year 1992 DERA funds for the payment of environmental ~~finer~~ and penalties. This is a problem that will be discussed in another chapter.

D. NAVY ENVIRONMENTAL COMPLIANCE ACCOUNT

The DERA is a DoD appropriation provided by Congress specifically for environmental restoration efforts. DERA funds are transferred by SECDEF to the Navy Environmental Compliance Account (NECA) based on relative priorities among services and fund availability. The Commander of Naval Facilities and Engineering Command (COMNAVFACENGCOM) has been delegated the authority to program and execute the DERA for the Navy.

The NECA is a pot of money used for environmental compliance which consists of OP-04 sponsored line items in the Operations and Maintenance, Navy (O&MN), Other

Procurement, Navy (OPN) and RDT&E appropriations, and the Navy's portion of the DERA. NECA funds are used for [Ref. 3]:

- a. Compliance projects, including remedial/corrective actions to ensure facilities, ships, and equipment meet environmental requirements.
- b. Special studies need for environmental program management (not including environmental impact statements or assessments).
- c. Costs associated with operating the NEPSS.
- d. RDT&E to solve unique Navy environmental problems.

All rules apply to each appropriation. Thus, if a compliance project requires construction over \$200,000 the project must be programmed in the Military Construction (MILCON) program, vice the NECA O&MN account.

The Navy provides funding for shoreside compliance in two ways:

- Base operations accounts (O&MN, OPN)
- Environmental Compliance Account (NECA)

Figure 5 shows how the funds are obtained through the budgeting cycle.

1. Base Operating Accounts

In accordance with OPNAVINST 5090.1A and CNO message of 5 October 1989:

Activity Commanding Officers are expected to budget for routine, recurring environmental requirements in base operating accounts. [Ref. 15]

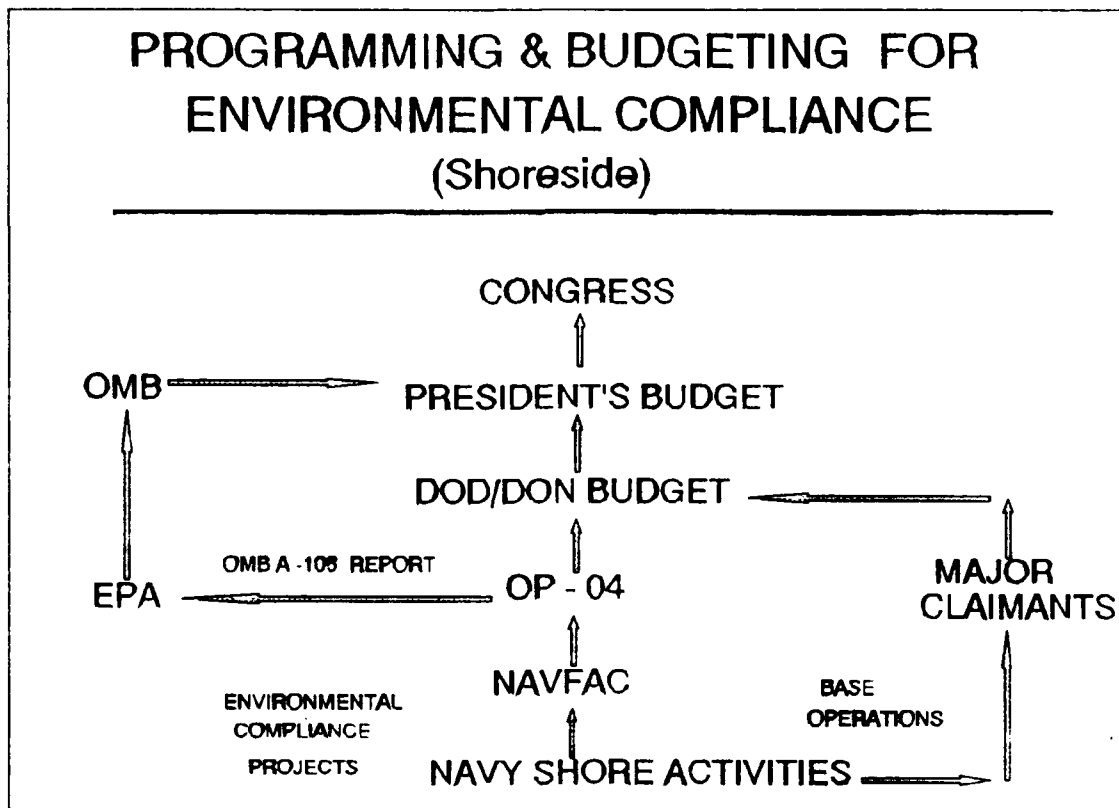


Figure 5 Source: NAVFAC Briefing Sheet

These costs will be reflected in the activity's O&MN or Navy Industrial Fund operating budget which is submitted to the major claimant. These costs and projects are not reflected in the PCR/OMB A-106 reports. Examples of these type of routine, recurring expenses include; permit fees, sampling/analysis, salaries, training, hazardous waste disposal, facility and equipment repair/maintenance, and compliance fixes under \$10,000.

Major claimants are expected to identify funding requirements in the POM and budget process to ensure compliance with applicable environmental requirements of a routine, recurring nature. [Ref. 15]

a. O&MN

Environmental compliance is the responsibility of the installation commander. Therefore, funding for the repair of a system must come from the

installation's operations and maintenance budget. When problems are identified through an environmental audit or compliance review, the installation must include the cost of pollution abatement projects in the request for O&MN funding if the project is of a routine or recurring nature. In addition, a pollution abatement project for the correction of the problem should be included in the PCR/OMB A-106 report. Inclusion in the A-106 report will provide support for the necessity of the funding request and will assist headquarter offices to identify unfunded requirements and take necessary actions to ensure adequate funding for environmental compliance. [Ref. 16]

In the O&MN account there have been recent changes to reflect the changing policies and practices. Until fiscal year 1990, hazardous waste disposal costs were funded through NECA from the DERA. Fiscal year 1990 was a trial year, activities were expected to pay for disposal out of their base operating accounts without having a budget or accounting classifications for it. In fiscal year 1991, NAVCOMPT assigned cost accounting classification codes for hazardous waste. The newly created accounting group/sub-accounting group (AG/SAG) codes are:

E4/FT Personnel Costs

E4/FX Disposal Costs

In the budget request for FY 1991, activities had to budget for these costs.

The O&MN dollars for the newly created AG/SAGs for PACFLT and its Type Commands for Fiscal Year 1991 was [Ref. 17]:

FY 1991 APPROPRIATIONS FOR E4 ACCOUNTING GROUP (IN THOUSANDS OF DOLLARS)			
	E4/FT	E4/FX	TOTAL E4
AIRPAC	\$ 5055	\$ 3162	\$ 8217
SURFPAC	6118	2828	8946
SUBPAC	2610	1827	4437
PACFLT	162	246	408
OCEANSYSPAC	51	109	160
CPF TOTAL	\$ 12,738	\$ 6,921	\$ 19,659

b. OPN and MILCON

The OPN appropriation is available for environmental compliance projects if the project meets the rules and requirements for use of OPN dollars. The same rules of obligations and expenditures still apply.

MILCON is a source of funds only for the activity or claimant under the existing rules, i.e. used for environmental construction projects greater than \$200,000.

NAVFACENGCOM requires that if an activity/claimant chooses to use MILCON or OPN, they are still required to submit a PCR to get the project in the OMB A-106 process. This draws attention of higher levels to help spot and perhaps alleviate these future funding problems in the PPBS process.

2. Environmental Compliance Account

Non-routine, nonrecurring compliance requirements that occur as a result of new/updated laws and regulations are eligible for funding from the Navy Environmental Compliance Account (NECA). Due to the uncertain environmental legislative and regulatory climate, these costs are difficult to plan, program, and budget, especially at local levels.

These requirements will be entered into the OMB A-106 process through the use of the Pollution Control Report (PCR). This ensures OPNAV level attention and reconciliation of requirements versus resources available at DoD, DoN, OMB, and EPA levels. OPNAVINST 5090.1A explains the importance of the PCR process as highlighted below by the Chief of Naval Operations:

Identification of such requirements in the PCR is vitally important to ensure that the true cost of Navy environmental compliance is recognized. [Ref. 15]

The NECA account:

offers a measure of protection to commanding officers and other personnel for possible liability for failure to meet environmental standards when compliance requirements exceed available operating funds... [Ref. 15]

It should be noted that entering a requirement that can not be funded from base operating accounts, into the PCR/OMB A-106 process does not eliminate the commanding officer or the activity from enforcement actions (fines, penalties, etc.).

NECA further provides central funds for urgent requirements and documents the problem and efforts of the activities to high levels to help obtain more future funding.

The Navy budget for Fiscal Year 1991 for environmental compliance and restoration will spend approximately \$408 million, \$100 million of that is being funded through the O&MN appropriation. Furthermore, the unfunded requirements list for environmental compliance and restoration for Fiscal Year 1991 will be \$36.8 million. [Ref. 18]

The Fiscal Year 1991 Navy Environmental Compliance and Restoration Budget, broken into its funding components (thousands of dollars) [Ref. 3]:

SOURCE	AMOUNT
MCON	\$ 36,300
NECA OMN	\$ 37,002
BOS OMN	\$ 63,005
RDT&E	\$ 11,560
NECA OPN	\$ 30,665
NECA DERA	\$ 229,688
TOTAL	\$ 408,220

COMNAVFACENGCOM has the responsibility for planning, programming and budgeting for DERA and shore facility compliance projects. Navy policy on funding of NECA projects states that "no eligible project is denied funding", but because of funding constraints a "worst first" execution plan is used. This plan considers the hazard posed to the environment, to our people and the public. All compliance requirements need to be documented. Failure to submit project documents, when required, could cause a presumption by the regulatory agencies that the activity has no intention of correcting the problem.

Some of examples of actions which are not eligible for DERA funds [Ref. 19]:

- Closing or capping of existing sanitary landfills
- RCRA closures associated with current waste generation or disposal
- Construction of hazardous waste storage, transfer, treatment, or disposal facilities
- Testing, storing, disposing, or replacing PCB transformers
- Current hazardous waste disposal operations, including associated management and operational costs
- Operation, maintenance, repair of current hazardous waste treatment, storage, or disposal facilities

To obtain funding from the NECA, a PCR must be submitted to the Engineering Field Division (EFD) in the area. NAVFAC's policy is that no eligible project will be denied funding. However, there is a priority system for selecting the projects due to financial constraints. The PCR priority system for projects is as follows [Ref. 19]:

1. Projects and studies to comply with requirements that became effective prior to the current fiscal year.
2. Projects and studies to comply with requirements that will take effect in the current fiscal year.
3. All other projects and studies.

In summary, the level of funding in the applicable appropriations are increasing relative to the baseline. However, the problem is that the generation of requirements is growing faster than appropriations. The DERA is increasing at 16-17 percent per year from 1991 through 1993. But, 95-97 percent of this funding level is

earmarked for IRP (reactive projects). This leaves only a small fraction of the available dollars for proactive solutions to the hazardous waste problems.

Within NECA, the compliance projects will be funded (NECA policy), but on a worst-first priority basis. The end result is that funds could be allocated to an installation years after the need arose. This is money for the permanent, non-routine, nonrecurring projects, not the day-to-day activities. These types of expenses are borne by the installation through its O&MN appropriation. The issue here is that, as the compliance requirements increase, hazardous waste generation continues (a part of doing business), and the defense budget is decreasing. This leaves less money available to the installation to fund disposal costs, permit fees, fines and penalties, as well as normal operations for the base. It is this challenge that financial managers, at all levels in the Navy, must endure. The following chapter will explain other problems associated with the declining budget and increasing compliance costs. It also explains how to reduce these costs through hazardous waste minimization, reductions, re-use or recycling efforts.

III. COMPLIANCE CONSTRAINTS AND MITIGATION EFFORTS

Approximately, two percent of the U.S. GNP is presently spent to mitigate environmental problems. It is probable that environmental expenditures will rise in the foreseeable future. Increased concern over a variety of problems ranging from the depletion of the ozone to the generation of hazardous wastes gives rise to regulations with very sobering price tags. [Ref. 11]

These costs must be borne by the public and private sectors alike. Private sector industries are able to make trade-offs between the level of compliance they are willing to fund and the amount of any ensuing fines for non-compliance. Federal facilities do not have this type of option. They are faced with the unique problem of funding constraints based on the appropriations from Congress.

This chapter will describe two fiscal constraints that DoD faces with regard to environmental compliance. Then it will conclude with an assessment of some environmental mitigation techniques available to DoD and DoN and an analysis of efforts that individual installations are pursuing to manage hazardous waste disposal.

A. CONSTRAINTS TO COMPLIANCE

The problems that the Department of Defense and the Department of the Navy are facing have an auto catalytic effect. Furthermore, these problems are very much

interrelated and difficult to distinguish the cause/effect relationships. As noted by Mr. William Parker, the DASD(E):

...in talking about these abatement programs is that all of the programs require more dollars from a smaller O&M and military construction account. This is a dilemma that we face. [Ref. 16:p. 126]

Several important constraints to compliance are:

1. The defense budget. (a) Many Navy accounts are single year accounts. Many account controls preclude line item transfers. In budget planning DoD is normally programming two years ahead and as conditions change it is sometimes very difficult to revise the budget figures. (b) There are limited federal dollars to spend at defense.
2. Environmental law has been growing exponentially.
3. States have passed or are passing environmental laws that the Navy must obey.
4. Complexities in duplication of effort at each command for environmental compliance. The Navy is decentralized for budget execution and this requires expertise at every installation.

The nature of these constraints are the declining defense budget and increasing environmental compliance costs.

1. DECLINE OF THE DEFENSE BUDGET

The decline of the defense budget began in fiscal year 1985 and continues through FY 1991. The budget, in the six years from FY 1985 through FY 1990 declined

a total of 8.4 percent. The drop from FY 1990 to FY 1991 alone is a 13.2 percent real decrease. Funding is scheduled to decline further through FY 1992 and FY 1993 at approximately three percent per year and it may decline even more rapidly. (See Figure 6)

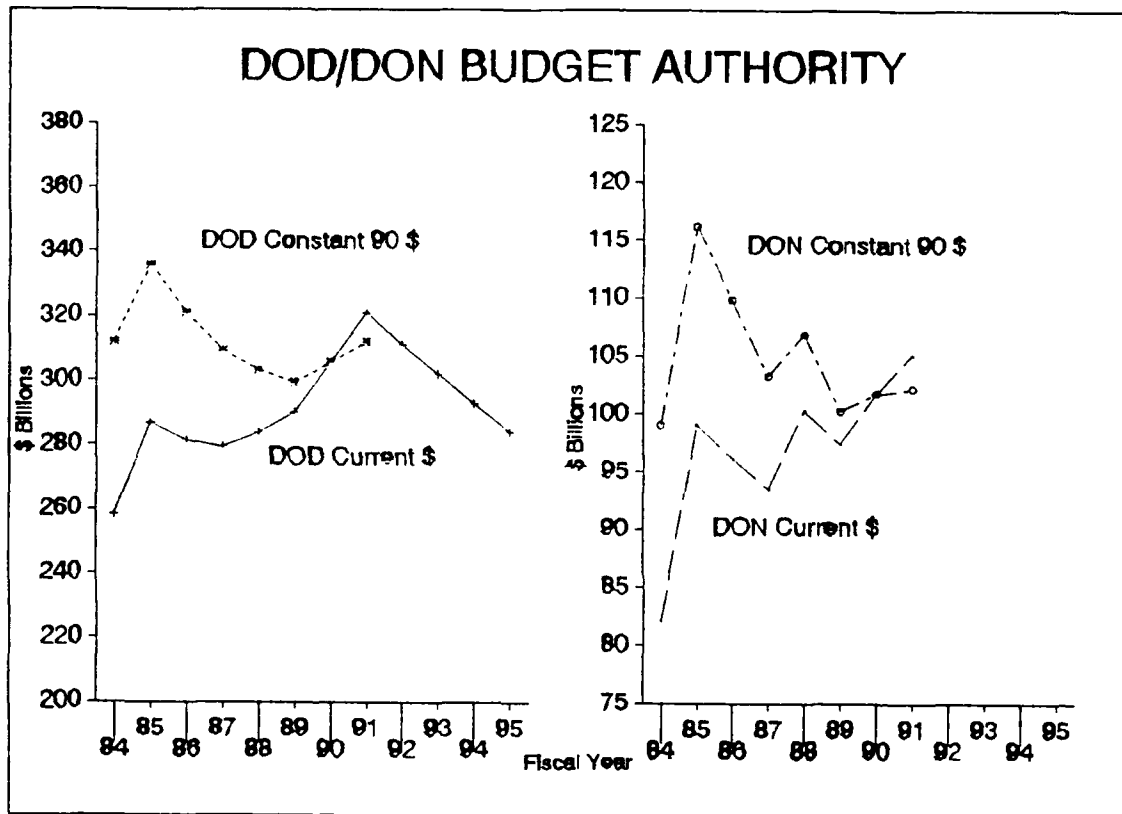


Figure 6

The decrease in the defense budget, particularly in the O&MN appropriation, will affect activities/claimants in that:

The cost of disposal has not been an issue for individual activities in the past, NAVCOMPT has recently ruled that, beginning in FY 90, individual activities will be billed for the costs of hazardous waste disposal. [Ref. 20:p. 24]

This in itself is not a problem except that with decreasing financial resources in the Navy, the base operating budgets are sure to decline proportionately. Hazardous waste disposal costs are paid for from the O&MN account.

This is a problem for the activity and claimant level commanders, comptrollers, and environmental engineers. This is a known problem factored into the Navy's environmental plan with some of the following assumptions considered in planning [Ref. 18]:

- defense resources are likely to decline further over the next ten years
- recruitment and retention of environmental professionals by the Navy will continue to be difficult and may result in a continued shortage of environmental professional within the Navy

Furthermore, the majority of the environmental problems (violations, non-compliance) are issues that require the use of O&MN funds to correct. In a NAVFAC review of the annual activity ECEs, 1093 findings were identified (see Figure 7). Of these, 196 (17.9%) were eligible for NECA funding. The other 897 findings (82.1%) did not meet the eligibility requirements for NECA; that is they were considered routine, recurring or fixes under \$10,000. Thus, financing is to come from the base operating accounts. [Ref. 19]

The following are important points regarding NECA:

1. The majority of the findings do not need NECA funding to correct the deficiency. The money should come out of the O&MN account.
2. Hazardous waste incorporates the largest amount of total findings and findings not requiring project funds (NECA)

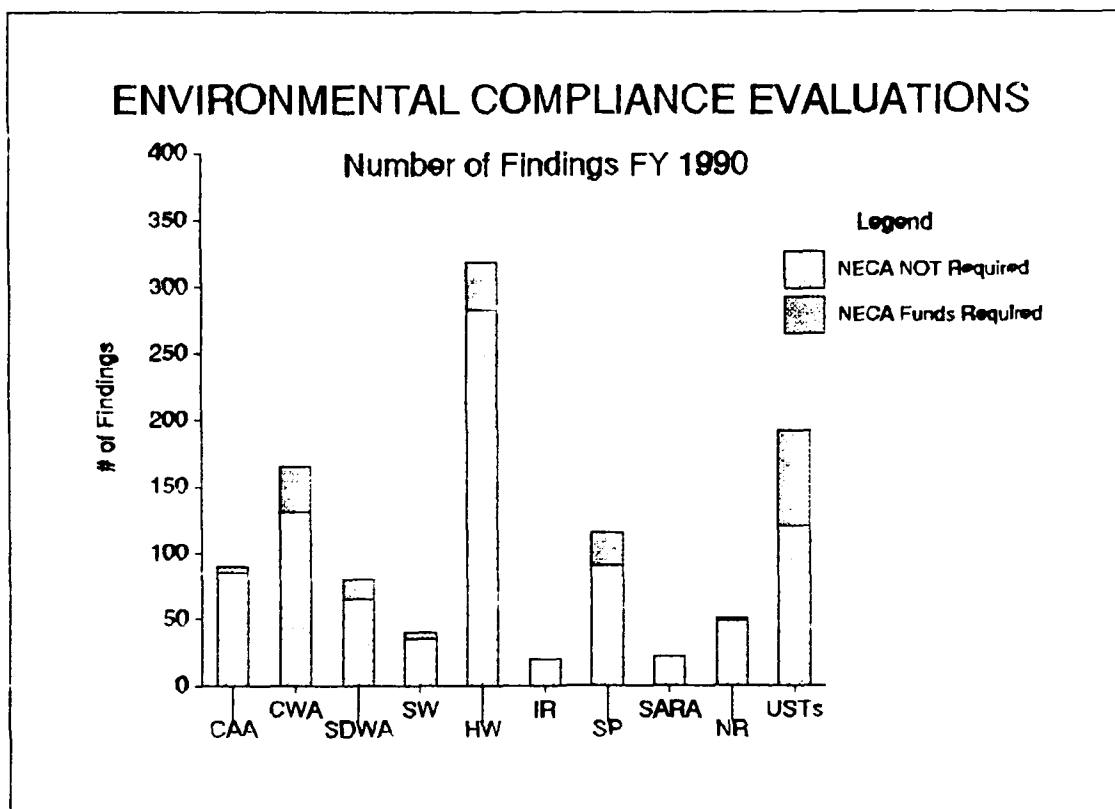


Figure 7 Source:NAVFAC Brief Sheet.

