Integrated Environmental Management Plan for Shipbuilding Facilities

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Project Summary

This project, titled “Integrated Environmental Management Plan for Shipbuilding Facilities,” was funded by the Office of Naval Research through the Gulf Coast Region Maritime Technology Center (GCRMTC). The project was initiated in June 1995 and was completed in June 1998. This final report provides information on project activities and achievements.

The main goal of the project, which was to prepare a generic Integrated Environmental Management Plan (IEMP) for the shipbuilding industry, was achieved with the help of Avondale Industries, Inc. (AII), a major shipbuilding company in the United States which served as the industry collaborator (IC) for the project. To prepare the generic IEMP, the researchers first prepared a specific IEMP for the main yard of AII. This final report summarizes the project results and presents a generic IEMP for the shipbuilding industry as well as a specific IEMP for Avondale Industries, Inc.

The role of an IEMP is to help the industry by providing the best management practices (BMP) possible at each stage of operation. The application of pollution prevention techniques of source reduction, recycling, treatment, and disposal were used in preparing the IEMP. This study provides a quantitative assessment of the waste discharges and environmental impacts along with information on possible management options and their suitability. Implementation of the IEMP will achieve waste minimization, health and environmental protection, overall risk reduction, cost optimization, regulatory compliance, and an improved public image of the industry. This project provides potential alternatives for the shipbuilding industry to help in complying with the ever-changing environmental regulations at optimum costs and to improve the industry’s competitiveness.
As briefly stated, generic shipyard processes and specific processes at AII were reviewed, documented, and used in developing the IEMP. Important shipyard processes such as surface preparation, metal plating and surface finishing/treatment, painting/coating, vessel cleaning, machining and metal working, and solvent cleaning and degreasing were reviewed and documented. Also, information on sources of wastes, waste streams, and relative potential for waste emissions was reviewed, analyzed, and documented in the IEMP report.

Available waste quantification methods from the literature and new proposed methods based on the material flow, standard operating procedures (SOP), and the experience of the industry were compiled. Also, the waste quantities for AII were estimated and documented based on AII data, responses to a questionnaire from various shipyards, and extensive field visits to AII and other shipyards.

Air quality was monitored at AII and Atlantic Marine, Inc. for particulate matter of less than 10-micron size (PM$_{10}$) and for volatile organic compounds (VOC) at AII. The purpose of the monitoring was to evaluate monitoring options such as methods and equipment, but not for the individual facility’s compliance. Current waste management practices at AII were reviewed. Information on the administrative structure at AII and the role of the Environmental Quality Section (EQS) along with the methods of waste collection, storage, treatment, and disposal were documented. Available on-site treatment facilities for liquid wastes and air emissions are also discussed.

Research on waste minimization was carried out with the tools of source reduction as the main objective because source reduction methods are the best tools for reducing the waste that is generated. Source reduction methods are included in this final report and follow the concept of “cleaner technology.” The methods are given for cleaning and degreasing, blasting, organic coating replacement, metal surface treatment, and plating operations, as well as for VOC emissions. These methods also include add-on controls for the processes.

The permit requirements for the shipyards in the areas of wastewater, solid and hazardous waste, and air pollution were reviewed and used in developing appropriate sections of the IEMP. Important aspects were covered in detail including the permit process, application requirements, permit fees, and type of information required for completing the application. The marine aquatic management chapter covers a mathematical model for modeling surface waters, the guiding factor being the mixing zone.

The IEMP developed as a result of this project addresses shipyard multimedia emissions, waste minimization, recycling, treatment, disposal options, and effective management methods. This IEMP, when implemented properly, will achieve environmental compliance with reduced costs and with relative ease.

The Generic Environmental Management Plan (GEMP) consists of two parts, as listed below.
1. The main report (Appendix A) contains information specific to a shipyard (brief on processes, materials, emission points, outfalls, treatment information, and others).

2. The second part is the Resource Book (Appendix B, bound separately) that contains information on environmental regulations, clean technologies for shipyard processes, waste treatment technologies, monitoring techniques, impact assessment methods/models, best management practices, training procedures, and others. The Resource Book provides alternatives to manage shipyard waste streams that help in cost optimization and regulatory compliance.

Individual shipyards have to customize the GEMP with their site-specific information and environmental regulations applicable to them. The GEMP will be a valuable tool in developing industry specific IEMPs for individual shipyards.

The specific IEMP concerning AII (Appendix C) is not available for circulation as this information contains company specific information.