An interesting fact noted from the above figure is that the hazardous waste problem appears to be overshadowing other environmental problems. Furthermore, the majority of the hazardous waste problems (88.4%), are required to be financed from the OMN budget. Is this problem indicative of a lack of funds or control over the funds used for hazardous waste and hazardous waste disposal? In FY90 the funding of hazardous waste disposal became the responsibility of the activity. Therefore, this indicates that there are insufficient funds being allocated to the individual activities in their O&MN budgets in the E4/FX AG/SAG for environmental compliance fixes.

In testimony before the Environmental Restoration Panel of the Committee on Armed Services, William Parker, III, Deputy Assistant Secretary of Defense for Environment (DASD(E)) stated:

I would like to say that our installation commanders do need flexibility on O&M funding in the field. We do feel that our environmental portion of our budgets need more flexibility. We do not feel that we need more fenced funding. [Ref. 16:p. 10]

Another environmental policy and budgetary complexity for DoD and DoN is the process by which monies are appropriated. Private industry budgets money from profits to pay for fines, penalties, or corrective projects. Federal agencies are different in terms of funding:

As I mentioned...we are different...we have to come up here [Congress] for our funds. We have to handle these programs, and the one thing we don't want to be is viewed as recalcitrant. If laws are passed with certain deadlines and we can't meet these because of the amount of time it takes us to get our money, to develop our projects. [Ref. 16:p. 10]

In a contracting fiscal environment for DoD funding environmental compliance can become difficult and burdensome. However, in the past few years Congress has been generous with funding (for DERA) as noted in the previous chapter. The problem is that even though Congress appropriates more money for DERA, this does not change the base operating accounts, linked to the defense budget, which is shrinking. Furthermore, sites requiring DERA funding are increasing faster than the increase in funding provided by Congress.²

²The number of sites are increasing due to increased efforts from DoD through the IRP to identify and then correct environmental deficiencies as soon as practicable on a worst first basis.

This is evidenced in a statement from Dr. Michael West, staff member to the Environmental Restoration Panel:

In terms of the adequacy of the DERA request this year- it seems to me that what we have seen in terms of your own testimony here today is that you are talking about 10-15 year program in order to get on with the cleanups of these DERA sites. Yet, if we just do simple arithmetic on taking the base line as we see it right now for this year and in the 5 year program, we are talking about a program that could take 30 to 50 years, So, we have a serious shortfall here to address. [Ref. 16:p. 31]

A concern for the Navy is what will activities/ claimants defer if the DERA account cannot be fully funded in terms of the total requirements. Dr. West expressed his concern with the lagging behind of the inactive/former sites program and hazardous waste minimization programs. Obviously, with constrained resources, financial managers need to assess problems and trade-offs between alternatives.

I would also like to point out that we really have to take even a more macro view. I think that talking about just DERA and the monies for DERA doesn't cover all of the demands. As I showed you a little earlier today, we are talking about spending over a billion dollars this year alone. We are talking about additional demands coming down the pike. We are seeing more and more legislation, more rules and requirements coming out, all of which are equating to more dollars. [Ref. 16:p. 31]

The DoD is putting money toward the problems of hazardous waste and hazardous material minimization, because they are of increasing importance for the future. However, There are other problems of environmental compliance and costs required of the Department, the Services, and the individual installations.

It seems to me that some of these things are very, very difficult because a lot of these laws do not take cost into consideration. You [Congress] don't have to have a cost effective view. They are also not prioritized. Essentially, the most aggressive regulatory body tends to be the squeaking wheel that gets greased. Would you agree that at some point in time we do have to come back and revisit this in terms

of priorities and cost effectiveness if we are going to try to get our arms around this and proceed in a responsible fashion? [Ref. 16:p. 32]

2. INCREASING COMPLIANCE COSTS

Compliance includes the costs of projects to bring a facility into legal compliance as well as hazardous waste disposal costs and costs associated with administration and training requirements. The following table demonstrates the magnitude of the increasing costs for disposal and costs associated with CERCLA/RCRA permitting requirements.

	DISPOSAL COSTS			
	1987	1988	1989	1990
AIRPAC	724,693	1,728,186	418,247	3,767,966
SUBPAC	158,290	67,591	107,061	1,129,628
SURFPAC	74,460	171,256	464,939	694,261
CPF	0	0	22,200	518,248
CPF TOTAL	957,443	1,967,033	1,012,447	6,110,103
	DRMO / CERCLA/RCRA COSTS			
AIRPAC	70,195	378,292	1,476,358	5,113,186
SUBPAC	10,500	0	27,357	350,000
SURFPAC	49,948	0	15,064	3,539
CPF	151,959	244,460	504,872	0
CPF TOTAL	282,602	622,752	2,023,651	5,466,725

The escalating cost of environmental compliance must be addressed with limited dollars. Figure 8 shows NAVFAC projections of compliance costs through FY 1997 [Ref. 19]. The costs to meet the requirements of the CERCLA and SARA (1986), may be increasing faster than the funding level requested by the Department.

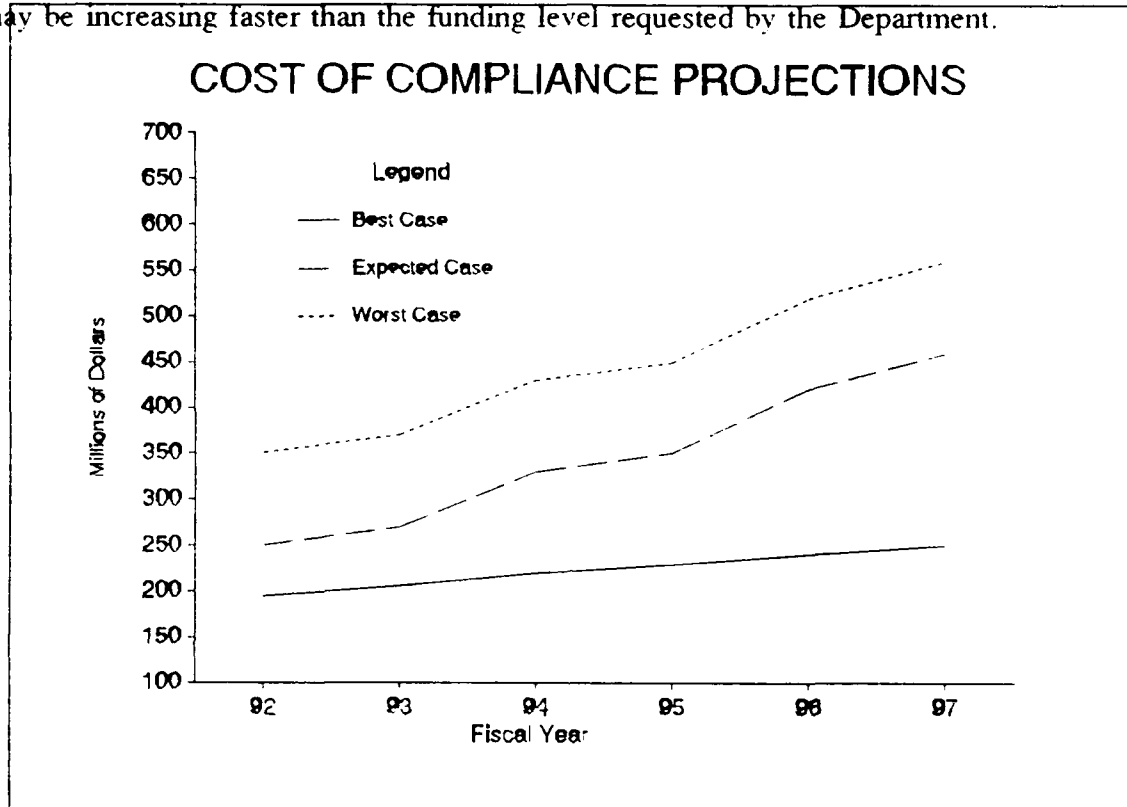


Figure 8 Source: NAVFAC Brief Sheet.

To ensure that limited funds are used wisely, DoD has a system based upon relative risk to public health, and the environment to establish priority for defense remedial action cleanups. This policy is the basis for distribution of the centrally managed funds, NECA and DERA. However, this policy is continually threatened by new legislation dictating where money is to be spent. Examples of this include the new Clean Air Act and the impending legislation for the removal of sovereign immunity for Federal facilities.

We are also trying to get our hands around how much money it's costing us to comply with environmental laws, and we were originally thinking somewhere in the terms of a billion to a half to perhaps two billion dollars a year as sort of a sustainment level for this kind of work. Right now you have raised the ante if that legislation were to be enacted, of another \$500 million to a billion dollars a year, not counting the military construction cost that would be associated. [Ref. 16:p. 30]

The Navy's Environmental Program plan assumes the following within the next few years [Ref. 18]:

- With a high level of public opinion expressing a strong desire to protect the environment, environmental requirements will increase over the next ten years.
- The Resource Conservation and Recovery Act (RCRA) will be reauthorized and probably result in increased requirements for source separation and recycling.
 - increased regulation will result in decreased disposal capacity and increased disposal costs
 - the categories of materials banned from disposal sites will increase which will also result in increased costs.
- Under the Toxic Substance Control Act, there will be increased control over the manufacture of toxic substances, thus reducing the use and availability.
- There will be increased oversight and inspections of Navy activities by the Environmental Protection Agency.
- Recruitment and retention of environmental professionals by the Navy will continue to be difficult and may result in a shortage of environmental professionals within the Navy.
- The growth in number and complexity of environmental laws, regulations and technologies will require a continuing education program for personnel to maintain competence.

Given these assumptions the Navy's objectives in environmental planning and budgeting for FY 1991 include the following [Ref. 18]:

- Simplify the collection and transfer of program management information by implementing and maintaining a Navy-wide micro-computer based environmental compliance information system.
- Conduct an effective Environmental Compliance Evaluation program for individual Navy activities. This program will require year end assessments by major claimants to ensure that stated objectives have been met, to determine the effectiveness of natural resource management programs.
- Develop and implement a comprehensive environmental and natural resources training program for all levels of Navy personnel.
- Promote alternative dispute resolutions as a means to ensure compliance rather than the use of fines and penalties.

The preliminary estimate for the total cost of the DERP program have been estimated by the DASD(E) office to be approximately \$15,760,000 as the baseline. The figures were adjusted for other factors in hazardous waste disposal, e.g., treatment, storage, and transportation industry. Accounting for these adjustments, program cost currently planned, could require \$21,025,000 in total expenditures. These expenditure streams are shown in Figure 9. [Ref. 21]

B. MITIGATION PROCESSES

The hazardous materials that are used at military installations include a wide variety of potentially environmentally unsafe items such as paints, solvents, cleaning compounds, adhesives, lubricants, and photographic developing chemicals.

Disposal of hazardous wastes remains a problem since all storage facilities needed have not yet been constructed. The problem is further exacerbated by the closing of off-base hazardous waste disposal facilities, which is causing the increase in disposal costs. [Ref. 20] Part of the solutions to the hazardous waste problem is reduction,

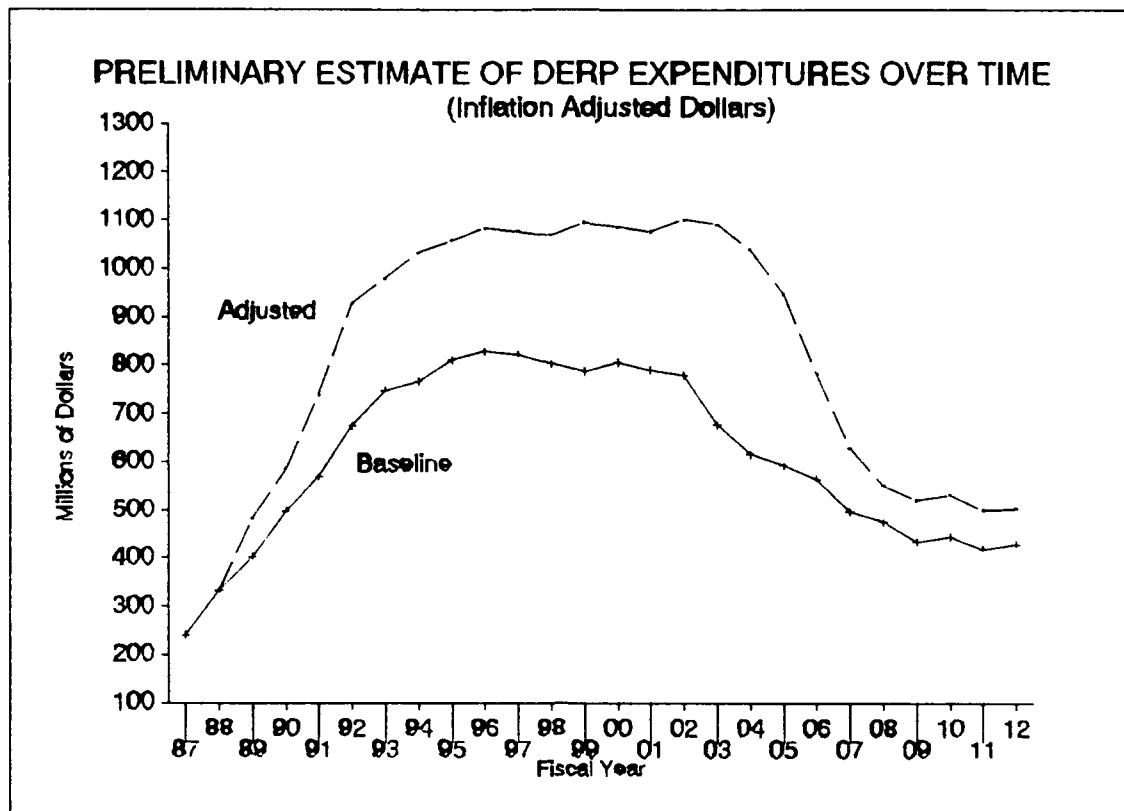


Figure 9 Source: HASC No. 100-65:p. 25.

minimization, re-use, and recycling.

A conscious effort is needed from each installation to mitigate its generation of hazardous wastes. Significant progress has been made in DoD and DoN through minimization, reductions, and recycling as evidenced by the data presented in Appendix C. The impetus behind minimization and recycling and their results are further described.

1. MINIMIZATION

One of the keys is waste minimization and minimization of the use of hazardous materials. We want to keep those materials out. We do not want to get in the position where we are creating problems for tomorrow. We have enough of yesterdays problems to handle. [Ref. 16:p. 7]

The EPA defines waste minimization as the reduction, to the extent feasible, of hazardous waste that is generated and subsequently treated, stored, or disposed. It includes any source reduction or recycling activity that results in either; (1) the reduction of total volume or quantity of hazardous or solid waste, or (2) the reduction of the toxicity of hazardous waste, or both. [Ref. 4]

Each Navy major claimant is to achieve a 50 percent (by weight) reduction of hazardous waste disposal for the five calendar year period 1988 through 1992, using 1987 as the baseline year. The long term goal is to eliminate hazardous waste disposal to the maximum possible extent by eliminating the use of hazardous materials and/or by implementing best management practices (BMPs) and best demonstrated available technology (BDAT). [Ref. 3:p. 9-15]

With all the competing forces affecting the hazardous waste disposal dilemma, the Navy and the individual activity must take action. If funding declines while compliance requirements increase, and with sovereign immunity waning, the outlook for resolution is bleak.

The majority of the centrally funded money (96 %) from the DERA will go toward installation restoration. This leaves the burden on the claimant and the installation to resolve their hazardous waste disposal and permitting problems. The cost of disposal has not been an issue for individual activities in the past, until NAVCOMPT recently ruled that, starting in FY 1990, individual activities will be billed for all hazardous waste disposal costs.

Waste minimization can take many forms including source reduction, material substitutions, minimizing the acquisition of hazardous materials, and other technological efforts at waste reduction. [Ref. 4] Reduction or minimization can apply to the hazardous

waste output. But this decrease of volume in the output can result from either process changes to yield less or no hazardous by-product, or the input of hazardous material must be decreased. The latter is more commonly known as source reduction.

To address minimization or reduction in the process, the following should be considered [Ref. 20]:

- Question processes that generate hazardous waste, maybe another process yields the same result without generating hazardous waste.
- Change of steps in a required process may eliminate or reduce the amount or toxicity of waste generated.

An example of an innovative approach is a Marine Corps base's use of a private company to provide oil change services for their motor pools. Essentially they are renting the oil. The contractor is responsible for proper disposal, re-use, or recycling of the oil. A more conventional approach is to have a Public Works Center (PWC) or some other activity to recover, recycle, and reuse the oil. Many installations have oil reclamation services.

The point is that the Marine Corps looked at the process and developed an alternative whereby they did not have to deal with the end waste product. There are many barriers to the transportation of hazardous waste or material, thus sending the oil to another DOD facility was impractical.

Minimization programs are required under RCRA, Section 3002: " . . . all hazardous waste manifests must contain certification that the generator has a program in place to minimize the volume and toxicity of waste." Such hazardous waste minimization activities can include [Ref. 22]:

- Improved housekeeping in and around hazardous waste generating processes.

- Improved maintenance and modifications to processes.
- Substitution of non-hazardous materials for hazardous materials in the processes, even if more costly. Look at the life-cycle-cost of the process, it may not necessarily be more costly. The Navy is currently doing this.
- Major process modifications.
- Discontinuance of nonessential process steps.

There are many issues of concern in the area of waste minimization and reduction. Since the DASD(E)'s statement in 1987 proclaiming that the DoD will reduce its hazardous waste generation by 50 percent by weight by 1992 from the 1987 baseline numbers, there has been much concentration on output levels. DoD has been criticized by the GAO and DOD IG about its lack of any structured hazardous waste accounting practices. This will be further discussed in the next chapter.

The Navy has embarked on a Total Quality Management (TQM) approach to the procurement and acquisition of hazardous materials. The idea behind the TQM top down approach in procurement is to stress the importance of being environmentally conscience. The TQM approach looks at the total life cycle cost of the material, a concept that was not readily associated with procuring commercial, consumable items like paints, solvents, cleansers, and the like. [Ref. 16]

Life cycle cost analysis looks beyond the "least cost" of procurement to examine toxicity, efficiency, effectiveness, reusability, recyclability, and the costs of disposal and any trade-offs associated with an alternative substance.

On hazardous waste minimization, we do have a directive that we are putting in place now in order to institutionalize hazardous waste minimization, and we feel that on a cost-effective basis there are trade-offs that will pay for reduction in the use of hazardous materials. [Ref. 16:p. 127]

We are also initiating through this directive a life-cycle cost. The emphasis in procurement has been primarily on first cost, and what we are looking at is the total cost to the Department in purchasing, maintaining, and disposing of hazardous material. [Ref. 16:p. 128]

This problem was highlighted by a GAO report finding that the Defense Reutilization and Marketing Service (DRMS) sold hazardous material from October 1986 through March 1989 with an estimated acquisition value of \$140 million for \$5 million³, and further that DoD spent an average of \$1.11 in disposal costs for every \$1.00 in original acquisition cost for the items disposed. [Ref. 23]

The problem is further exacerbated by the fact that a large quantity of hazardous waste that must be handled and disposed of by the Navy is hazardous materials that have never been used. These include [Ref. 22]:

1. Items whose shelf life has expired. Overstocking is a major cause of such wastage, age may be alright, but there is a need to look at chemical stability of the material. NAVFAC is currently looking into methods of extending shelf lives.
2. Excess hazardous materials that are obsolete, having been replaced by a preferred alternative method.
3. Items with deteriorated containers, including labels which are not fully legible.

³It must be noted that on the positive side, this action saved \$170 million in disposal costs on that material.

4. Off-specification material.
5. Partially used material.
6. Open purchase material, regardless of condition; generally only material with assigned National Stock Number can be returned to Naval Supply Centers.

Navy activities must comply with all federal, state, and local regulatory requirements relating to hazardous materials and hazardous waste. Compliance with all aspects of an EPA approved state hazardous waste management program is considered compliance with federal requirements. OPNAVINST 5090.1A requires that Navy activities reduce hazardous waste generation and disposal in accordance with OPNAVINST 4110.2 by implementing a combination of the following procedures and processes as listed in priority order [Ref. 3]:

1. Eliminating and/or reducing, at the source, the use of hazardous materials by changing the process, requirement or materials used.
2. Substituting a less hazardous/toxic hazardous material in the process.
3. Reducing and/or eliminating the generation of hazardous waste by reduction process or equipment changes.
4. Recycling/recovery and reuse of the hazardous material.
5. Reducing and/or eliminating excess and expired shelf-life hazardous material.
6. Treating the hazardous waste to reduce the volume or to reduce it to less toxic or non-hazardous state.
7. Destruction of the hazardous waste.
8. Disposal, as a last resort.

Pollution abatement costs are difficult to quantify because abatement may be accomplished in a variety of means including the reduction of product output⁴ or of harmful emissions per unit of output, the redirection of emissions, or the insulation of property. Thus, suppose that pollution may be reduced either by cutting output (which has a cost in terms of lower profits and employment and reduced consumer benefits) or by introducing a costly new environmentally sound process of production. The marginal cost of alternative pollution abatement techniques could then in principle be assessed relative to the cheaper of the two alternatives. [Ref. 24]

The Navy has made significant progress in minimization and source reductions, as well as in some process changes. For instance, some Naval Aviation Depots have switched to plastic media blasting instead of using solvents to strip aircraft prior to re-painting. This has been so successful that less hazardous materials are being used. Furthermore, better bonding is being obtained and thus results in a better paint job, which means that the life of the system will last longer. Therefore, the depot has to use less paint such that over the life cycle they have saved even more money aside from the disposal costs associated with the wastes. Saving money is the bottom line as installations confront environmental compliance.

⁴In this instance output as applied to the Navy or DoD may be defined as level of activity, i.e., number of oil changes, number of aircraft stripped, that generates the hazardous waste.

2. RECYCLE/REUSE

Pollution is nothing but the resources we are not harvesting. We allow them to disperse because we've been ignorant of their value.

- Buckminster Fuller

Recycling or reusing waste materials are other ways to avoid disposal costs of hazardous waste. Section 6002 of RCRA requires all Federal agencies to procure items of the highest percentage of recoverable materials practicable, consistent with competitive procurement requirements. [Ref. 22]

DoD does not recycle a large percentage of its hazardous waste items as reported by DLA.

In FY 89, one percent of the 115,748 line items of hazardous waste processed were reused by the DoD, other Federal agencies, or eligible donees. Three percent of the 115,748 line items received by DLA were sold [to the public]. The remaining 96 percent of the hazardous waste line items were ultimately disposed of by service contracts. [Ref. 23:p. 17]

One reason for this problem is that each installation may generate a number of hazardous wastes in such small quantities so that it is not cost effective to recycle or reclaim the material at the installation level. Exceptions include the PWCs, NIFs, Shipyards, and Logistics Depots where they have a steady stream of wastes by-products which makes recycling feasible. However, the following data indicate that in CINCPACFLT, recycling of hazardous waste is increasing. Note that the data is in tons of waste recycled and does not differentiate between line items.

	HW RECYCLED (TONS)			
	1987	1988	1989	1990
AIRPAC	1,602	2,308	8,586	1,044
SUBPAC	355	149	283	352
SURFPAC	334	8,109	2,227	10,975
CPF	0	15	45	10,358
CPF TOTAL	2,291	10,581	11,141	22,729

Variances are caused by the omittance or inclusion of certain activities in the TYCOM. These data variations and accounting and classification problems are further described in the next chapter.

Private firms, like Navy PWCs, NIFs, and shipyards make a few products and always get the same hazardous waste effluent stream. In fact, within industry, the practice of recycling and resource recovery with material reuse has often proven to be the most cost-effective manner of waste management. When hazardous wastes are stored for recycle or reuse the process is RCRA exempt, which translates into a cost avoidance of permitting fees. [Ref. 22]

A private firm will recycle materials if recycling is cheaper than the use of virgin materials. But from the social viewpoint, pollution costs and the benefits of conserving resources should also be taken into account. Peter Abelson in a book on the

analysis of environmental problems, developed a relationship for an optimal level of recycling. For a given level of output it is desirable to recycle materials if [Ref. 24:p. 13]:

$$\sum_{i=1}^N \frac{(Cr+Pr-Br)_i}{(1+r)^i} < \sum_{i=1}^N \frac{(Cv+Pv)_i}{(1+r)^i}$$

Where:

Cr = Production Cost of using recycled material

Pr = Pollution Cost of using recycled material

Br = Benefit from extending the resource life of material

Cv = Production Cost of using virgin materials

Pv = Pollution cost of using virgin materials

r = Social discount rate

i = time period in years

This is a useful model. However, due to the nature of DoD business, normally the reuse of materials does not apply to the individual activity. Production type activities like NIFs and PWCs are the exception. Recycling may reduce the present value of future pollution costs, but not always. Benefits of extending the life of raw materials favor recycling but when discounted to the present these benefits may be small and may not justify the other costs involved. This is why recycling of hazardous wastes at the installation level is not always feasible. [Ref. 24]

If businesses have to minimize pollution costs as well as production costs, they are more likely to produce the optimal amount of recycling. However, federal facilities are not motivated by profit. Still, they might be under unit cost budgeting and reimbursable funding as proposed by the Defense Management Report initiatives.

Thus, the private sector is taking some initiatives, they make capital investments in incinerators, recyclers, compactors, and separators for reuse. The advantage is that they have a known waste effluent stream. The majority of DoD installations have intermittent waste streams, normally associated with the level of maintenance which comprise a small portion of the total waste generated by DoD. In fact, 90 percent of the DoD hazardous waste originates from only 60 installations [Ref. 22]. It is at these 60 installations where these processes have benefit. Industry will invest in these types of processes and equipment when the benefit (MSB) is equal to or exceeds the costs (MSC). As previously noted, industry does not comply 100 percent, many pay fines and penalties because it is more economical.

Within the Navy, 88 percent of major hazardous waste streams are derived from ten categories of hazardous waste [Ref. 22]. Studies of the feasibility of such equipment for certain Naval installations and complexes (NIFs and PWCs) show that it is cost effective to invest in recycling equipment. In this period of increasing disposal costs and decreasing funds, it may be beneficial for activities or claimants to look again at their waste streams to determine if it is beneficial to invest in this equipment or to work cooperatively with other installations to seek scale economies.

The DoD and the Navy are also concerned with recycling of non-hazardous materials and wastes. The Qualified Recycling Program (QRP) is required in accordance with OPNAVINST 5090.1A. Further guidance on the QRP is contained in NEESA 5-010 ("How to Develop a QRP") and in DODINST 7310.1 ("Fiscal Management of a QRP").

The following is an economic analysis of the QRP policy. This program is explored because the proceeds from the QRP can be applied to augment mitigation projects for hazardous waste. In this era of constrained funds, commanding officers and comptrollers should have a thorough understanding of this program in order to reap as much benefit in applying them to hazardous waste projects as possible.

3. QUALIFIED RECYCLING PROGRAM

A qualified recycling program is designed to take advantage of legislatively created incentives for military installations. It establishes and operates programs to reduce waste streams, prevent pollution, and conserve material resources. The incentive is the return of proceeds from the sale of recyclable material to help support military Morale, Welfare and Recreation (MWR) and Non-Appropriated Fund Instrumentality (NAFI) activities. In addition, the program will finance pollution abatement, energy conservation, and occupational safety and health projects. [Ref. 3]

To receive the proceeds from the sale of recyclable materials, an installation must have a qualified recycling program meeting the standards delineated in OPNAVINST 5090.1A. The activity will receive 100 percent of the proceeds from the sale of qualifying recyclable materials through the Qualified Recycling Program (QRP).

The monies derived from those sales will accumulate in a fund up to two million dollars, and may be spent on MWR programs and environmental projects.

a. Program Requirements

Federal legislation requires proceeds from the sale of recyclable materials from an installation to be used to cover operation, maintenance, and overhead costs incurred in the recycling operation. Any excess may be used for pollution abatement, energy, and safety projects and/or any nonappropriated morale and welfare purposes. [Ref. 3]

Accumulation of proceeds from sales of recyclable materials is authorized only for installations which have a QRP. A qualified recycling program will include the following program requirements [Ref. 3]:

1. The managing activity will be designated by the activity commanding officer. Potential managing units are the Morale, Welfare, and Recreation (MWR), the Environmental Department, or the Public Works Department.
2. Means for maintaining fiscal accountability for all funds received and disbursed.
3. Maintenance of records of the quantity and types of materials sold for recycling.
4. Review of all projects funded with the proceeds of recycling sales by the same chain of command that would normally review such projects if funded from normal appropriations.
5. Specific implementation of recyclable material sales requirements contained in OPNAVINST 5090.1A.
6. Notification of DRMO that the installation has a QRP as established by the Military Construction Codification Act and implemented by directives.

OPNAVINST 5090.1A requires that the following materials be segregated

for recycling:

- Scrap metal
- High-grade paper
- Corrugated containers
- Aluminum cans

Exceptions from recycling of those materials shall only be considered when:

1. Market analysis conducted by DRMO or the managing activity indicate that the recovered materials cannot be sold.
2. The net costs exceed the net income plus avoided costs for disposal by another means.

Table 1 lists the current market value of some of the recyclable materials.

<u>TABLE 1</u> <u>DRMO Market Price</u>			
Paper	\$ 45 / ton	Canvas	\$ 0.024 / lb
Aluminum	\$ 0.26 / lb	Tires *	\$ 0.02 / lb
Corrugated Paperboard	\$ 63 / ton	Silver	Reclaimed
Metal	\$ 12.71 / ton	Animal Fat	\$ 0.032 / lb
Wire	\$ 0.189 / lb	Bones	\$ 100 / month (Lot)
Brass	\$ 0.32-0.40/lb	Grease, Cooking	\$ 205 / month (Lot)

Electronic Scrap	\$ 0.10 / lb	
* Currently no market for tires. Activities have to pay to have their tires removed by a qualified tire recycler.		

b. Analysis of a QRP

The objectives of the QRP can be summarized as follows:

- To take advantage of legislative incentives for military installations to increase revenue to fund needed environmental projects and to improve/expand military MWR programs.
- To identify valuable resources now being lost in the waste stream to divert these resources to the recycling program.
- To avoid excessive costs for disposal of solid waste by other means, and reduce the volume of wastes disposed in landfills.
- Compliance with Federal, state, and local laws and regulations.

The alternatives to a QRP include:

1. Not recycle at all, simply dispose of all wastes in a legal manner at a public refuse collection facility (landfill). However, the current rate for dumping in a landfill depends on the region of the country due to the availability of landfill spaces; the current rate in central California is \$ 9/Ton for normal solid waste, not including tires, hazardous materials, or other toxic substances. The landfill will accept these items but at a premium price.

2. Not dispose of the material at all (metals, tires, wire) and allow it collect on site in order to avoid the disposal charge of \$ 9/Ton. This alternative, however, has other implications in that the storage of these materials may become unsightly, unhealthy, and undesirable for the image that military installations are supposed to portray to the general public.

Some of the costs and benefits associated with a QRP may include the following:

Costs:

- Personnel wages to administer and manage the program.
- Transportation of material to the DRMO.
- Use of storage facilities while awaiting shipment of the materials to the DRMO.
- The recycling facility.
- Notification and public awareness of the program.

Benefits:

- Proceeds from the program. In accordance with the instruction, the disposition of the proceeds occurs as follows:
 - a. First cover all the costs of running the QRP, including personnel salaries, advertising costs, and the like.
 - b. Up to 50 percent of the remaining proceeds can go towards other pollution abatement projects.
 - c. The remainder goes to non-appropriated funds activities - MWR.
 - d. Any proceeds over two million dollars are returned to the U.S. Treasury.
- Cost avoidance of disposing of material to a landfill.
- Increased use of current resources.
- Decrease in solid waste pollution levels.

The crux of this program as it applies to the problem of hazardous waste disposal at the installations, is the benefit of using some of the proceeds to off-set or fund abatement programs. The gains from a QRP are realizable. Table 2 lists the amount of proceeds from the top 10 Naval activities in FY 1989 [Ref. 25].

TABLE 2 Recycling Proceeds For Top 10 Activities In FY 1989 (76.8% of Navy Total)	
ACTIVITY	PROCEEDS (\$)
COMNAVBASE Norfolk	2,417,485
NS San Diego	666,322
NAS Mare Island	273,228
NAS North Island	217,518
FLT ACTS Yokosuka	215,492
NWSC Crane	183,308
NSPCC Mechanicsburg	176,779
NCBC Port Hueneme	161,823
NAS Corpus Christi	160,975
NS Charleston	146,568
TOTAL	4,619,498
12 Programs over \$100K	

C. SUMMARY

Navy installations face constraints in achieving environmental compliance. Each year more laws and regulations are passed and the defense budget shrinks. These constraints are directly linked to the management of financial resources available. Mitigation efforts like treatment or recycling cost money. Disposal costs money. There have to be trade-offs analyzed in the execution of the installations budget in the environmental areas (E4/FT and E4/FX AG/SAGs) between funding mitigation and disposal.

Mitigation takes many forms. Any effort that avoids disposal costs or generation of hazardous waste greatly benefits the installation and the Navy. As described in the next chapter, the Navy's TQM approach and life cycle cost analysis for material procurement will ease some of these difficulties. However, to assess the success of a waste minimization program, an accurate method of accounting for the waste generation must be in place. Also, the next chapter describes some further barriers to environmental compliance that installation commands must face and some new barriers that they could encounter in the future.

IV. MULTI-JURISDICTIONAL AND MULTI-GOVERNMENTAL COMPLEXITY IN HAZARDOUS WASTE DISPOSAL

Despite all the efforts on behalf of the DoD and DoN on resolving the multitude of issues related to hazardous waste generation and disposition, there are a number of barriers or hurdles that must be resolved. As compliance costs continue to increase, these barriers significantly impact the fiscal resources at the activity level.

Among the issues faced by activities is the absence of coordination between inter- and intra- agency regulatory responsibilities and requirements. Hazardous waste disposal is regulated by Congress as modified by the EPA, and the states and local governments. Disposal for DoD installations, in the past, was handled and funded through the Defense Logistics Agency (DLA), via the Defense Reutilizations and Marketing Service (DRMS).

In the past not many bases opted to independently contract for HW disposal. To what extent do you feel that this was because HW disposal funding did not come out of the installation funds if a DLA contractor were used? [Ref. 23:p. 86]

The reason for this is unclear. However, today the issue is moot; installations fund HW disposal regardless of who awards and administers the contract.

Furthermore, hazardous waste cleanup actions at DoD facilities are centrally managed and centrally funded and further accomplished under an agreement between DoD, the EPA, and the states, under Federal Facilities Agreements.

Major issues for hazardous waste disposal include:

- The future usefulness of DLA and the problems associated with the DRMS handling of hazardous waste for the installations.

- Shift of disposal funding from centrally managed to individual activity responsibility and the increased responsibility of the activities.
- Accurately accounting for the hazardous waste generation and disposal in order to demonstrate the each activity has a waste minimization program. And to alleviate some future data interpretation problems.
- The impact of the inevitable waiver of sovereign immunity on the installation in terms of fiscal management of hazardous wastes.

The following sections will describe the implications of these issues for the Navy activity, in the context of current reform to decentralize fiscal and managerial responsibilities.

A. DATA VARIABILITY AND INTERPRETATION PROBLEMS

There are many interpretations of the available data as to the status and progress that DoD is making in hazardous waste reduction. Examining the hazardous waste data for CINCPACFLT, many different results are obtainable.

Consider the volume of hazardous waste "disposed."

	DISPOSED (TONS)			
	1987	1988	1989	1990
AIRPAC	4,126	4,795	3,387	2,123
SUBPAC	1,892	1,339	1,021	918
SURFPAC	427	714	6,371	2,125
CPF	266	440	303	644

CPF TOTAL	6,711	7,288	11,082	5,810
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The data indicate that there was a 65 percent increase through the end of 1989. Then in 1990, there was a 47 percent decrease from the previous year and a 13 percent overall net decrease as compared to the 1987 levels. These are not the results that DoD wants as this is not compatible with the DoD and DoN goals of a 50 percent reduction in waste.

Consider the volume of hazardous waste "generated."

	HW GENERATED (TONS)			
	1987	1988	1989	1990
AIRPAC	140,083	7,395	12,310	3,575
SUBPAC	2,620	1,572	1,598	6,276
SURFPAC	23,677	9,470	10,300	14,845
CPF	296	507	349	11,162
CPF TOTAL	167,426	18,944	24,557	35,858

The 50 percent reduction goal has clearly been accomplished. Or has it? The GAO reports that DoD cannot possibly answer this question because DoD does not have an accurate measurement system [Ref. 4]. More significantly, there is a definite increasing

trend in hazardous waste generation. This is the wrong direction. The 50 percent reduction was a starting point and the ultimate goal is to have zero hazardous waste generation for disposal.

The problems in interpreting this data are two-fold. First, is the method used for accounting for hazardous waste generation. The Navy is currently only recording cumulative waste generated. This precludes determining if an installation has an effective minimization program. Thus, where twice as many aircraft are painted, twice as much waste is produced. Therefore, to say that the installation is not minimizing waste may be a fallacy. In the aggregate the installation has really generated twice as much waste, but what about the amount of waste generated per airplane? This question cannot currently be answerable, and is the question that will be addressed in the following section.

The other problem is the classification of the waste depending on its disposition. For example, waste turned over to DRMS is classified as 'disposed' by the generating activity. Yet, if DRMS sold the waste through its various mechanisms, it is really re-used or 'recycled.' The following subsections address these issues.

1. CLASSIFICATION OF HAZARDOUS WASTES

In the past, common practice was to have the Defense Reutilization and Marketing Service (DRMS) handle an installations hazardous waste for possible resale or disposal. The classification problem centers around the fact that a large percentage of the hazardous waste is virgin hazardous materials. The GAO found in their survey:

40 percent of the HM transferred to the disposal process were unused and 80 percent of these materials were transferred because of expired shelf life. Now, if the Department's requirements for testing and evaluating such materials are working, you would have to assume that most of this material has been found to be incapable of performing the function for which it was purchased. [Ref. 27:p. 2,3]

Rep. Synar, the chairman of the Environment, Energy, and Natural Resources

Subcommittee of the Committee on Government Operations stated:

It would appear that one of the major ways that the DOD has reduced its waste disposal is by selling as surplus property unusable hazardous waste materials which might otherwise be disposed of as hazardous waste. But because of inadequate control over the sales of such material it would appear that a sizable portion of those HM may be abandoned or otherwise mishandled by the purchasers and end up as hazardous waste in the environment. If so, the societal cost of disposing of the material and cleaning up the environmental damage will undoubtedly far exceed what the DOD's original disposal costs. [Ref. 26:p. 235]

The problem is also who is liable for cleanup costs; DoD, Superfund, or someone else. Mr. Synar questioned DoD's responsibility from a financial and environmental point of view.

The logical question asked by a number of organizations is, should not the hazardous materials with expired shelf life be reclassified as hazardous waste and disposed of in accordance with the laws and regulations rather than offered for sale? Col. Agnor, the Commander of the Defense Reutilizations and Marketing Service testified:

No we [DRMS] do not believe it should be reclassified. The reason is as follows. HM that comes to us because of expired shelf life, in theory this happens prior to the point it reaches disposition with me, it has been tested for its military specific uses. If it fails those tests, there still may be a good commercial application, a good use of those same commodities. They just may not meet the high military specifications. [Ref. 26:p. 497]

Some members of Congress believe that DoD is trying to have the best of both worlds.

You cannot have it both ways. Either the material should be tested and if found to be capable of performing as originally intended, it should be kept and then used, or if it is found to be incapable of performing its original function and has not been tested, it should be reclassified as a HW and disposed of accordingly....It is not fair to offer something for sale to the public if you do not know whether it will perform its intended function and if it creates an unnecessary environmental risk. Because if it does not work, it is more likely to be abandoned and thrown away. [Ref. 26:p. 497]

At the installation, a maintenance or supply technician is normally responsible for determining whether hazardous property is a waste or a material prior to turn-in. The policy is that serviceable and unused items of hazardous property are classified as hazardous material, while unused or spent materials are classified as hazardous waste, or property that specifically is listed as hazardous waste by EPA or state criteria. The hazardous material is screened by the DRMS for reutilization within DOD, transfer to other Federal agencies or authorized donees, or sold. If the material cannot be disposed by the above methods, then it becomes hazardous waste when and only when the DRMS designates it on a delivery order request for disposal through commercial contract. Further policies governing DoD disposal are provided in the Defense Utilizations and Marketing Manual, DOD 4160.21-M.[Ref. 26]

Thus, from an accounting point of view, the transferred material is accounted for; however, the generating installation did not capture the costs involved with the disposal process. A caveat is that should a container of excess hazardous material be leaking or damaged, it is not reclassified as hazardous waste, yet it is treated as hazardous waste and disposed of accordingly [Ref. 26]. As mentioned earlier, this is a moot point as now installations are charged for all disposal regardless of how or when it is disposed.

However, the classification issue is significant where DRMS sells an installation's material for recycling but the installation records it as a disposal, as this complicates the accounting tally. This issue is discussed further in a subsequent section on activity responsibilities and why activities want more control over the process.

2. ACCOUNTING OF HAZARDOUS WASTE

The Navy and DoD are measuring the total aggregate amount of waste generated, stored, treated, disposed, or recycled. This approach, although relevant to the reporting mechanisms that are currently in place and the payment of contracts for disposal, storage, treatment, or transportation; ignores the level of activity that generated this waste. Hazardous waste generation is "variable" with the level of activity that generates the waste. As an illustration, assume the following:

- Waste: Paint stripper solvent
- Activity: Aircraft stripping operations for maintenance
- Volume: 1800 tons (1988) and 3500 tons (1990)
- Activity level: 1000 aircraft (1988) and 2000 aircraft (1990)

Thus, when looking only at the total volume, more hazardous waste was generated in 1990 than in 1988. It is not apparent from this analysis that the activity has a minimization program, since volume is increasing. However, on an activity basis, or "per unit" basis, the installation actually generated 'less' hazardous waste per unit.

One solution to this measurement problem is to use a measure of activity to determine if the installation is actually minimizing its waste generation. In the above

illustration, the installation reduced its generation from 1.8 tons per aircraft to 1.75 tons per aircraft. Obviously, activities like repainting aircraft or ships, or changing oil and lubricants in vehicles or machines are cyclical in accordance with the Navy Preventative Maintenance System (PMS), but not necessarily in an annual cycle. Perhaps aircraft stripping is based on the number of flight hours, which for a particular aircraft may occur every four years. Thus, if the maintenance schedule of stripping and repainting aircraft had an uniform distribution then it would not matter. Conversely, any other statistical distribution, normal or even random, would result in surges of hazardous waste generation in some years and slacks in others. Since, use is not necessarily always constant, consider Desert Shield and Desert Storm.

The issue of accounting and measuring hazardous waste generation has been a concern since the GAO report [Ref. 4]. In testimony given on February 13, 1990 before the Environment, Energy, and Natural Resources Subcommittee of the Committee on Government Operations, Mr. Parker, the DASD(E), stated that OSD and the services are working on a hazardous waste index system which will correct this measurement deficiency. He indicated that the system may be ready for implementation by 1992. [Ref. 26]

In the interim, how is a base commander, who is required to reduce his own installations waste generation by 50 percent, to know if the goals are being met? To this end, an activity-based accounting model for hazardous waste generation is proposed here to accomplish the following:

- Determine if an installation actually is minimizing waste generation determined by activity based measures
- Identify those processes that generate the majority of the wastes
- Accurately account for the total amount of waste generated
- Ensure waste segregation

The model provides justification for the system and analyzes the effectiveness of it. The analysis demonstrates that the system is feasible and will provide the information that is necessary to obtain a better understanding of cost drivers. The control system ensures accurate accountability for the waste generated and allows analysis of the activities minimization program.

B. ACTIVITY BASED ACCOUNTING SYSTEM AND CONTROL SYSTEM

1. NATURE OF THE PROBLEM

The General Accounting Office (GAO) has reported that the services will experience difficulty monitoring their progress because hazardous and solid waste generation data are unreliable. The problem is that DoD lacks the means for accurately measuring its generation or disposal rates and who is generating wastes. [Ref. 4] These rates are important because DoD currently reports only total amount of waste generated and disposed. From existing data it cannot be determined whether a decrease in the reported data is due to a successful minimization program or to a decrease in the work load (activity level).

In October of 1989, the Secretary of Defense issued a policy memorandum on environmental management policy to the service secretaries. Secretary Cheney stated:

This Administration wants the United States to be the world leader in addressing environmental problems and I want the Department of Defense to be the Federal leader in agency environmental compliance and protection. [Ref. 5]

The Secretary's statement went on to say:

The first priority of our environmental policy must be to integrate and budget environmental considerations into our activities and operations. This will decrease our future liabilities and costs for our people. [Ref. 4]

It is therefore necessary to implement a control system that can achieve these goals. As Merchant explains:

Only when an understanding of what needs to be controlled - the key activities or key results - and why they might happen - the control problems - has been assembled can a control system be designed or analyzed. [Ref. 33:p. 58]

a. Model Framework

The Navy has a very successful control program in the submarine community. This program is the Quality Assurance(QA) program. Each submarine is required to have one to ensure that any maintenance which effects the integrity or safety of personnel or equipment on board submarines is conducted in accordance with specific procedures. This program is the basis for the model I am proposing.

The submarine QA program is predicated on qualified inspectors, Quality Assurance Inspectors(QAI) , which serve as supervisors or overseers of the maintenance. It further emphasizes the necessity of training. Some differences include the fact that there is no performance measure to ensure the specific actions take place (results type of controls). The only thing that is required is annual review of records, qualifications and procedures be conducted by officers. The QAI is qualified by the ship's Commanding Officer, an indication of the importance and of top-down support.

The QAI learns through qualification and training the responsibility to ensure that maintenance is done in accordance with the required procedure. He is also responsible to ensure that the retest (operational check, hydrostatic test, etc.) is completed safely, properly, and that the results are satisfactory before allowing that system to be returned to service, or more importantly that the submarine is safe to submerge.

b. Organizational Structure

(1) *Top Down Support.* A control system must have the support of top management for it to work. In regards to the control system that is being developed for hazardous and toxic waste management and control, the necessary top down support is present, but needs to be modified.

It will be necessary that the major claimants and sub-claimants establish a department which reports directly to the commanding officer, and equivalent to other department heads. This Environmental Quality Department (EQD) will be headed by a Naval Civil Engineering Corps (CEC) officer. The claimant level EQD has the responsibility for the environmental conditions within the command. Subsequently, each activity will establish a similar department with the same organizational relationship.

(2) *Reorganization.* Within an activity there are various responsibility centers, the aircraft squadrons, aircraft maintenance, medical and dental, public works, finance and accounting, etc. The Environmental Quality Department (EQD) will be established at the same level as the other activity level departments.

The EQD at the activity level, like the sub-claimant level, will be comprised of a Naval Civil Engineering Corps (CEC) Officer as the department head, the Environmental Quality Officer (EQO) and another CEC officer as his deputy. It will be necessary for the environmental engineers (civilians) who are currently working for the Public Works Officer (PWO) in the Public Works Department to laterally transfer into the EQD and work for the EQO. This will be a lateral shift as their duties and responsibilities will not change, only who they report to. The rest of the EQD at the activity level will be comprised of the inspectors (defined and discussed below) who are currently part of the existing manpower levels within the activity.

2. NEED FOR A MANAGEMENT CONTROL SYSTEM

a. Goals And Objectives

In developing a management control system we need to distinguish between goals and objectives, since control systems are directed at goals [Ref. 34]. Goals are stated without reference to a time period, while objectives are intended to be accomplished by a specified date. Goals are stated in general terms that provide purpose for the organizational activities, objectives are stated in specific terms, preferably in a way which is measurable in order to determine the extent to which they have been achieved.

In regards to environmental policy, the goals have been established. The President of the United States wants the U.S. to be the world leader in environmental concerns. The Secretary of Defense wants the Department of Defense to be the Federal agency leader in environmental compliance and protection.

From these goals, the DASD(E) established the objective for DoD; reducing the weight of hazardous waste generated by 50 percent by 1992 from the 1987 levels. The objectives of the service secretaries (DoN, DoA, DoAF) can only be more restrictive. They, however, have chosen to make the 50 percent reduction their objective as well.

The objective of the EQD at the TYCOM/Claimant level is to assess the effectiveness of compliance and minimization efforts of the activities within their command to achieve this 50 percent reduction by 1992. They should provide technical guidance and assistance to those activities that require it. TYCOM environmental engineers should compile the data, provided to them by the activities on an activity based measure (per unit), of volume of hazardous waste generated by category of waste, volume of hazardous waste disposed, cost savings of minimization or recycling programs. From this information they can provide a monthly 'lessons learned' on a comparative analysis between the different activities. This assessment will determine which activity is doing well in minimization and which ones need assistance. In this manner the activities can learn from one another.

The objectives of the activity level EQDs are to reduce the hazardous and solid wastes at their activity. It will be necessary for them to collect data and provide it to the TYCOMs. Furthermore, the environmental personnel will have to coordinate with the other responsibility centers that are generators of hazardous waste. Therefore the goals and objectives of our organization have been clearly defined.

b. Scope Of Control System

The control system that needs to be implemented is at the EQD to ensure that the other responsibility centers of the activity comply with environmental laws and regulations. In determining which type of control models are feasible, Merchant [Ref. 35] provides guidance. He discusses the use of specific action controls, personnel controls and results controls. Simons [Ref. 36] discusses the importance of feedback as part of a control system. Thus feedback models will also be considered and implemented as part of the control system.

(1) *Action Controls.* These types of controls are inevitable in a bureaucratic organization, such as the Navy. There are literally thousands of instructions, procedures, guides and rules that govern practically everything that is done in the Navy. These ensure standardization. The sensitivity of hazardous and toxic wastes also necessitates this type of action controls.

The use of behavioral constraints (locks, segregated areas), as an action control, is required by law to restrict access and to minimize any liability for any unaccounted materials. This creates a problem in that if a person generates hazardous waste and has the desire to dispose of it properly, he is impaired and may elect to dispose of the material in an illegal and undesirable method. The personnel controls will eliminate this in that the qualified inspector becomes an action control (preaction review) as a supervisor.

Furthermore, the use of procedures become important because properly abiding by them is essential to ensure accurate accountability which affects the

integrity and validity of the activity based measuring system. These procedures define a more restrictive boundary within which the personnel are expected to perform. They provide the policies, rules, and desired conduct which they are expected to follow. These objectives are a subset of specific action controls which Merchant [Ref. 35] calls action accountability controls.

The third type of specific action control as described by Merchant [Ref. 35] is preaction review. This will take place by the use of the 'qualified inspector'. He provides oversight as a 'local expert' in the area of hazardous and toxic waste disposal, storage, and minimization. His role is that of a supervisor, there to provide guidance if needed and to make corrections to ensure the actions taken are in compliance with the procedures and regulations.

The advantage of action controls is that where they are feasible they are the most direct form, of control. If it is absolutely essential that an action be performed properly the first time, action control usually provide the best control. If controls over the actions are judged to be adequate there is no need to monitor results [Ref. 33]. Other advantages of action controls include:(a) Direct managerial attention to the actions being used within the organization,(b) they tend to lead to documentation of the accumulation of knowledge as to what works best,(c) particularly in the form of policies or procedures they are an efficient way to aid organizational coordination (key element in a bureaucratic organization).

Merchant states that problems with specific action controls is that they can cause operating delays or rigid, bureaucratic behavior. Both of these problems

should be overcome by proper planning and feedback. Maintenance activities that generate hazardous waste are not something that 'just happens' (unless of course an accident occurs). And the only additional control that is being implemented that could cause delays is the use of the qualified inspector. Each cost center supervisor will have one under his cognizance so this should not be a problem given proper planning. The monthly reports from the environmental personnel will provide feedback to encourage innovative ideas on how to improve their performance (generation rates) as compared to other cost (responsibility) centers.

(2) *Activity Based Accounting Measures.* Most of the documentation required is already in place. The cost accounting codes for hazardous and solid waste management were implemented in FY91. The object is to develop a control system that will effectively and efficiently compile and utilize this data in a useful manner to achieve desired results. The control system should be able to detect and correct ineffective and inefficient performance.

The performance measures will be on a 'per unit' (activity based measure) usage of a particular category of hazardous or solid waste. It should also be able to evaluate performance on a per unit cost of disposal of each activity, as well as the per unit acquisition value of hazardous materials procured. Thus another measure of performance will be a financial measure in that centers or activities with the lowest hazardous material procurement costs and lowest disposal costs are showing superior performance.

Due to the Navy's inability to determine if a decrease in total volume is due to a decrease in activity level or due to a minimization program, an activity based accounting measurement model is proposed.

Each responsibility center that generates hazardous wastes should have segregated storage containers for each type of waste. Standard operating procedure (SOP) will be for the person disposing of the hazardous waste to fill out a custody tag. This tag will annotate the amount of waste being disposed, the type of activity which generated the waste, and the number of units or activities performed to generate this waste (an activity based measurement).

The Environmental Quality Department will generate a monthly summary⁵ of the per unit data of each waste generated by each responsibility center of the activity. This can be used as a comparison of how each center stands relative to the other centers on the activity. An activity based measure can then determine if there is a decrease in activity (i.e. zero generation rate) or minimization efforts. An activity based measuring system provides a way to influence the behavior of the responsibility centers as they will see how much waste they are generating in comparison with the other centers.

The EQD at the type command level, will compile monthly data provided from each activity. They will analyze and aggregate the information on an activity level and report the results to all activities so they can see how well they are

⁵Weekly summaries will be generated for the first couple of months to enable all responsibility centers to adapt to what inputs are required and what the output results mean.

doing relative to the other activities in the type command. These reports constitute the diagnostic feedback system [Ref. 36] by providing a means of measurement and comparison to a standard or objective.

The key here is that this activity based accounting method for waste provides a way to normalize the data in order to make meaningful comparisons and analysis. Before, a lower volume could have been due to decreased activity and not necessarily minimization.

Furthermore, when the Navy implements unit costing in the near future, this system is already generating per unit information for the cost center. Thus the cost of disposal or storage can then be allocated back to the cost centers to determine the total cost of using the material; procurement cost plus storage and disposal of the subsequent hazardous waste.

This method will also allow a determination of the efficiency of alternatives. In that, if three times as much non-toxic substance is required to accomplish the task, the total price (procurement plus disposal) would differentiate between the two. This then results in an economic decision of how much they are willing to pay to not generate hazardous wastes.

(3) *Personnel Controls.* Hazardous and toxic waste handling and accountability is a very sensitive area. It will be necessary to make the personnel understand, through training, what is required and why; thus personnel controls will be required. These personnel controls are to ensure that there is honesty, integrity, and

responsibility for actions. These personnel should have training and qualification requirements similar to those of the QAIs mentioned above.

Each responsibility center which handles or generates hazardous or toxic waste will be required to have at least one 'qualified inspector'. The qualification requirements will be determined by the EQD. The environmental personnel of the EQD will conduct monthly training for the qualified inspectors and those in qualifications for inspector. Monthly training will be required at each cost center for all personnel. Annual training will be required for all other personnel at the activity to increase awareness and to promote the top-down concern (it is everyone's responsibility). This training schedule should develop a "culture" amongst the personnel as to the importance of what they are doing and its implications.

The qualification program must emphasize and select those people who are regarded as having honesty, integrity, accountability, and the ability to carry responsibility. The training and qualification requirements incorporates the interactive control system of feedback [Ref. 36].

(4) *Results controls.* Finally, as an incentive, a control system should be established to reward those responsibility centers and individual activities that show improvement. These incentives can only come in the form of non-monetary awards since pay and promotion are controlled by other mechanisms in the military. The object of the control system being implemented is to encourage innovation and competition in reducing the generation of hazardous or toxic wastes. These can be influenced by holding

responsibility centers accountable for their outcomes as determined by the activity based performance accounting system mentioned above.

Thus in this scenario a results accountability control system is certainly justified to motivate congruent behavior of the responsibility centers. Furthermore, a results accountability system requires:(1) defining the dimensions along which results are desired, in this case efficiency and quality, (2) measuring performance on these dimensions, the activity based measurement system, and (3) providing rewards to encourage behavior that will lead to those results. As Merchant [Ref. 35] points out these will only be effective if employees feel that their efforts will be noticed and rewarded.

Merchant [Ref. 33] points out some advantages of results controls:

- Feasibility - can provide effective control even where knowledge as to what actions are desirable are lacking.
- People's behaviors can be influenced even while they are allowed significant autonomy which can induce innovative ways of thinking. (Which is exactly what needs to be accomplished)

And some disadvantages:

- Results measures often provide poor indicators of whether good actions have been taken, because the measures failed to meet one or more of the qualities of good measure - congruence, precision, objectivity, timeliness, or understandability, or because the results were influenced by factors over which the person involved had little control.
- Results targets are often asked to perform two important but competing control functions. The first is motivation - thus targets should be challenging but achievable. The other function is communications. Plans are treated as commitments of what is expected - thus targets should be conservative.

(5) *Multiple Controls.* In some situations it may be beneficial to use more than one form of control. One advantage is that if used and well designed, they should provide better control. They can reinforce each other and they can address a broader set of control problems.

Another advantage is that it provides the possibility for learning, in particular, how actions or certain personnel characteristics are related to results [Ref. 33].

In light of the advantages listed the design of this control system, it necessary to include the following:

- Action Controls: Instructions and procedures will have to be established. Security of the hazardous disposal and storage areas is required. The event that generates the waste and the subsequent disposal and/or storage will be overseen by the qualified inspector.
- Activity Based Accounting Method of Measurement: Will be used in order to obtain per unit information on each category of waste as a performance based measure (financial and non-financial performance).
- Personnel Controls: Selection, training and qualification of inspectors. Qualification will ultimately be determined by the base commanding officer. Training of all personnel at all levels.
- Results Controls: An award system will be established for centers with increased performance in minimization efforts. Each type command will also establish an award system based on the activities performance.

(6) *Feedback Controls.* Simons [Ref. 36] states that once strategies are formulated and implemented, control systems are used to compare outputs or results against some standard - organizational goals in this case. Feedback on any discrepancies

is required so that the strategies or implementation procedures can be adjusted accordingly.

Feedback will be provided by the use of all three categories of feedback systems discussed by Simons: boundary systems, diagnostic systems, and interactive systems. This will facilitate control over both the implementation of intended strategies and formation of new strategic initiatives [Ref. 36].

Two of the functions of the boundary system are of particular concern in this model. First, boundary systems help in maintaining public credibility concerning the conduct of the organization. In the environmental issues, as long as the activities comply with the laws and regulations, then the activity should be free of public criticism of any non-compliance. These regulations establish the boundary in which the base must operate with regard to environmental issues. Secondly, boundary systems establish focus for all organizational personnel by providing guidelines as to where it is permissible to look for opportunities and where it is not. Non-compliance could be a crime (felony). Personnel involved with hazardous waste need to understand these boundaries within which they must comply.

The diagnostic systems monitors the implementation of past intended strategies, they focus on 'getting the job done'. These systems inform the personnel that they are not performing or meeting the established standards. They show people that corrective action is required but they do not give the guidance.

Finally, interactive systems should stimulate and guide the emergence of strategies for the future. Interactive systems activate organizational

learning. This learning process is necessary as new ideas or better ways of accomplishing a task are presented. The activity can only be successful if the responsibility centers are all collectively successful in obtaining the desired objectives.

3. ENVIRONMENTAL HAZARDOUS WASTE MANAGEMENT CONTROL SYSTEM

a. Specific Action Controls

Procedures will have to be developed giving authority to the head of the Environmental Quality Department, to implement these systems. The instruction will delineate the proper use of the custody tag, the qualification and training programs, and the incentive and award system.

(1) *Custody Tag.* The custody tag will provide an auditable paper trail of any hazardous waste which is generated by an organization. The fact that it provides an auditable trail is important for enforcement reasons as well as accuracy for data collection.

Specifically the tag will include two flimsy copies and a hard tag.

The tag will have the spaces to annotate the following:

- Responsibility Center Name
- Log Number
- Date
- Type of waste
- Volume of waste

- Description of activity that generated the waste
- Number of units accomplished with this volume of waste
- Signature block for the technician
- Signature block for the inspector

The hard tag will be attached to the storage container (drum) as a record and control document of the total volume in a particular container. This provides an audit control in that the total volume of all tags should be equal to the total of the drum capacity, when full.

One flimsy copy will be retained by the individual cost center as record of hazardous waste they have generated and stored. The other flimsy (the original), will be sent to the EQD. The EQD can calculate generation rates of each type of waste for each cost center on a per unit of activity basis.

b. Activity Based Measurement

Two uses of the activity based measurement system includes; (a) an aid for reporting hazardous waste generation information, and (b) to allow an allocation base for costs associated with hazardous waste procurement, use, and storage and disposal.

(1) Reporting Base. The EQD will generate a monthly report to the activity commanding officer showing the break down of waste generation rates and volumes generated of each waste by individual responsibility center. The report will compare current data with last months for each center.

This report will also be distributed to all the responsibility centers via their department heads. Such that all levels of the organization are informed as to their performance. They can compare themselves to last month and to the other centers to measure their accomplishments or problem areas.

The activity EQD will also aggregate the information by waste type for the entire base and forward the results to the claimant EQD. They will aggregate all the data by activity and redistribute it back to all the activity commanding officers. This will provide a means for each activity to compare themselves to the other activities within the Type Command.

The claimant EQD will also be required to aggregate the data from its activities and submit a Hazardous Waste Management Report (HWMR) to the Assistant Secretary of the Navy (Installations and Environment) on a quarterly basis.

(2) *Allocation Base.* The activity based data (per unit) can also be used for financial performance analysis. The cost of storing or disposing of a container of hazardous waste is known. The EQD can allocate this cost back to the appropriate cost center from the information provided from the hard tag record. Furthermore, the procurement cost of the hazardous material is also known. Therefore, it is possible to calculate the total cost to each cost center of procuring, using, and storing or disposing of hazardous waste. This then provides a basis by which alternative materials could be used. Even though the procurement cost of a non-hazardous or less hazardous substance could be more than a hazardous one, the total cost could be less.

This system could result in dishonesty, shirking, and illegal disposal. Illegal disposal is heightened by the fact that each individual responsibility center and some of the activities are considered a small quantity generator (SQG)⁶. SQG's may be more inclined to illegally dispose of the material than to abide by the regulations since it may be too difficult to comply as compared to illegal disposal. Thus there is an increased need for personnel controls.

c. Personnel Controls

Personnel controls will be in the form of training and a qualification program. Each cost center that generates hazardous waste will be required to provide at least one person to be qualified as a 'Hazardous Waste Inspector (HWI)'. This designation will be a collateral duty to their normal duties and responsibilities. They should be volunteers who are at least a Second Class Petty Officer and someone with high integrity and trust. In this way knowledgeable people (via qualification) provide oversight at each responsibility center to ensure that: (1) excessive waste is not being generated needlessly, (2) the custody tags are properly filled out, (3) the waste is properly segregated, and (4) increase awareness of the importance of problems concerning hazardous and toxic wastes at the user level.

(1) *Qualifications.* The qualification process will involve an understanding of the following:

- Federal, state, local, and Navy rules and regulations

⁶A SQG is a organization which generates less than 1 ton of hazardous material per month.

- Storage and disposal rules and procedures
- Emergency actions/ Safety
- Use of the custody tag
- Legal implications

The candidate will be required to pass a written examination and further required to pass an annual proficiency examination. The process will also require oral interviews with the activity Environmental Engineers, EQD head, Public Affairs Officer (PAO), and the activity commanding officer. The commanding officer will be responsible for final qualification.

(2) *Training.* Training will be required on a monthly basis for all qualified inspectors and personnel in qualifications. The training will involve a review of the past months hazardous waste generation data. The commanding officer and the PAO will also be invited to attend the training. This will serve a couple of functions in that it will reinforce the top down concern for this issue and allow the commanding officer to address specific problems to specific centers or simply just observe.

The training at this level will involve discussing lessons learned, innovative or new ideas, and possible alternatives from each responsibility center as to successes or failures. This interactive feedback control method will encourage goal congruence with the attention of upper management, the commanding officer. Emphasis will always focus on integrity and importance of properly filling out the custody tag.

This process of 'challenge and debate' [Ref. 36] further strengthens these interactive controls.

The personnel will have an understanding of the legal implications of any violation. The training should help to develop professionalism and 'culture' among the inspectors. These inspectors are not policemen, they are expected to assist their centers when needed. They are the local 'experts' at the user level.

Training on environmental issues will be part of each centers monthly training requirements to be given by a qualified inspector. This should help alleviate any misunderstandings that may develop between the inspector and members of his center as to his status. Emphasis on the importance and responsibility of completing the custody tag as a reliable measure for accurate data collection and its other benefits. It will reduce further unnecessary exposure to the materials and the ability to look for alternative less hazardous materials. Some of the professionalism and culture that the training should develop is also the idea that all this is for the 'good of the environment'. He should explain the importance of not illegally disposing of material or shirking of their duties concerning hazardous waste, including the punishments which they could receive.

Quarterly training will be conducted by the head of the EQD to all other department heads on the activity. This training will concentrate on the past months reports and any major problems which should have the attention of 'top management'. Problems of non-compliance and violations will also be discussed. Current and upcoming environmental projects and any new laws or regulations will also be discussed. This is

an area where Total Quality Leadership (TQL) should be emphasized. If the end users don't feel that 'management' thinks this is serious or important, they won't either.

d. Results Controls

The use of the activity based measuring system lends itself nicely to performance measurement. A command award will be given to the center that has the lowest generation rate for the quarter, and an annual award for the lowest overall generation rate. Generation rate is the key, not total volume. Recall that total volume could decrease due to a decrease in activity not due to minimization or other alternatives.

A similar award system would be developed by the claimant for the best performing activity. This of course also drives the activity level reductions, as a commanding officer's performance is reviewed by the claimant. The Chief of Naval Operations (CNO) already has an annual Environmental Quality Award given to the best activity. This further emphasizes the top down involvement in environmental issues.

Furthermore, any individual or collection of people that conceive of an idea that saves the government money is always entitled to a portion of those savings through a government program. Also, any personnel that have innovative ideas can easily be recognized through awards and medals, which in the long run also improve their chance of being promoted to the next rank.

Using results controls based on the activity based measure can cause two additional problems; data manipulation or gamesmanship. Data manipulation would only be possible as long as there was collusion between the maintenance person and the qualified inspector (which is the purpose of qualifications, to preclude this). Reporting

wrong data is verifiable. The total of all wastes on the tags must equal the total of the container when full. Also, the actual performance of a maintenance activity could be verified by the responsibility centers maintenance records and work logs. Furthermore, if the center wanted to show improved performance, than all inspectors in the center would have to collude with all the personnel in order to manipulate the data on the custody tags. Economics implies that the price of getting the whole center to collude is too high and is thus not considered feasible to do so. If one person or inspector did not collude it would be readily noticed by the EQD in the difference in the generation rates of the same waste for the same maintenance. This would certainly raise some questions.

Gamesmanship is essentially not applicable beyond the concept of data manipulation. The person in charge of the center could not change the data as three copies of the custody tag exist (just for this reason).

Thus, these practices are not practical or feasible in this situation. There is nothing to be gained from manipulating the data. There are no punishments for not reducing generation rates. Maybe, there is no other method or substitute for what you are doing and you are doing it efficiently. Thus, a center should not be penalized for uncontrollable results.

4. EVALUATION

a. Feasibility

I believe the system as described can be implemented and be very effective at achieving its objectives and goals. The submarine force Quality Assurance

Program with its controls is extremely effective and successful. A question of the feasibility which could be raised, is that of the personnel involved. I don't consider that this is a weakness, as that issue can be addressed in the personnel control system.

Personnel on submarines are there because they want to be (all volunteer) and they are highly motivated. However, some personnel at shore activities may not want to be there or have the same motivation as submariners. This problem can be overcome by the selection of personnel for qualifying as an inspector and through the extensive qualification and training programs they are required to attend. Perceived attitude is critical in a qualification program as the qualifiers are certifying (by their signature) that the person has demonstrated the requisite knowledge, responsibility, trust, and accountability for their actions.

Another feasibility issue that could be raised is in the design of the organizational structure. This system is predicated on the use of all military personnel to avoid similar problems of motivation as discussed above. Civilian personnel would want to know what's in it for them? Why should they have to do custody tags, attend training and obtain qualification as an inspector?

Civilian personnel can't be influenced into a "culture" by training. However, in the design of the control system, the civilian environmental engineers retain their same responsibilities and functions. The civilian personnel are not affected at all. They, however, may benefit by the generation of the additional data from the program. In fact, the civilian environmental engineers are very important to this control system in that they are the "experts" and provide consistency to the department. The development

of the Engineering Quality Department is a reorganization of the current structure with a few additional responsibilities (see section above on reorganization). The EQD is more of an internal review/audit department within the command structure. Thus, the training, qualifications, and custody tag are part of the additional responsibilities. It would be too much for the Public Works Officer to take on in conjunction with all his other collateral duties. Certainly, the civilian environmental engineers will be required to sign off on the qualifications of the inspectors. Thus, I don't believe that this will impede the feasibility of implementing this control system.

b. Tightness Of Controls

Merchant states that the:

benefits of a control system is derived from the increase in the likelihood that organizational objectives will be achieved...tight control is good because it provides a high degree of certainty that people will act as the organization wishes. [Ref. 33:p. 58]

The crux of the whole control system is the accuracy of the data provided on the custody tag. It is the basis of the activity based measurement/performance measure, which provides the necessary data for (1) calculating generation rates, (2) rewards, and (3) ways to track usage and procurement costs versus activity, to indicate areas where substitutions could be made. The person performing the activity is responsible for filling out the tag. Oversight is always provided by the inspector. This provides incentive for the maintenance person to do it correctly. The qualified inspector has the specific knowledge of the activity being performed and the proper procedure for filling out the tag. This in itself should provide the tightness of control that is required.

Merchant suggests a universal role of control:

the amount of control capable of being generated in any situation is positively related to the extent and certainty of the knowledge linking the object of control and desired outcomes. [Ref. 33:p. 58]

In this system the object of control which is being discussed is the custody tag and the desired outcome is properly filling it out. To achieve tight control, knowledge must be present and used.

The maintenance person and the qualified inspector both have incentives to ensure it is properly completed since they are required to sign their names. This implies a realm of accountability and traceability. An auditable trail exists, even if they both neglect to sign their names.

According to Merchant [Ref. 33] the control system (custody tag) is a tight control for action accountability because; first, the actions are well defined. Specifically, the required action of properly filling out the custody tag is specific and understandable. Acceptance of the need for properly filling out the tag can be gained through the training and qualification program. The control is complete in that "all of the important actions are well defined". The SOPs delineate the proper way to fill out the tag, the procedure is relatively simple and no information needs to be researched and is easily determined.

Secondly, there is effective action tracking. The personnel involved can be certain that their actions will be noticed and noticed quickly. Furthermore, through the training and qualification process they will understand that their actions are important for reducing substances which are dumped to the environment (good for the environment),

their contact with the substance could be reduced by the use of substitutions. They will understand that these are all important and that it is not just some bureaucratic menial task. This is reinforced by providing oversight via the qualified inspector and the monthly reports.

Finally, there does exist a system of rewards and punishments. The reward system has already been discussed, but excellent performance on the part of an individual will be noticed and can be incorporated into their performance evaluations (similar to an officers Fitness Reports) which are required for promotion. The punishments are like that of any other military system. Examples for improperly filling out or failing to fill out a custody tag could include: (1) disqualification of the qualified inspector until remedial training is completed, (2) disciplinary action to the maintenance personnel would be more severe (since it is their responsibility) which could range from extra duty to extra hours to the loss of leave or liberty. Disciplinary action of these types are not forgotten and could influence the persons performance evaluation.

Therefore, the accuracy of the custody tag relies on the integrity and honesty of the individuals involved in the maintenance action and inspector oversight. Merchant [Ref. 33] states that determining the tightness of personnel controls is difficult. However, through the qualification system (requiring specific knowledge and final qualification by the activity commanding officer) and the continuing training program provided to the qualified inspectors and other personnel, should develop a "culture". Both of these aspects, knowledge and culture, Merchant [Ref. 33] says can provide stability and be powerful controls.

Accordingly, I conclude that the control system does provide the tightness required to ensure the accuracy and completeness of the custody tags; and thus a useful activity based accounting system for hazardous wastes.

c. Conclusion

In summary, the framework for the Environmental Hazardous and Solid Waste Management Control System as described above is feasible and will achieve the goals and objectives of the system. It will also provide more assurance to commanding officers and Navy top management that the Navy is headed in the right direction in achieving the 50 percent (by total weight) reduction goal with more reliable information. It should encourage an environmentally conscious culture within the Navy. the system provides the tightness of control required to ensure valid and accurate data, which will help Navy managers consider source substitutions or alternatives.

Analysis of the data provided may flag a problem common to a group of activities (i.e. all air stations) which can't be solved by substitutions of procedural changes. This could be an indication of an area for possible technological research into new methods or future design changes. At the very least, more detailed cost data can be acquired which will help Navy managers obtain a better understanding of how the money is spent concerning environmental issues.

C. SOVEREIGN IMMUNITY

Federal agencies are required to comply with all environmental laws and regulations, but they are not subject to fines or penalties associated with any violations

they may incur. This sovereign immunity from paying fines is challenged by new legislation. The public and some members of Congress would like to see the federal agencies be responsible for paying fines or penalties. They do not understand why federal agencies, particularly DoD, should be treated differently from private sector businesses and industries. Members of Congress believe that by eliminating sovereign immunity, a "level playing field" will be created for federal agencies and commercial industry.

There is a superficial attraction to the level playing field idea. It fails to take into account that Federal facilities are fundamentally different from private sector ones in that they derive their capital decision making authority solely from appropriations decisions made by the Congress and they do not have the option of discontinuing the activity that gives rise to the potential liability under RCRA. [Ref. 16:p. 78]

DoD is different than the private sector. It does not have the luxury of moving its operations, shutting down, or going into other businesses to avoid new laws and regulations governing environmental actions.

The proponents of this new legislation need to take into account the economic and budgetary issues related to this change in policy. This change in policy will greatly impact the financial managers and installation commanders.

I. BACKGROUND

H.R. 2194 was introduced by Congressman Eckart early in the first session of Congress in 1991, and would expand the current waiver of sovereign immunity in RCRA. It would allow the states and their political subdivisions to assess penalties against federal facilities and allow the Environmental Protection Agency to issue unilateral administrative orders to bring Federal facilities into compliance. A similar bill, S 596, has been introduced in the Senate, by Senator Mitchell, the Senate Majority

Leader. This is the third time that the House has introduced this bill and subsequently passed it. In the past two years the Senate has failed to take action on the House bill. This year may be different, since the Senate is introducing its similar version concurrently. This is a strong indicator of a changing attitude towards waiving the sovereign immunity for federal facilities. [Ref. 28]

HR 2194 presumes that expanded enforcement authority is necessary because federal facilities, according to their observations, are among the worst RCRA violators and extraordinary efforts are necessary to keep DOD under control. Despite the bills eliminating sovereign immunity to bring federal facilities in alignment with the private sector and make them more responsible for their actions; Rep. Richard Ray, Chairman of the Environmental Restoration Panel of the Committee on Armed Services stated:

I want to plainly admit that DOD has not always been lily white with its environmental programs. But I would like to emphasize, for that matter, neither has the private sector. In fact, the record clearly points out that during the last 6 months only Federal installations made progress in RCRA compliance, while there was an increase in private sector non-compliance. [Ref. 16:p. 33]

There is a strong incentive for DoD and its installation commanders to come back into compliance as quickly as possible, from an environmental as well as public credibility perspective. As a partner with the local community, DoD would rather work out an arrangement with a state to come into compliance rather than suffer the impact of negative publicity resulting from judicial findings and orders.

Using RCRA Significant Non-Compliers (SNCS) figures for fiscal year 1988 for DoD, of the 31 DOD SNCS (6% of all SNCS in the U.S.), five were in compliance by the end of the year, 11 were under consent orders, and six were under Federal Facility

Compliance Agreements. The remaining nine SNCS had not been resolved. Rep. Ray states:

It is clear that the nation is not facing a DOD RCRA compliance problem that is out of control. It would also appear that the focus of attention should be on the significant rise in other RCRA SNCS that are supposedly subject to the full range of enforcement actions. Obviously, we are not going to effectively address national RCRA compliance problems by focusing an inordinate amount of attention on 6 percent of the problem. [Ref. 16:p. 44]

2. BUDGETARY AND ECONOMIC ISSUES

The waiver of sovereign immunity and subjection of federal facilities to state fines obviously would affect the Department's environmental compliance activities in a significant manner. Although the use of fines and penalties as enforcement tools has proven a strong incentive when applied against profit-motivated businesses, it is difficult to see how it could have more than a limited value for federal government operations. The payment of large fines and penalties by federal agencies is not likely to increase environmental compliance. In fact, it is probable that whatever funds are diverted to pay state fines would come from funds that had been congressionally authorized and appropriated to be used for environmental activities at federal sites. Accordingly, the payment of these fines might have the undesirable effect of reducing funding for the mitigation activities that should take place. [Ref. 16]

Penalties assessed against a federal agency deplete the funding allowances for the very environmental programs the states want implemented. If the money does not come from an environmental area it will be funded at the expense of other defense activities that Congress has funded. This has the unfortunate side-effect of siphoning

funds that would otherwise be used to perform DoD's mission to protect the country or depleting the funding DoD uses to correct environmental problems. Another issue with penalties is the potential to upset the worst-first priority system that DoD is trying to establish for its waste cleanup program. State authority to impose fines and penalties could result in determination of priorities for site cleanups. This could force DoD to reorder its actions by assessing penalties at sites that states want cleaned up, but that do not rank high enough under the DoD environmental prioritization system.[Ref. 16]

The process for spending limited federal funds on environmental restoration should not be based solely on the comparative aggressiveness of states or the comparative complexity or simplicity of state administrative procedures. Prioritization should be based on a rational procedure under a national perspective. The waiver of sovereign immunity could lead to a more fragmented, ad hoc DoD allocation of funding for environmental restoration.

Furthermore, there is another way to view this issue. The cost of pollution abatement (control) increases as the level of pollution emitted (released) is decreased. The public desires a low level of environmental pollution, thus requiring a high cost to the government, in this case a federal agency as shown in Figure 10.

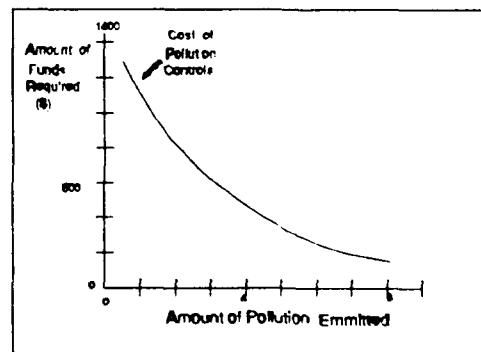


Figure 10

With a fixed level of funding for environmental restoration (pollution control), as determined by appropriations from Congress, the amount of environmental restoration (pollution) is relatively determined (Figure 11). For example, P^* is the level of funding provided by Congress in DERA for environmental restoration/pollution control. Thus, OQ^* is the level of pollution emitted to the environment.

As requirements for pollution control are increased and fines and penalties are assessed against an offending agency, the amount of money available for environmental restoration/ pollution control in that agency is reduced. Moreover, since the amount of money authorized by Congress is relatively fixed, the level of environmental pollution control decreases as the level of pollution

allowable is reduced. Where this occurs, OQ^* is the level of pollution emitted, an effect exactly opposite of what is desired by the public in general (see Figure 12). Unless funding is focused to areas where the benefit/cost ratio is highest, as regulatory performance levels are

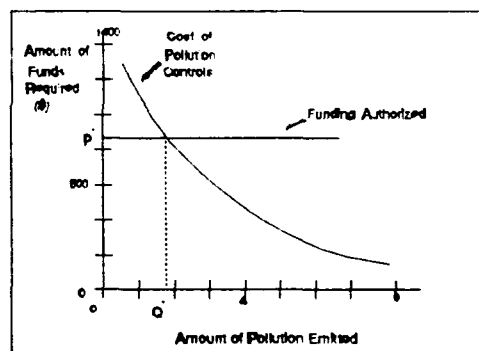


Figure 11

raised, more pollution is emitted as there are fewer dollars to fund abatement programs.

Another concern with the approach taken in HR2194 is the expansion of existing EPA authority to issue unilateral administrative orders. DoD and EPA have developed mutually agreeable procedures to resolve disputes and compliance problems when they arise. These procedures specify that EPA and the DoD installation promptly

develop a Federal Facility Compliance Agreement (FFCA) with a schedule for returning to compliance. If EPA and the installation are unable to come to an agreement, resolution frequently involves a legal or judgement call between the parties over whether and how a

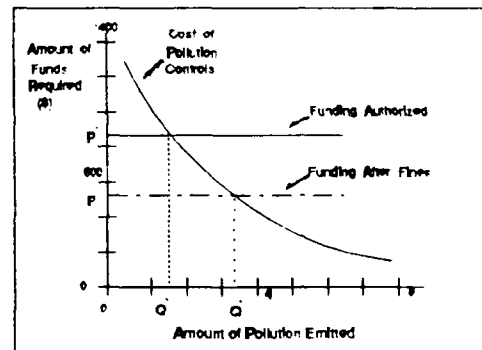


Figure 12

particular provision of RCRA applies. When such an impasse occurs, it must be promptly addressed by the parties involved for resolution, including establishment of a DoD tracking mechanism to ensure compliance. Also, under FFCA procedures, the agreement provides that the EPA Administrator may take the final action to resolve an issue. In all agreements, DoD recognizes the right of states and citizens to sue the installation should the installation fail to meet the compliance schedule. Although most violations do not require capital investment to correct, some do, e.g., retro-fitting waste management facilities or installing more ground water monitoring wells--projects that DoD cannot fund or contract for quickly. The Federal Facility Agreement process takes this reality into consideration and provides a way for both parties to negotiate reasonable time frames to return the installation to compliance. [Ref. 16] However, giving EPA even more power and control in this area than it now has may not be in the interest of DoD.

3. POLICY ISSUES

This may allow the EPA and the states or the political subdivisions to use enforcement mechanisms to extract more funding from DoD and the Navy for RCRA compliance than Congress has appropriated and designated for this purpose.

The loss of sovereign immunity could conceivably cause DoD installations to rely heavily on their O&M accounts, which are already subject to budget shortfalls, to pay fines levied by EPA, the states or their political subdivisions, to fund RCRA problems and concerns. This position challenges the integrity of the authorization and appropriations process established by Congress, which is proposing this legislation.

The Anti-Deficiency Act clearly does not allow the obligation of funds in excess of those appropriated for a particular purpose. State-imposed fines or penalties that would force funding more than that dedicated to environmental compliance by Congress have the potential to violate the Act. As noted by Rep. Richard Ray:

In other words, the waiver of sovereign immunity could eliminate the requirement that such funds should be reprogrammed by the Armed Services and Appropriations Committees and could allow states or their political subdivisions to, in effect, raid the Treasury by levying fees and fines. [Ref. 16:p. 34]

Part of the problem lies with the budgeting cycle and the way federal agencies obtain and use their funds. Congress controls the budget. The fact is that any fines would come out of the O&M accounts. Taking funds out of that account for nonappropriated purposes could significantly impact the command levels.

The mission of DoD is somewhat contradictory at times because it receives more than one legislative assignment from the Congress. The preferences of Congress can be conflicting when it comes to expending funds as DoD has limited resources. Should states be allowed to levy penalties, for some kinds of violations that involve sizable capital to correct, DoD could accrue large penalties while the budget request to

"fix" the problem makes its way through the budget process. It takes two or three years from the time a budget request is submitted until it is funded.

Furthermore, there may be few limitations on the total amount of fines and penalties a state could seek to collect as state law will set the limits. States can assess fines for each day the facility is out of compliance (up to \$25,000 per day in some states), which may accrue to large amounts if the federal agency challenges the legitimacy of a state enforcement action. For example, DoD has been assessed penalties under the Clean Air Act and some are in the six and seven figure range. [Ref. 16]

Furthermore, in the private sector the precedent exists for companies to receive multi-million dollar RCRA penalties. Some major fines against single firms for RCRA violations include (the names of the firms were not disclosed) [Ref. 16]:

AMOUNT	REASON
\$1.7M	-Releases into bayou -Not following waste plan -Improper manifesting -Not sampling -Not reporting on storage contents -Infrequent self inspections
\$8.9M	-Leaky drums/exposed to elements -Unlabeled drums -Inadequate record keeping -Lack of permits -No alarms
\$140K	-Violations of liquids in landfill restriction
\$2.4M	-Not provided
\$184M	-Illegal dumping

\$2.8M	-Failure to notify of intent to construct -Failure to describe waste-water sources -Failure to notify acceptance of new waste -Discharges
\$2.5M	-RCRA violation

The magnitude of these fines show that DoD, let alone DoN, may be stressed to find funding to pay penalties and maintain their efforts in environmental compliance.

In reviewing the above penalties, it is important to keep in mind that:

- These are fines for just one year (FY88)
- These are not all the same company or firm
- The total amount authorized for environmental compliance and restoration (DERA) in FY88 was \$402.8 million, divided among the Air Force, Army, Navy, and the Defense Logistics Agency (DLA)
- There are over 900 installations within DoD, each one capable of a potential RCRA violation, similar to each incident listed above.

In testimony in April 1990, civilian contractors identified some of the major problems in handling, storing, transporting, and disposing of DoD hazardous waste [Ref.

23]. These include:

- Loss of control over liability and waste tracking (inadequate records)
- Misidentification of waste
- Inadequate waste descriptions
- Inadequate sampling to determine waste type

- Contract process and unbalanced bidding due to some of the above listed items (more than 50 percent of the line item estimates were off in quantity by 100 percent or more).

The point is that DoD has some the same type of problems that have resulted in major fines against civilian companies and firms as identified above. And, the magnitude of fines and penalties for an individual installation could drain its O&MN funds and have significant impact on any DERA funds for which it may be eligible. Thus, the waiver of sovereign immunity may not have the desired effect on federal agencies. This is not to say that the above problems should go untreated. DoD is currently attempting to rectify many of these problems.

Finally, the DoD position is that it does not have the ability to enter into agreements that obligate the United States Government prior to authorization and appropriation from Congress. Legal basis for this provides that an officer or employee of the federal government may not involve the government "in a contract or obligation for the payment of money before an appropriation is made unless authorized by law." [Ref. 23] Thus, the waiver of sovereign immunity could have significant impact on the DoD and particularly on the ability of installations to plan for expenditures on environmental compliance.⁷

⁷Environmental compliance refers to compliance in general, as sovereign immunity has already been waived for compliance with the Clean Air Act.

D. ACTIVITY RESPONSIBILITIES

Another important multi-jurisdictional, multi-governmental issue is the degree of responsibility and accountability of the individual installation. As stated above, there are words in the proposed waiver of sovereign immunity legislation to protect the personal liability of the installation commanding officers. However, this does not preclude professional liability or implications. As commented on by Col. Agnor, the Commander of the Defense Reutilization and Marketing Service of the Defense Logistics Agency:

Base commanders have also expressed concern about the quality of DLA operations and the desire to exert more direct control over them. In recent years I have found that base commanders have come to realize that about the worst problem that could befall them is an environmental controversy. They have also become aware that one of the most serious legal problems they could have would be noncompliance with the environmental permits they have signed. Under the circumstances, they want to be assured that the environmental technicians they depend on know their jobs and what is riding on their performance. It is not good enough to have hazardous waste picked up on time if there is any doubt about how it will be handled, transported, or disposed of. I am convinced some base commanders would be willing to pay more for higher confidence about quality and want to exercise direct control over hazardous waste disposal operations.[Ref. 23:p. 79]

In the realm of hazardous waste disposal new territory is being charted. In the past, the individual activity was protected from disposal problems. Disposal was mainly the problem of DLA, the TYCOM, or the claimant, for handling the disposal contracts and services. RCRA/CERCLA permits were not the concern of the installation. Decentralization has pushed the responsibility down to the activity level.

There are a number of reasons for this decentralization. Since in FY 1990, NAVCOMPT required the activities to be fiscally responsible, the commanding officer may not want to rely on a bureaucratic and centralized agency to do what is in his best

interest. Some members of Congress would like to see that environmental performance be evaluated in commanding officers' FITREPS, promotion, and career. The prudent manager (C.O.), if he is going to make a mistake, would rather be the one who made that decision. Fortunately, H.R. 2194 and S 596⁸, have provisions to protect individual federal employees from personal liability for cleanup. [Ref. 29] Irresponsibility on behalf of the commander could affect his FITREP or promotion abilities.

Despite these risks and the classification problem discussed above, activities are encouraged to use the services provided by DRMS. In an August 9, 1989, memorandum from the ASD(P&L):

Inherent in the proper disposal of hazardous waste in accordance with the increasingly stringent governing body of law and regulation, are considerations of strict accountability and long-term liability, standardized procedures for handling, compliance verification and cost efficiency . . . I support the use of DRMS. A decision not to use the DRMS for hazardous waste disposal may be made in accordance with DODD 4001.1 . . . but should be concurred in by the component chain of command to ensure that installation contracts and disposal criteria are at least as stringent as criteria used by DRMS.[Ref. 30]

With recent changes in policy (activities responsible for disposal) and legislation (probable waiver of sovereign immunity) the installation commanding officers are becoming more leery in order to protect their budgets, reputations, and careers. With growing public demand for a clean environment, the public and members of Congress want to assign personal responsibility for environmental actions, i.e. one person to blame

⁸The two pieces of legislation which propose to strip sovereign immunity from federal facilities.

for irresponsibility, not a bureaucratic organization like the DoD or DoN. Consider a statement made by Congressman Synar, addressed to the DASD(E) in a hearing:

. . . what kind of incentives and disincentives do you have and do you plan to use to ensure that this [waste minimization and pollution prevention] happens? Will waste minimization factors be taken into account, for example in fitness reports and making promotions? In short, how do you plan to bring about what we have found over 6 years is the need for cultural change which you acknowledge is necessary to shift from the 'end of the pipe' cleanup mentality to pollution prevention? What kind of incentives are you going to have there for base commanders and others? [Ref. 26:p. 235]

This issue is not likely to disappear. Mr. William Parker, the DASD(E), commented that he would like to see environmental compliance of commanding officers be a criterion for promotions. Installation commanding officers must realize that being environmentally conscience is just as important as staying within budget, getting the required number of flying or steaming hours in, or making changes that will improve quality of life.

How is a base commander to know that this is now an equal priority to the other things that they are given responsibility for? I want to know if there are incentives or disincentives in place which they know they will be personally held accountable for if they are not performed.[Ref. 26:p. 237]

Col. Agnor answered Mr. Synar's questions with regard to the process in which DRMS receives hazardous property from installation commanders and the legalities and responsibilities associated with the transfer.

For every facet of the environmental business that we have put into our new policies and procedures we have built a series of check lists, a series of certifications that require people to put their name on their decision and their actions so that we can indeed go back and hold them personally accountable for their decisions.[Ref. 26:p. 237]

Therefore, installation commanding officers have become more inquisitive of the process and there is indeed a culture change already occurring. The moral here is that change is coming and installations will have more responsibility for the disposal of hazardous wastes. With declining funds, this is the challenges for financial managers and commanding officers.

Furthermore, DLA and specifically DRMS have been in the limelight for some questionable actions. The DRMS has been before Congress to testify about how they conduct business, specifically selling hazardous wastes to buyers who do not have RCRA permits to receive the wastes, or selling to buyers who subsequently dispose of the material illegally. The problem is that DoD can be traced to the material, but DoD has sold it and claims no liability or responsibility for it.

For example, in April of 1989, local officials discovered a warehouse in Collinsville, CA, containing thousands of gallons of abandoned hazardous chemicals, many that were leaking. An investigation determined that the chemicals were purchased at government surplus auction sales. In August of 1988, authorities from the Port of Los Angeles discovered a similar hazardous chemical site near San Pedro, CA. Again it was discovered that chemicals were purchased at a government surplus auction.[Ref. 26] Finally, in an August 1991 edition of the NBC show "Prime Time Live", aired more instances from around the country of illegal dumping of hazardous wastes obtained through government surplus auctions.

As a result, DRMS has reorganized and changed its procedures for handling hazardous material and hazardous wastes. All regional DRMOs have government surplus

auctions on a periodic basis. They were allowed to auction off all excess property in their custody, including hazardous property. Now, hazardous property can only be auctioned at national sales. This change will not completely correct the problem as DRMS has stated that they could not possibly ensure that the person who purchased the material would handle it in accordance with laws and regulations. It would be too costly for DRMS to determine whether every person has the proper permits or responsibility to properly dispose of or handle this material. These problems are the subject of a recent GAO Report on hazardous waste management among the federal agencies. [Ref. 27] Perhaps these troubles and lack of confidence in DRMS result in the decentralization of authority and responsibility of hazardous waste disposal to the activity level.

E. CIVILIAN SERVICE CONTRACTS

Civilian contractors have complained about doing business with DRMS because of unethical or illegal practices. The nation's two largest hazardous waste disposal companies (Chemical Waste Management and Rollins Chempak, Incorporated) initially refused to bid on disposal contracts due to some illegal practices, specifically misidentification of wastes. Major DoD problems reported by contractors include misidentified wastes and mixing of wastes. As stated by Patrick McCann, Technical Services Director, Southern Region of Chemical Waste Management:

As the Nations's largest waste handler, we would like to service DOD bases for their on-going hazardous waste needs, but we cannot participate through the DRMS, given the current contract approach. We are encouraged that there are some changes maybe in the works, but at least for the near term, we are going to be out of bidding until we can see some very fundamental changes.[Ref. 23:p. 51]

Most large commercial waste generators in the private sector and the public sector have developed systems to control liability through strict audit programs that limit the treatment, storage and disposal facilities they use to facilities best able to manage their wastes.

A most important issue is getting past the problem of misidentified waste. In the waste industry, when the contractor is asked to handle a waste, he expects the kind of waste he contracts to handle. If in fact the DRMS is not able to identify its waste through its current procedures, then there is a need for new procedures so that the wastes can be identified. Identification could either be done with properly trained government personnel, or by having installation commanders bring in contractors to perform the service.[Ref. 23] As stated by Mr. Yates, Director, Services Group, Rollins Chempak, Incorporated:

Waste identification is one of the things that we do in our business. If a customer has a wide range of waste streams and are not sure what they have, we provide the services to find out what they have. We help develop the waste data sheets so that when it is time to ship the material to the disposal facility, the disposal facility knows exactly what they are going to receive and there is no surprises at that end which is where you really do not want to have any problems. [Ref. 23:p. 64]

Under waste management decentralization, the issue is whether base commanders should more or less have this responsibility on their own, or at least have independent authority to contract. The major problem is waste misidentification and personal liability. However, when contractors deal with their normal customers, they do not have misidentification problems very long with that customer or else the contractor will refuse to handle their waste in the future. It is very important for installations to get the

hazardous waste disposed of and off site within the permit RCRA requirements, especially with the elimination of sovereign immunity protection.

DOD IG found that DOD installations do not exercise enough care in identifying the HW they are generating. According to the DODIG, this involved the failure to weigh drums or analyze the contents. If the base commander was contracting for the disposal of his own HW from a reputable firm, he would find that he could not dispose of it if he did not identify it properly. As the permit holder, he might also find that the regulatory community would take a dim view of lax management of HW disposal.[Ref. 23:p. 89]

The contractors have contractual clauses that allow them the right to return or reject the waste when they receive a drum that turns out to be something other than what they were told. They do a quality control check in accordance with their permit requirements. They pull samples and do a fingerprint analysis. If during that analysis they find that a waste is different than what it was characterized to be, the contractor can do one of two things. [Ref. 23]

First, we call the customer and let him know that we have waste that is other than what they told us they were shipping to us. We will then try to find a way to bring it into our facility so that we do not have to turn the truck around. We have, if we cannot accept that waste, sent the truck back to the customer. Once the customer has paid for a truck travelling thousands of miles and being turned around and sent back to them because they sent the wrong thing, they quickly learn that they best do a better job; when they ship something to the disposal facility.[Ref. 23:p. 64]

The other major problem that the contractors have with DRMS is that many of wastes are mixed together against permit requirements. This is complicated by the fact that wastes may be mixed at the installations, or DRMS may be mixing the wastes.

If, at a plant, someone is mixing five or six different kinds of solvents together in a drum, when it is really supposed to be two, typically what happens is they get the bill from the disposal contractor and it turns out to be a lot more expensive. [Ref. 23:p. 65]

These added costs are not captured by the installation if they are the responsible party for mixing wastes. The activity based accounting system analyzed earlier is designed to prevent this type of error as well as blatant disregard of regulations. The system attempts to ensure proper classification and waste segregation, including checks and balances for accuracy. Mixing of wastes beyond what is allowed by the permit increases the cost of disposal or treatment.

Right now, the way the budgeting process worked, I am not sure that feedback mechanism got all the way back to the base. With this change in budgeting, that will help some, but I think anything that can be done to improve the communication process, the accountability between the base operations, whoever is painting those jeeps or stripping paint off of those tanks, and the people disposing of the waste, because they are the ones that know what went into the drums, would be very helpful. Somehow you've got to include them in the process.[Ref. 23:p. 65]

This provides more impetus for the installation commanders to assume more direct control. There is congressional support for such decentralization of authority. Mr. Ray, Chairman of the Environmental restoration Panel of the Committee of the Armed Services stated:

If a base commander is responsible enough to be personally liable for the disposal of HW at his installation, he is responsible enough to see that it is done correctly and if he cannot do so maybe DOD needs a new base commander who can? [Ref. 23:p. 89]

As previously stated, there is increased concern from the installation commanding officers over the quality of DLA operations. Some of them are forgoing the services provided by DLA through DRMS for hazardous waste disposal due to increasing penalties for non-compliance as well as to avoid environmental controversy. As a result, a survey

conducted by DASD(E) on this issue as well on what services are desired from DLA by base commanders.

If a base commander is responsible enough to sign the environmental permit, then he should not have to go through a major headquarters review to secure approval to independently contract for hazardous waste disposal. However, current DOD policy requires that DOD components are responsible for and have maximum authority/flexibility to achieve and maintain long-term compliance with environmental laws and regulations [Ref. 30]. In view of prevailing or new strict accountability considerations and long-term DOD liability, DOD decision-makers believe that DRMS has the disposal expertise and specialized contracting procedures to best handle the hazardous waste disposal requirements of the military services. Accordingly, the current DOD policy encourages use of DRMS services and requires that installation commanders obtain concurrence of higher authority if DRMS is not used, based on criteria set forth in DODD 4001.1. [Ref. 23:p. 80]

F. SUMMARY

Environmental management and policy in DoD is extremely dynamic, especially since saving the environment and natural resources is of great public concern. From Greenpeace to the Audubon Society, the environmental lobby is diverse and strong and has the ear of Congress. DoD has attempted to be environmentally conscious. Many policies and instructions to protect the environment were in place before there were

regulations. But, with each new law or regulation, DoD decision-makers are now reacting to keep out of trouble.

The issues described above are only a few that DoD must confront. Decentralization of the fiscal and managerial responsibility should make for a more environmentally responsible department. However, there must be funding for compliance. If installations can remain under the sovereign immunity umbrella for a while longer the likelihood of satisfactory resolution is increased. Once commanding officers obtain more contracting authority for their disposal, they will have more incentive to ensure that wastes are properly classified and identified. Proper identification should be a result of the activity-based accounting model for hazardous wastes. This, in turn, will reduce conflicts between DoD and civilian contractors since the responsibility has been decentralized. The accurate accounting system will further indicate a successful waste minimization program to meet the DASD(E) and the CNO reduction goals.

Once installation commanders understand the activities that generate their wastes and which drive their costs, minimization programs can be targeted at specific problem areas. To achieve this, installations will require support and financing. Once this understanding is obtained through better accounting of hazardous waste generation volumes and disposal costs, the financial manager will be better able to program, budget, and execute the limited amount of financial resources that are available to the installation to maintain environmental compliance.

V. CONCLUSIONS

We don't inherit the earth from our ancestors, we borrow it from our children.

- Theodore Roosevelt

The Department of Defense and the Department of the Navy have long supported environmental compliance. However, given public and congressional pressure for a clean environment, the leadership of the DoD and the DoN are placing more emphasis on compliance. The secretaries of DoD and the military departments are providing top-down support for compliance measures and waste reductions efforts. As the Secretary of Defense stated in his Annual Report to Congress:

Environmental quality is an integral part of the DoD mission that provides essential benefits to the nation as a whole. The Department's goal is to integrate environmental protection into all its activities including acquisition, production and testing, training, and operations and maintenance. [Ref. 31:p. 10]

Statements made by the Secretary of the Navy confirm this view:

The Department of the Navy is committed to practical effective measures to protect the environment and to eliminate the pollution of our oceans. . . . The Navy and Marine Corps installations are conforming to CERCLA and are working on identifying sites and negotiating agreements for cleanups wherever wastes were improperly handled in the past. . . . The best policy is simply to generate as little hazardous waste as possible. [Ref. 32:p. 8]

And finally the Chief of Naval Operations has stated:

We initiated a TQM approach for hazardous material requiring comprehensive evaluation of material acquisition, storage, use, recycling, and disposal to minimize hazardous wastes. . . . I am committed to integrating the environmental ethic in our

organization from top to bottom and ensuring that we dedicate the resources necessary for environmental compliance. [Ref. 32:p. 31]

However, in recent years environmental law and regulation has become more complex and dynamic. This web of laws and regulations extend from the federal and state level to the local governments, and each law has associated costs. Increasing costs impose more burden on the private sector and government agencies. The result is that private sector industries are behaving like profit maximizers and in some cases prefer to pay fines rather than spend money to achieve compliance. The same result may occur in the public sector.

In this era of declining defense budgets, the DoD is further constrained and is thus forced to make trade-offs between weapons systems, readiness, and other funding priorities and environmental compliance. Currently, 96 percent of the money allocated to DERA is spent to fix old problems in the installation restoration program [Ref. 12]. Thus, four percent is used to devise new methods and processes to reduce the current generation of hazardous wastes. Hundreds of thousands of dollars are spent, both in the private sector and public sector, on studies and analysis as part of the problem identification process. In the interim, new problems are continually created with current generation of wastes.

Occasionally, there is a sympathetic voice in support of the DoD and its services. Congressman Ray, Chairman of the Environmental Restoration Panel of the Armed Services Committee commented:

Let me say that we believe that the Department of Defense in environmental situations have been painted with a pretty bad brush, maybe more so than they

deserve. For a great number of years, we have worked behind locked gates of classification security. We have had every reason, because of security projects, to keep the private sector out, the State agencies out, and EPA in some cases in past years. Because of that the DoD has been identified as polluting the well, doing what they wanted to do behind hose gates. We know, for a fact that a lot of money has been spent by the DoD to try to correct all these problems. That is the biggest agency that we have in this whole country. Therefore, the bureaucracy of controlling it is difficult. Before a problem begins to surface to the point of correcting that problem, it is sometimes out of hand. [Ref. 23:p. 69]

It is these complexities and issues that provided impetus for this research. New environmental planning and policy efforts are currently in progress at the OSD and Office of the Secretary of the Navy levels. Implementation of these efforts is occurring but not at a rate needed by the activity-level comptrollers and commanding officers to deal with the environmental problems that they have today. This research addressed the sources of environmental funding and the adequacy of these sources. It further identified the obstacles that the Navy and, in particular, the individual activities have to contend with to achieve compliance, and barriers out of their hands that affect the way in which they will have to plan and execute their operating budgets to meet the new requirements. Finally, this research addressed the progress of current environmental mitigation efforts within the Navy and DoD.

A. RESEARCH QUESTIONS

Funding sources for environmental compliance include the base operating accounts (O&MN), MILCON, NECA, and DERA. Each of these sources have associated uses and trade-offs. The more money appropriated to DERA, the less money for other defense

appropriations. Thus OSD and Congress determine the amount of money available each year for DERA. Furthermore, money appropriated to NECA depends on the Navy's need for DERA dollars relative to the needs of the other services. Environmental projects that meet the thresholds for funding under OPN or MILCON may be addressed through Navy resource sponsors. A major issue is that the day-to-day business and the routine, recurring items like disposal and permits fees are required to be paid out of base operating accounts. It is important that projects that are not funded by the O&MN account be properly documented via the PCR/OMB A-106 process. This process is a project and financial management tool for Congress and the resource sponsors and NAVFAC to determine the needs and priorities.

Due to increasing compliance costs and decreasing budgets, there are insufficient funds to meet all the Navy's and DoD's environmental compliance projects. Installations need to take action on their current generation of waste and to secure other sources of funding like from the QRP. It is these opposing trends, increasing compliance costs and disposal costs coupled with decreasing defense funding that create the challenges of the current financial and environmental managers in the Navy. The worst-first priority system by which funds are allocated is a method to distribute the limited amount of funds available. The theory is that by correcting the major problems first, the total volume of the problem will show greater improvement. Considering that only 60 installations generate 90 percent of DoD hazardous waste, this is a very effective strategy. Still, funding levels and priorities must be addressed. DoD cannot defer the problem to the future by avoiding disposal and generation issues now.

A problem that installations and the Navy face on hazardous waste generation and minimization efforts is the absence of accurate accounting. This deficiency complicates analysis of compliance data and sends the wrong signals to the installations about their reduction efforts. OSD is working on a Hazardous Waste Index System as a resolution to this problem and this thesis has introduced a model activity-based accounting system to improve environmental compliance accounting. This is important to the financial managers because generation of hazardous waste is a variable product, thus a variable cost. Once the cost driver is accurately identified, planning and budgeting will become easier for comptrollers as they will better understand their costs.

Another problem that affects the way in which financial managers budget and execute their environmental funds is the inevitable loss of sovereign immunity. The difficulty is in budgeting the O&MN account for a contingency (a fine) that may or may not occur. If federal agencies lose their sovereign immunity from fines and penalties, some funds allocated to the prevention and correction of environmental problems will be used to pay these fines. This is not in the best interest of the public. The money can be reprogrammed to pay these fines, but the problem will not be corrected. This is further complicated by each state having different environmental requirements and levels of compliance standards. Congress needs to view the problem from DoD's perspective. DoD has established a systematic approach to control and correct the problem. Mr. William Parker, DASD(E) commented on the issue:

We have to take the leadership role in recommending to Congress the amount of our budgets and where that money should be spent, and that is accepted by the Department. We have set priorities, as far as spending goes, on a "worst-first"

basis. I think it is very important to understand that all of the assumptions that we make in the budgeting process are that we will be able to get the most cost effective use of our money. [Ref. 16:p. 129]

Finally, concerning the Navy's current environmental mitigation efforts, this thesis research suggests that a number of measures are in progress. For example, the data collected indicate that the level of recycling of hazardous wastes have increased. The Navy has a TQM approach for material procurement to reduce or eliminate the acquisition of hazardous materials. Also, process changes are occurring. Plastic media blasting for aircraft and torpedoes has replaced solvent stripping at some installations. However, the total generation of hazardous waste has increased which indicates a problem. Installations need to be more proactive in their approach to identifying and correcting hazardous waste generation problems. This would be more easily accomplished with the implementation of an activity-based accounting/measuring system. This system would accurately determine the effectiveness of installation minimization programs.

Other mitigation efforts are being investigated at the OSD level through the Other Hazardous Waste sub-element of the DERP and by NAVFAC. NAVFAC is looking into extending the shelf life of expired hazardous materials. This is an important study, since 40 percent of the hazardous waste is virgin or unused hazardous materials. Installations can be proactive on this issue and monitor the use of hazardous materials on a first-in first-out basis. As noted by Rep. Synar:

Another deficiency found in the GAO report and the DOD IG, was that the requirement of the first-in first-out inventory management system . . . were not being followed in many cases even for HM with short shelf life, because of what they found were a lack of internal controls or excessive granting of exceptions. . . . Consequently, the GAO recommended again that the Secretary [of Defense] direct

supply organizations to make greater use of this FIFO procedure . . . and discourage exceptions. [Ref. 26:p. 494]

Despite these efforts there is still room for considerable improvement in the mitigation efforts within the Navy. However, with only four percent of DERA money going toward R&D, installations should take it upon themselves to find alternate solutions and methods.

Environmental problems need to receive higher priority in the POM and PPBS. Activities and the Navy need to make this a higher priority. NAVFAC and OP-04 are currently programming and planning for environmental compliance. However, they need inputs from activities and fleet commands via the PCR process to identify needs and problems. Cost data for disposal needs high level visibility to show how financially burdensome disposal is for the activity.

B. AREAS FOR FURTHER RESEARCH

Environmental compliance demands are here to stay, at least for a while. With public support and national campaigns the complexity of the problem is certain to increase. This will not alleviate the environmental problems encountered by the DoD or other federal agencies. Further research may be considered in the following areas:

- Development of DoD regional recycling/reuse facilities, geographically located to serve many installations.
- Team up DoD installations with civilian industries within the same geographic region to see what they are doing and how they are handling similar compliance issues, and perhaps enter into joint efforts.

- Investigate research and development on material substitutions and process modifications for new technologies.
- Analyze the life cycle costs of alternate materials and compare them to life cycle costs of current methods.

C. SUMMARY

Financial managers of the 1990's face a significant environmental funding challenge. With pressures to keep the federal deficit at a minimum, with the Cold War over, with the Soviet threat diminishing, defense funding levels are contracting. There is less money and DoD is downsizing its forces.

Financial managers have difficulty in funding current military operations and support requirements. This is complicated by funding requirements for environmental compliance. Compliance and disposal costs are increasing. The installation comptroller needs more money to finance these increases. However, the budget is shrinking. The solution is not readily apparent as there are many entities competing for aa share of the budget. An understanding of environmental compliance issues and funding constraints may help alleviate the frustrations at the installation level. However, more proactive measures are needed to cope with environmental regulation and public demands.

APPENDIX A

Accronyms

AG/SAG	Accounting Group/ Sub- Accounting Group
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regualtions
CWA	Clean Water Act
DASD(E)	Deputy Assistant Secretary of Defense for Environment
DERA	Defense Environmental Restoration Account
DERP	Defense Environmental Restoration Program
DLA	Defense Logistics Agency
DOD	Department of Defense
DOE	Department of Energy
DRMO	Defense Reutilization and Marketing Office
DRMS	Defense Reutilization and Marketing Service
DSMOA	DOD/State Memorandum of Agreement
EA	Environmental Assessmnet

ECE	Environmental Compliance Evaluation
EFD	Engineering Field Division
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facility Agreement
GAO	General Accounting Office
HAZMIN	Hazardous Waste Minimization
HRS	Hazardous Ranking System
HSWA	Hazardous and Solid Waste Amendments
HW	Hazardous Waste
LAG	Inter-Agency Agreement
IR	Installation Restoration
IRP	Installation Restoration Program
LUST	Leaking Underground Storage Tank
MILCON	Military Construction
MOA	Memorandum of Agreement
NAVCOMPT	Navy Comptroller
NAVFAC	Naval Facilities Engineering Command
NCP	National Contingency Plan
NEESA	Naval Energy and Environmental Support Agency
NEPA	National Environmental Policy Act

NIF	Navy Industrial Fund
NOV	Notice of Violation
NPL	National Priorities List
O&M	Operations and Maintenance
OHW	Other Hazardous Waste
OMB	Office of Management and Budget
OPN	Other Procurement Navy
PA	Pollution Abatement
PA/SI	Preliminary Assessment/ Site Inspection
PCR	Pollution Control Report
POM	Program Operating Memorandum
PWC	Public Works Center
PPBS	Planning, Programming, and Budgeting System
QRP	Qualified Recycling Program
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/ Feasibility Study
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TSCA	Toxic Substance Control Act
TQM	Total Quality Management
TYCOM	Type Commander

UST

Underground Storage Tank

APPENDIX B

- **Clean Air Act (CAA) of 1970 as amended through 1977-** requires prevention or control and abatement of air pollution from stationary and mobile sources; requires EPA to set binding National Ambient Air Quality Standards (NAAQS). Air quality standards are achieved by the states through plans (State Implementation Plans - SIP's), they are tailored to meet the needs of the different air quality control regions. Navy installations are subject to federal, state and local air pollution control requirements.
- **Clean Water Act (CWA) of 1972, as amended through 1987-** regulates discharge of pollutants into waters of the U.S. from any point source including industrial facilities and sewage treatment facilities; requires permits for discharges; requires reporting and clean-up of oil and hazardous substance spills in waterways; also protects waterways and requires a permit to adversely affect wetlands. The Navy has a more stringent policy requiring no-net-loss of wetlands, meaning wetlands must be created to replace any which are destroyed, whether by filling or draining.
- **Toxic Substances Control Act (TSCA) of 1976 -** empowers EPA to collect information and regulate toxic chemicals at any stage from manufacture through disposal; regulates, among others, polychlorinated biphenyls (PCBs), chlorofluorocarbons (CFCs), and asbestos; requires testing of chemical substances entering the environment, regulating releases where necessary. Allows EPA to prohibit manufacture, limit production, ban or control the use of toxic chemicals to protect the public health. TSCA authority may not be delegated to states.
- **Safe Drinking Water Act (SDWA) of 1974 -** regulates drinking water quality for pollutants that may have an adverse effect on human health or negatively effect the aesthetic quality of drinking water. Protects underground sources of water by regulating the underground injection of wastes and requires states to have plans to protect well field areas from contaminants.
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) of 1972 -** requires the licensing or registration of pesticide products; requires proper management of pesticide use, storage, and disposal.
- **Endangered Species Act of 1973 as amended -** requires that actions of Federal agencies do not jeopardize the existence of threatened or endangered species or destroy or adversely impact critical habitats of these species.

- **Sikes Act** - requires military installations to manage their national resources and provide public access for natural resource use that is consistent with the military mission.
- **Emergency Planning and Community Right-to-Know Act of 1986**- provides local governments information concerning possible chemical hazards in the community; requires emergency planning for releases of extremely hazardous substances.
- **Executive Order 12088** - link between Federal environmental regulations and Federal facilities; requires Federal facilities leadership in furthering the purpose and policies and monitor environmental pollution in compliance with Federal environmental regulations, and established the A-106 process (signed October 13, 1978).

APPENDIX C

Data Tables

There are two sets of data:

1. Hazardous Waste Costs for CY 87 through CY 90.
2. Hazardous Waste Summary for CY 87 through CY 90.

HAZARDOUS WASTE COSTS---CY87
PACFLT ACTIVITIES

UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N00236	NAS ALAMEDA CA	51,2249	0	0	0	0	512,249
N00245	NAVSTA SAN DIEGO CA	9,460	0	0	0	0	9,460
N00246	NAS NORTH IS SAN DIEGO CA	0	0	0	27,354	29,742	57,096
N00255	NAVSTA SEATTLE WA	0	0	0	0	0	0
N00296	NAS MOFFETT FIELD CA	6,200	0	15,000	0	0	21,200
N00314	SUBASE PEARL HARBOR HI	35,000	0	0	0	0	35,000
N00334	NAS BARBERS POINT HI	47,380	0	39,000	0	0	86,380
N00620	NAS WHITBEY ISLAND WA	0	0	88,696	0	0	88,696
N57053	NAVFAC CENTERVILLE BEACH CA	19,068	0	0	2,359	0	21,427
N57054	NAVFAC BIG SUR CA	0	0	0	0	0	0
N60028	NAVSTA TREASURE ISLAND CA	0	0	4,000	0	0	4,000
N60042	NAF EL CENTRO CA	3,677	0	0	0	0	3,678
N60259	NAS MIRAMAR CA	0	0	0	0	0	0
N60462	NAS ADAK AK	30,428	0	94,211	0	4,700	129,339
N60495	NAS FALLON NV	0	0	0	5,000	0	5,000
N60872	NAVMAG GUAM GO	0	0	20,185	0	0	20,185
N61577	NAS AGANA GO	0	65,195	40,120	0	0	105,315
N61755	NAVSTA GUAM GO	15,000	0	0	0	0	15,000
N62021	NAVPHIBASE CORONADO SDIEGO C	0	49,948	34,383	0	0	84,331
N62494	NAF MIDWAY ISLAND	0	0	0	0	0	0
N62586	NAVSHIPREFAC GUAM GO	0	151,959	93,513	0	0	245,472
N62813	NAVSTA PEARL HARBOR HI	0	0	72,010	0	0	72,010
N63042	NAS LENOORE CA	124,759	5,000	600	20,800	13,000	164,159
N63406	SUBASE SAN DIEGO CA	0	0	0	0	0	0
N65918	SIMA SAN DIEGO CA	50,000	0	0	0	0	50,000

HAZARDOUS WASTE COSTS--CY87
PACFLT ACTIVITIES (Continued)

UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N68251	SIMA PEARL HARBOR HI	15,000	0	0	0	0	15,000
N68297	NAVMAQ LUALUALEI HI	0	0	15,952	0	0	15,952
N68311	NAVSTA LONG BEACH CA	0	0	0	0	0	0
N68436	SUBASE BANGOR WA	123,290	10,500	147,117	428,748	118,865	828,520
N68828	SIMA NREFM LONG BEACH	0	0	0	0	0	0
	TOTAL	991,511	282,602	664,787	484,261	166,307	2,589,469

HAZARDOUS WASTE COSTS--CY88
PACFLT ACTIVITIES

UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N00236	NAS ALAMEDA CA	1434,368	3,948	640	0	1,548,435	2,987,391
N00245	NAVSTA SAN DIEGO CA	18,630	0	7,121	0	0	25,751
N00246	NAS NORTH IS SAN DIEGO CA	0	0	0	89,494	41,200	130,694
N00255	NAVSTA SEATTLE WA	1,026	0	62,655	0	0	63,681
N00296	NAS MOFFETT FIELD CA	79,751	169,775	31,101	0	0	280,627
N00314	SUBASE PEARL HARBOR HI	35,000	0	0	0	0	35,000
N00334	NAS BARBERS POINT HI	31,858	0	14,000	0	0	45,858
N00620	NAS WHIDBEY ISLAND WA	0	0	93,687	0	0	93,687
N57053	NAVFAC CENTERVILLE BEACH CA	9,388	0	0	3,059	0	12,447
N60028	NAVSTA TREASURE ISLAND CA	0	0	730,000	0	0	730,000
N60042	NAF EL CENTRO CA	30,146	0	1,600	0	0	31,746
N60259	NAS MIRAMAR CA	0	5,000	0	0	0	5,000
N60462	NAS ADAK AK	0	0	73,662	0	4,700	78,362
N60495	NAS FALLON NV	0	57,676	7,781	18,000	0	83,457
N60872	NAVMAG GUAM GQ	0	0	3,556	0	0	3,556
N61577	NAS AGANA GQ	27,463	136,893	58,183	38,461	4,142	265,142
N61755	NAVSTA GUAM GQ	10,528	0	267	0	0	10,795
N62021	NAVPHIBASE CORONADO SDIEGO C	96,800	0	0	0	0	96,800
N62494	NAF MIDWAY ISLAND	0	0	0	0	0	0
N62586	NAVSHIPREFAC GUAM GQ	0	244,460	103,896	0	0	348,356
N62813	NAVSTA PEARL HARBOR HI	0	0	52,880	0	0	52,880
N63042	NAS LEMOORE CA	124,600	5,000	7,000	20,800	13,000	170,400
N63406	SUBASE SAN DIEGO CA	0	0	0	0	0	0
N65918	SIMA SAN DIEGO CA	44,272	0	0	0	0	44,272
N68251	SIMA PEARL HARBOR HI	20,000	0	4,000	0	0	24,000

HAZARDOUS WASTE COSTS--CY88							
PACFLT ACTIVITIES (Continued)							
UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N68297	NAVMAG LUALUALEI HI	0	0	32,000	0	0	32,000
N68311	NAVSTA LONG BEACH CA	0	0	0	0	0	0
N68436	SUBASE BANGOR WA	32,591	0	422,088	0	155,389	610,068
N68828	SIMA NRFM LONG BEACH	0	0	0	0	0	0
TOTAL		1,996,421	622,752	1,706,117	169,814	1,766,866	6,261,970

HAZARDOUS WASTE COSTS--CY89
PACFLT ACTIVITIES

UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N00236	NAS ALAMEDA CA	400	437,325	23,313	0	0	461,038
N00245	NAVSTA SAN DIEGO CA	187,540	0	6,789	0	0	194,329
N00246	NAS NORTH IS SAN DIEGO CA	94,879	0	0	0	0	94,879
N00255	NAVSTA SEATTLE WA	11,494	0	35,608	0	0	47,102
N00296	NAC MOFFETT FIELD CA	30,000	32,000	173,000	0	0	235,000
N00314	SUBASE PEARL HARBOR HI	57,061	0	0	0	0	57,061
N00334	NAS BARBERS POINT HI	0	82,229	3,000	0	0	85,229
N00620	NAS WHIDBEY ISLAND WA	0	0	119,558	0	0	119,558
N09517	PATWINGSPAC MOFFETT FIELD CA	0	0	0	0	0	0
N57053	NAVFAC CENTERVILLE BEACH CA	0	1,433	8,819	0	0	10,252
N60028	NAVSTA TREASURE ISLAND CA	0	0	101,000	0	0	101,000
N60042	NAF EL CENTRO CA	0	0	0	0	0	0
N60259	NAS MIRAMAR CA	0	657,216	123,000	0	0	780,216
N60462	NAS ADAK AK	0	45,000	25,000	0	4,700	74,700
N60495	NAS FALLON NV	4,500	140,000	0	76,000	0	220,500
N60872	NAVHAG GUAM GO	0	0	0	0	0	0
N61119	NSD GUAM GO	0	224,872	33,050	0	0	257,922
N61577	NAS AGANA GO	23,511	77,588	75,688	4,193	5,215	186,195
N61755	NAVSTA GUAM GO	0	15,064	15,298	0	0	30,362
N62021	NAVPHIBASE CORONADO SDIEGO C	104,898	0	0	0	0	104,898
N62494	NAF MIDWAY ISLAND	0	0	0	0	0	0
N62586	NAVSH1PREPAC GUAM GO	0	280,000	93,600	0	0	373,600
N62813	NAVSTA PEARL HARBOR HI	103,700	0	0	0	0	103,700
N63042	NAS LEMOORE CA	264,957	5,000	22,500	7,000	59,000	358,457

HAZARDOUS WASTE COSTS--89
PACFLT ACTIVITIES (Continued)

UIC	ACTIVITY	DISPOSAL COSTS	DRMO COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
M63406	SUBASE SAN DIEGO CA	0	0	12,000	0	0	12,000
M65918	SIMA SAN DIEGO CA	57,307	0	102,984	0	0	160,291
M68251	SIMA PEARL HARBOR HI	28,164	0	0	0	1,797	29,961
M68297	NAVYAG LUALUALEI HI	22,200	0	18,800	0	0	41,000
M68311	NAVSTA LONG BEACH CA	0	0	195,000	0	0	195,000
M68436	SUBASE BANGOR WA	50,000	27,357	560,000	0	250,000	887,357
M68828	SIMA NRMF LONG BEACH	0	0	0	0	0	0
M68831	SIMA NRMF SAN FRANCISCO	0	55,623	0	0	0	55,623
M68897	NAVRESSOFSO PEARL HARBOR HI	0	0	225	0	0	225
TOTAL		1,040,611	2,080,707	1,748,232	87,193	320,712	5,277,455

HAZARDOUS WASTE COSTS--CY90
PACFLT ACTIVITIES

UIC	ACTIVITY	DISPOSAL COSTS	CERCLA/RCRA COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
M00236	NAS ALAMEDA CA	381,771	0	109,444	0	0	491,215
M00245	NAVSTA SAN DIEGO CA	52,000	0	0	0	0	52,000
M00246	NAS NORTH IS SAN DIEGO CA	870,230	0	0	0	0	870,230
M00255	NAVSTA SEATTLE WA	12,020	0	18,020	0	0	30,040
M00296	NAS MOFFETT FIELD CA	468,542	400,000	0	0	0	868,542
M00314	SUBASE PEARL HARBOR HI	508,628	0	0	0	0	508,628
M00334	NAS BARBERS POINT HI	251,128	0	0	0	0	251,128
M00620	NAS WHIDBEY ISLAND WA	382,000	0	0	0	0	382,000
M00651	NSD SUBIC BAY RP	3,062	0	0	0	0	3,062
M09517	PATWINGSPAC MOFFETT FIELD CA	0	0	0	0	0	0
M32778	COMFLEACT CHINNAE KS	0	0	4,000	0	0	4,000
M57053	NAVFAC CENTERVILLE BEACH CA	7,395	0	860	0	0	8,256
M60028	NAVSTA TREASURE ISLAND CA	0	0	25,165	0	0	25,165
M60042	NAF EL CENTRO CA	33,239	0	0	0	0	33,239
M60259	NAS MIRAMAR CA	673,000	0	627,000	0	0	1,300,000
M60462	NAS ADAK AK	103,491	1,713,186	68,119	0	0	1,884,796
M60495	NAS FALLON NV	100,000	3,000,000	0	24,000	0	3,124,000
M60872	NAVMAG GUAM GQ	6,279	0	1,678	0	0	7,957
M61119	NSD GUAM GQ	109,308	0	0	0	0	109,308
M61552	NAVSTA SUBIC BAY RP	2,526	0	0	0	0	2,526
M61577	NAS AGANA GQ	280,981	0	104,973	5,000	9,612	400,566
M61755	NAVSTA GUAM GQ	110,220	3,539	15,328	0	0	129,087
M62021	NAVPHIBASE CORONADO SDIEGO C	397,000	0	0	0	0	397,000
M62254	COMFLEACT KADENA OKINAWA JA	5,000	0	0	0	0	5,000
M62494	NAF MIDWAY ISLAND	0	0	0	0	0	0

HAZARDOUS WASTE COSTS--CY90
PACFLT ACTIVITIES (Continued)

UIC	ACTIVITY	DISPOSAL COSTS	CERCLA/RCRA COSTS	OTHER COSTS	STORED COSTS	TREATED COSTS	TOTAL COSTS
N62507	NAF ATSUGI JA	32,887	0	0	0	0	32,887
N62586	NAVSHIPREFPAC GUAM GO	260,000	0	31,500	0	0	291,500
N62649	NSD YOKOSUKA JA	25,000	0	7,198	0	0	32,198
N62735	COMFLEACT SASEBO JA	55,500	0	15,000	25,000	0	95,500
N62758	NAVSHIPREFPAC YOKOSUKA JA	64,299	0	3,000	0	500	67,799
N62770	NAVSHIPREFPAC SURIC BAY RP	91,638	0	0	0	0	91,638
N62807	NAVMAF SUBIC BAY RP	5,300	0	0	0	0	5,300
N62813	NAVSTA PEARL HARBOR HI	0	0	0	0	107,575	107,575
N62876	NAS CUBI POINT RP	0	0	57,944	0	0	57,944
N63042	NAS LENOORE CA	182,600	0	13,000	7,000	17,000	219,600
N63406	SUBASE SAN DIEGO CA	21,000	0	43,300	0	0	64,300
N65115	PUC YOKOSUKA JA	89,566	0	0	0	0	89,566
N65918	SIMA SAN DIEGO CA	64,995	0	240,995	0	0	305,991
N68212	NAF MISAWA JA	3,097	0	0	0	0	3,097
N68251	SIMA PEARL HARBOR HI	74,000	0	10,000	0	0	84,000
N68297	NAVMAF LUALUALEI HI	45,000	0	5,000	0	0	50,000
N68311	NAVSTA LONG BEACH CA	0	0	0	0	0	0
N68436	SUBASE BANGOR WA	600,000	350,000	0	0	250,000	1,200,000
N68539	NAVSHIPREFPAC DIEGO GARCIA IO	0	0	30,032	0	0	30,032
N68828	SIMA NRMF LONG BEACH	33,372	0	0	0	0	33,372
N68831	SIMA NRMF SAN FRANCISCO	33,000	0	0	0	0	33,000
N68897	NAVRESOFSO PEARL HARBOR HI	0	0	0	0	0	0
	TOTAL	6,439,075	5,466,725	1,431,557	61,000	384,687	13,783,044

REPORT DATE 07/22/91 HAZARDOUS WASTE SUMMARY FOR CY87 HAZ ADD
PACFLT ACTIVITIES

SHIPYARD	TONS GENERATED	TONS BACKLOG	TONS TREATED	TONS STOPPED	TONS DISPOSED	TONS RECYCLED
NAS ALAMEDA CA	1,778.39	15.11	0.00	135.03	1,561.39	97.04
NAVSTA SAN DIEGO CA	20,395.41	0.00	19,833.09	44.70	184.07	333.56
NAS NORTH IS SAN DIEGO CA	135,838.41	67.44	134,725.97	70.88	471.12	637.88
NAVSTA SEATTLE WA	24.83	1.02	0.00	2.03	23.81	0.00
NAS MOFFETT FIELD CA	532.88	0.00	0.00	125.70	35.61	371.57
SUBASE PEARL HARBOR HI	140.45	0.00	0.00	0.00	140.45	0.00
NAS BARBERS POINT HI	42.95	0.00	0.00	0.00	42.95	0.00
NAS WHIDBEY ISLAND WA	1,445.43	0.00	0.00	0.00	1,445.43	0.00
NAVFAC CENTERVILLE BEACH	25.28	0.00	0.00	0.66	24.62	0.00
NAVSTA TREASURE ISLAND CA	100.52	0.00	0.00	11.91	88.61	0.00
NAF EL CENTRO CA	322.50	0.00	0.00	0.00	66.14	256.36
NAS MIRAMAR CA	76.97	0.00	0.00	0.00	76.97	0.00
NAS ADAK AK	65.05	0.00	0.00	0.00	54.34	10.71
NAS FALLON NV	265.54	75.51	0.00	7.21	333.84	0.00
NAVHAG GUAM GO	11.21	0.00	0.00	0.00	11.21	0.00
NAS AGANA GO	15.64	0.00	0.00	0.00	15.64	0.00
NAVSTA GUAM GO	8.39	0.00	0.00	0.00	8.39	0.00
NAVPHIBASE CORONADO SDIEG	3,009.81	0.00	2,998.79	3.52	7.50	0.00
NAF MIDWAY ISLAND	1.16	0.00	0.00	1.16	0.00	0.00
NAVSHIPREPAC GUAM GO	46.73	0.00	0.00	0.00	46.73	0.00
NAVSTA PEARL HARBOR HI	58.63	0.00	0.00	0.00	58.63	0.00
NAS LEMOORE CA	273.40	16.58	0.00	38.87	22.98	228.13
SUBASE SAN DIEGO CA	741.01	0.00	171.14	7.55	250.06	312.26
SIMA PEARL HARBOR HI	29.36	0.00	0.00	0.00	29.36	0.00

REPORT DATE 07/22/91	HAZARDOUS WASTE SUMMARY FOR CY87						PAGE 2
	PACFLT ACTIVITIES						
SHIPYARD	TONS GENERATED	TONS BACKLOG	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED	
NAVY MAG LUALUALEI HI	136.68	0.00	0.00	5.93	130.75	0.00	
NAVSTA LONG BEACH CA	77.14	0.00	20.53	0.00	56.61	0.00	
SUBASE BANGOR WA	1,705.71	33.33	70.81	122.87	1,502.21	43.15	
SIMA NREFM LONG BEACH	45.70	0.00	22.60	0.00	23.10	0.00	
	167,215.19	208.99	157,842.93	578.05	6,712.53	2,290.66	

REPORT DATE 07/22/91

HAZARDOUS WASTE SUMMARY FOR CY88
PACFLT ACTIVITIES

PAGE 1

ACTIVITY NAME	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
NAS ALAMEDA CA	2,206.30	0.00	0.00	187.83	2,016.62	1.85
NAVSTA SAN DIEGO CA	8,108.50	0.00	0.00	0.00	0.00	8,108.50
NAS NORTH IS SAN DIEGO CA	851.76	0.00	0.00	0.00	8.45	843.31
NAVSTA SEATTLE WA	12.05	0.00	0.00	0.00	12.05	0.00
NAS MOFFETT FIELD CA	873.69	0.00	0.00	0.00	873.69	0.00
SUBASE PEARL HARBOR HI	86.79	0.00	0.00	0.00	86.79	0.00
NAS BARBERS POINT HI	38.70	0.00	0.00	0.00	38.70	0.00
NAS WHIDBEY ISLAND WA	1,222.23	0.00	0.00	0.00	1,220.99	1.25
NAVFAC CENTERVILLE BEACH	15.99	0.61	0.00	0.00	2.24	14.36
NAVSTA TREASURE ISLAND CA	666.45	0.00	0.00	0.00	666.45	0.00
NAF EL CENTRO CA	145.31	0.00	0.00	0.00	36.88	108.43
NAS MIRAMAR CA	860.85	0.00	0.00	0.00	205.87	654.98
NAS ADAK AK	46.44	0.00	0.00	0.00	25.31	21.13
NAS FALLON NV	169.47	12.08	0.00	33.77	147.78	0.00
NAVMAG GUAM GO	2.26	0.00	0.00	0.00	2.26	0.00
NAS AGANA GO	27.38	0.00	0.00	27.38	0.00	0.00
NAVSTA GUAM GO	12.58	0.00	0.00	0.00	12.58	0.00
NAF MIDWAY ISLAND	0.25	1.16	0.00	1.41	0.00	0.00
NAVSHIPREFFAC GUAM GO	49.43	0.00	0.00	48.89	0.00	0.54
NAVSTA PEARL HARBOR HI	20.13	0.00	0.00	0.00	20.13	0.00
NAS LEMOORE CA	899.14	38.87	0.00	40.84	219.04	678.13
SUBASE SAN DIEGO CA	106.66	0.00	0.00	0.00	106.66	0.00
SIMA SAN DIEGO CA	277.38	0.00	0.00	0.00	277.38	0.00
SIMA PEARL HARBOR HI	26.62	0.00	0.00	0.00	26.62	0.00

REPORT DATE 07/22/91

HAZARDOUS WASTE SUMMARY FOR CY88
PACFLT ACTIVITIES

PAGE 2

ACTIVITY NAME	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
NAVWAG LUALUALEI HI	128.80	0.00	0.00	0.00	128.80	0.00
NAVSTA LONG BEACH CA	649.63	0.00	643.97	2.62	3.03	0.00
SUBASE BANGOR WA	1,354.15	23.05	70.57	12.87	1,144.58	149.19
SIMA NRFH LONG BEACH	5.26	0.00	2.04	0.66	2.57	0.00
	18,864.17	75.76	716.58	356.27	7,285.44	10,581.64

HAZARDOUS WASTE SUMMARY--CY89
PACFLT ACTIVITIES

UIC	ACTIVITY	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
N00236	NAS ALAMEDA CA	1,607	4	0	11	1,329	271
N00245	NAVSTA SAN DIEGO CA	3,518	0	0	0	1,406	2,112
N00246	NAS NORTH IS SAN DIEGO CA	743	0	9	0	463	271
N00255	NAVSTA SEATTLE WA	10	6	0	6	9	0
N00296	NAS MOFFETT FIELD CA	242	0	0	0	211	31
N00314	SUBASE PEARL HARBOR HI	66	0	0	0	66	0
N00334	NAS BARBERS POINT HI	53	0	0	0	53	0
N00620	NAS WHIDBEY ISLAND WA	711	0	0	0	696	15
N09517	PATWINGSPAC MOFFETT FIELD CA	115	0	0	0	115	0
N57053	NAVFAC CENTERVILLE BEACH CA	50	0	0	1	5	44
N60028	NAVSTA TREASURE ISLAND CA	4,728	0	0	10	4,718	0
N60042	NAF EL CENTRO CA	98	0	0	0	41	57
N60259	NAS MIRAMAR CA	7,888	0	0	0	205	7,683
N60462	NAS ADAK AK	24	0	0	23	0	1
N60495	NAS FALLON NV	51	2	0	0	25	28
N61119	NSD GUAM GO	32	0	0	0	32	0
N61577	NAS AGANA GO	506	0	255	6	16	229
N61755	NAVSTA GUAM GO	30	0	0	0	30	0
N62021	NAVPHIBASE CORONADO SDIEGO CA	101	0	0	0	79	22
N62494	NAF MIDWAY ISLAND	8	1	0	10	0	0
N62586	NAVSHIPPREPAC GUAM GO	40	0	0	0	40	0
N62813	NAVSTA PEARL HARBOR HI	58	0	0	0	58	0
N63042	NAS LEMOORE CA	215	41	0	23	233	0
N63406	SUBASE SAN DIEGO CA	237	0	20	0	218	0
N65918	SIMA SAN DIEGO CA	106	0	0	0	106	0

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HAZARDOUS WASTE SUMMARY--CY89
PACFLT ACTIVITIES

PAGE 2

UIC	ACTIVITY	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
N68251	SIMA PEARL HARBOR HI	20	0	0	0	20	0
N68297	NAVYAG LUALUALEI HI	89	0	0	0	89	0
N68311	NAVSTA LONG BEACH CA	1,851	0	1,585	101	71	93
N68436	SUBASE BANGOR WA	1,259	34	224	50	737	283
N68831	SIMA NRMF SAN FRANCISCO	12	0	0	0	11	1
N68897	NAVRESSOFSO PEARL HARBOR HI	3	0	0	0	3	0
TOTALS:		24,471	88	2,093	241	11,085	11,141

HAZARDOUS WASTE SUMMARY--CY90
PACFLT ACTIVITIES

UTC	ACTIVITY	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
N00236	NAS ALAMEDA CA	505	0	0	0	337	167
N00245	NAVSTA SAN DIEGO CA	5,168	0	0	0	471	4,697
N00246	NAS NORTH IS SAN DIEGO CA	690	0	33	0	351	306
N00255	NAVSTA SEATTLE WA	9	0	0	0	8	1
N00296	NAS MOFFETT FIELD CA	479	0	0	20	400	58
N00314	SUBASE PEARL HARBOR HI	90	0	0	0	90	0
N00334	NAS BARBERS POINT HI	52	0	0	0	52	0
N00620	NAS WHIDBEY ISLAND WA	507	0	0	0	450	57
N00651	MSD SUBIC BAY RP	7,416	3	0	34	13	7,373
N57053	NAVFAC CENTERVILLE BEACH CA	7	0	0	0	2	5
N60028	NAVSTA TREASURE ISLAND CA	1,588	2	0	0	1,589	0
N60042	NAF EL CENTRO CA	237	0	18	0	160	59
N60259	NAS MIRAMAR CA	6	0	0	0	6	0
N60462	NAS ADAK AK	21	0	0	0	21	0
N60495	NAS FALLON NV	53	2	0	3	45	7
N60872	NAVHAG GUAM GO	1	0	0	0	1	0
N61119	NSD GUAM GO	2,231	0	0	0	8	2,223
N61552	NAVSTA SUBIC BAY RP	6,248	0	0	0	23	6,225
N61577	NAS AGANA GO	584	8	254	12	50	277
N61755	NAVSTA GUAM GO	21	0	0	13	7	0
N62021	NAVPHIBASE CORONADO SDIEGO CA	1,767	0	1,732	0	2	34
N62254	COMFLEACT KADENA OKINAWA JA	2	0	0	0	0	2
N62494	NAF MIDWAY ISLAND	2	9	0	11	0	0
N62507	NAF ATSUGI JA	63	0	0	0	53	10
N62586	NAVSHIPREPFAC GUAM GO	38	0	0	0	38	0

HAZARDOUS WASTE SUMMARY--CY90
PACFLT ACTIVITIES

UIC	ACTIVITY	TONS GENERATED	TONS BACKLOGGED	TONS TREATED	TONS STORED	TONS DISPOSED	TONS RECYCLED
N62649	NSD YOKOSUKA JA	7	0	0	0	1	6
N62735	COMFLEACT SASEBO JA	95	0	0	51	43	0
N62758	NAVSHIPPREPAC YOKOSUKA JA	36	0	0	0	29	7
N62770	NAVSHIPPREPAC SUBIC BAY RP	556	0	0	0	86	470
N62807	NAVMAV SUBIC BAY RP	2	0	0	0	2	0
N62813	NAVSTA PEARL HARBOR HI	42	0	0	0	25	18
N62876	MAS CUBI POINT RP	25	0	0	0	25	0
N63042	MAS LEMOORE CA	303	23	0	57	168	101
N63406	SUBASE SAN DIEGO CA	4,804	0	4,182	0	315	308
N65115	PWC YOKOSUKA JA	330	0	7	0	177	145
N65918	SIMA SAN DIEGO CA	194	0	68	0	40	86
N68212	NAF HISAWA JA	5	0	0	0	5	0
N68251	SIMA PEARL HARBOR HI	19	0	0	0	19	0
N68297	NAVMAV LUALUALEI HI	120	0	0	0	120	0
N68436	SUBASE BANGOR WA	1,326	55	784	40	513	44
N68539	NAVSUPPAC DIEGO GARCIA IO	63	0	0	0	20	43
N68828	SIMA NRFM LONG BEACH	43	0	0	0	43	0
N68831	SIMA NRMF SAN FRANCISCO	4	0	0	0	4	0
TOTALS:		35,759	102	7,078	241	5,812	22,729

LIST OF REFERENCES

1. Stiglitz, Joseph E., Economics of the Public Sector, New York: Norton, 1988.
2. Schumacher, Aileen, A Guide to Hazardous Materials Management, New York: Quorum Books, 1988.
3. Department of the Navy, Office of the Chief of Naval Operations, OPNAVINST 5090.1A Environmental and Natural Resources Program Manual, Washington, D.C., October 1990.
4. GAO (U.S. General Accounting Office), Hazardous Waste: DOD's Effort to Reduce Waste, GAO/NSAID-89-35, Washington, D.C., February 1989.
5. Secretary Of Defense Memorandum, Subject: Environmental Management Policy, 10 October 1989.
6. Schafer, Jacqueline E., "Speaking From Topside," Navy Civil Engineer, v. XXIX, Winter 1991.
7. "\$7 Billion Earmarked for Worst Polluting Agencies," The Federal Times, p. 10, 4 March 1991.
8. NAVFACENGCOM, NAVFAC Briefing Sheet, Synopsis of Environmental Laws, undated.
9. United States Code, Armed Services, Environmental Restoration, 10 USC 160, U.S. Government Printing Office, Washington, D.C., 1984.
10. Casagrande, Daniel, Department of Defense Requirements in the Superfund Amendments and Reauthorization Act (SARA), Mitre Corp.: McLean, VA, October 1987.
11. Office of Management and Budget, Budget of the United States Government Fiscal Year 1992, Government Printing Office, Washington, D.C., February 1991.

12. U.S. Department of Defense, Defense Environmental Restoration Program, Annual Report to Congress for Fiscal Year 1990, Government Printing Office, Washington, D.C., February 1991.
13. Department of the Navy, Deputy Chief of Naval Operations Letter Ser 453C/OU599632, Subject: FY91 Defense Environmental Restoration Account (DERA) Funds, 9 October 1990.
14. U.S. Congress, House of Representatives, National Defense Authorization Act for Fiscal Years 1992 and 1993, 102nd Cong., 1st sess., Government Printing Office, Washington, D.C., 1991.
15. Department of the Navy, Chief of Naval Operations Message, Subject: Funding for Shoreside Environmental Compliance, 092239Z Aug 89.
16. U.S. Congress, House of Representatives, Hearings Before the Environmental Restoration Panel, Committee on Armed Services, Overview of DOD Environmental Activities, HASC No. 101-27, 101st Cong., 1st sess., U.S. Government Printing Office, Washington, D.C., 1990.
17. Facsimile Report from Glen Oshirio, PACFLT Budget Analyst, July 1991.
18. Department of the Navy, Office of the Chief of Naval Operations, United States Navy FY 1991 Environmental and Natural Resources Program Plan, Washington, D.C., January 1991.
19. NAVFACENGCOM, NAVFAC Briefing Sheet for short course on Environmental Compliance and Laws, undated.
20. Commanding Officer's Guide to Public Works Functions, P-1040, NAVFAC, March 1990.
21. U.S. Congress, House of Representatives, Hearings Before the Environmental Restoration Panel, Committee on Armed Services, Fiscal Year 1989 Defense Environmental Restoration Account Request and Related Issues, HASC No. 100-65, 100th Cong., 2nd sess., U.S. Government Printing Office, Washington, D.C., 1988.
22. Roberts, R.M., Koff, J.L., and Karr, L.A., Hazardous Waste Minimization Initiation Decision Report, TN-1787, Naval Civil Engineering Laboratory, June 1988.
23. U.S. Congress, House of Representatives, Hearings Before the Environmental Restoration Panel, Committee on Armed Services, DLA's Management of

Hazardous Materials and Hazardous Waste. HASC No. 101-64, 101st Cong., 2nd sess., U.S. Government Printing Office, Washington, D.C., 1990.

24. Abelson, Peter, Cost Benefit Analysis and Environmental Problems. Saxon House, England, 1979.
25. NAVFACENGCOM, NAVFAC Briefing Sheet on the Qualified Recycling Program, undated.
26. U.S. Congress, House of Representatives, Hearing Before the Environment, Energy, and Natural Resources Subcommittee, Committee on Government Operations, Management and Disposal of Hazardous Materials By Government Agencies, 101st Cong., 2nd sess., U.S. Government Printing Office, Washington, D.C., 1991.
27. GAO (U.S. General Accounting Office), Hazardous Waste: Attention to DOD Inventories of Hazardous Materials Needed, GAO/NSAID-90-11, U.S. Government Printing Office, Washington, D.C., November 1989.
28. "Federal Polluters' Immunity Attacked on Two Fronts," Congressional Quarterly, June, 8, 1991.
29. "Senate Panel Renews Battle Against Federal Facilities," Congressional Quarterly, May, 18, 1991.
30. Assistant Secretary of Defense for Production and Logistics Memorandum, Subject: Hazardous Waste Management, 9 August 1989.
31. U.S. Department of Defense, Report of Secretary of Defense, Annual Report to the Congress Fiscal Year 1990, U.S. Government Printing Office, Washington, D.C., January 1991.
32. U.S. Depart of the Navy, Report to Congress Fiscal Year 1990, Navy Internal Relations Activity, Arlington, VA, 1991.
33. Merchant, Kenneth A., Control in Business Organizations, Pitman, Boston, 1985.
34. Anthony, Robert N., Deaden, John, and Pedford, Norton M., Management Control Systems, Irwin, 1984.
35. Merchant, Kenneth A., "The Control Function of Management," Sloan Management Review, Summer, 1982.

36. Simons, "Rethinking the Role of Systems in Controlling Strategy," Unpublished paper Harvard Business School, February 1989.

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