

The National Shipbuilding Program (NSRP)
Information Booklet and Guide

U.S. DEPARTMENT OF THE NAVY
DAVID TAYLOR RESEARCH CENTER

in cooperation with
National Steel and Shipbuilding Company

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The National Shipbuilding Research Program
(NSRP)
Informational Booklet and Guide

Submitted to
National Steel and Shipbuilding Company
by
Lynwood P. Haumschild
on
January 21, 1991

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EXECUTIVE SUMMARY

This report is a handbook/guide for individuals who are interested in supplementing their knowledge of the NSRP. As noted in the Forewarn, it was requested by several new members of the SNAME Ship Production Committee Panels.

A background/history **statement** covering the multi-disciplined cooperative nature of the NSRP'S drive for applied research implementation is followed by a policy statement. The overall guiding objectives are followed by a description of the NSRP organization. A timetable for project submittal is followed by directions concerning "How to" submit a proposal abstract. At the end of the report you will find a sample proposal abstract and the results of a December 1990 meeting of the Ship Production Committee (SPC) regarding the mission, goals and objectives of NSRP.

Specific "OFFICIAL" questions regarding the NSRP should be directed to David Taylor Research Center which sponsors the program.

FOREWORD

This handbook/guide concerning the National Shipbuilding Research Program (NSRP) was written at the request of several new members of the Ship Production Committee Panels.

It is a description of the operations and procedures followed in many of the Ship Production Committee Panels in conducting the business of the NSRP. It is, of course, the author's rendition; although it draws heavily from the Operations and Procedures Manual published by the David Taylor Research Center (DTRC) which sponsors the NSRP Program.

Specific questions regarding the "OFFICIAL" operation or procedures of the NSRP should be referred to the Contracting Officer's Technical Representative (COTR) at DTRC. At the time of this writing, Dale Rome is the NSRP COTR [(301) 227-1363].

BACKGROUND

The NSRP has been in continuous operation for two decades. It originated as a result of the 1970 amendments to the Merchant Marine Act, 1936, which directed the Maritime Administration to establish a collaborative productivity improvement program with the U.S. shipbuilding industry. The objective of this legislation was to improve the competitiveness of the U.S. shipbuilding industry. Collaboration with the industry in the planning and execution of the program was seen as an efficient means of developing and maintaining the industrial base needed for national security.

The Program's success has been attested to by numerous independent studies indicating the value of NSRP projects. The program has provided a continuous stream of technology, innovation, procedures, and other useful information to improve the productivity (reduce the cost) of shipbuilding and ship repair. In addition, the Program has created a dynamic technology transfer network which has stimulated innovation in areas well beyond that contained in individual project work. This success appears, at least in part, to be the result of unique features of the Program philosophy and how it is organized and managed. These features, which must be preserved, are:

COOPERATION:

The NSRP involves the major U.S. shipbuilding and ship repair companies, both public and private, as well as design agents, universities, and government agencies with an interest in ship construction, overhaul, and repair. All participants are involved in the program planning and decision making and share in the Program results. Outside of the Program, the Industry operates in a very competitive market environment. Overtime it has been demonstrated that the tension between these opposing conditions (cooperation and competition) contributes to rapid implementation of project results provided there is sufficient communication among the competing parties to ensure the transfer of the necessary technical information and know-how to facilitate implementation. This is the primary reason that the Program operates under the auspices of a professional society (SNAME). Under the SNAME ByLaws competing firms can meet and address technical issues of common concern in a non-threatening environment free of anti-trust constraints. Conducting the work under government contracts with government funding assures that the results of the Program are placed in the public domain.

MULTI-DISCIPLINED:

A second feature is that the Program is aimed at the manufacturing (or production) processes and the management of these processes. In its broadest sense manufacturing employs a wide variety of technologies; no single discipline dominates the process. In order to be effective, the Program must be a collaboration between practitioners in all the technologies employed in the ship building process (including such technologies as management science and human resource innovation). The organizational structure of the Program reflects this multi-disciplined approach (see Chart 1, National Shipbuilding Research Program Organization).

IMPLEMENTATION:

Implementation is the operative word in describing the objective of the Program. The strategy is to advance the development of technologies, procedures, business practices, and anything else which is expected to improve the efficiency of the shipbuilding process. it is therefore a matter of Program policy that the main thrust of the Program be focused on products which can be implemented into shipyard operations. Program managers are instructed to "package" the results of all projects in such a way as to expedite implementation. As a further effort to emphasize implementation and prevent the Program from becoming dominated by "technologists", the program planning and review organization places heavy emphasis on the participation of practicing shipbuilders.

POLICY

The National Shipbuilding Research Program (NSRP) consists of productivity improvement projects related to shipbuilding and ship repair developed through the collaborative efforts of the Ship Production Committee (SPC) of the Society of Naval Architects and Marine Engineers (SNAME) and executed by shipbuilding and ship repair organizations. The Program is an integral part of the government's efforts to develop and maintain a modern and efficient shipbuilding industrial base and reduce the cost of naval ship construction and repair. The Program is also a central part of the individual efforts of U.S. shipbuilders to become competitive in commercial shipbuilding markets. For government funded projects, the Program is centrally managed by the Manufacturing System Division of the David Taylor Research Center.

All projects submitted for government funding will be evaluated against the following criteria:

National Security Requirements. Every project funded by the government shall satisfy all current or anticipated national requirements for enhanced shipbuilding technology. Projects which meet this requirement and also contribute to enhancing the competitiveness of the U.S. shipbuilding industry in the world market are acceptable and desirable.

Manufacturing Technology Problem Solutions. Manufacturing Technology deals with the development and application of more economical manufacturing processes, methods, techniques, or equipment. Projects shall contain an element of technical, economic, or institutional uncertainty which must be resolved as part of the project scope to facilitate application in a shipbuilding environment.

Duplication of Effort. Every effort shall be made to ensure that no project duplicates efforts currently underway in either the public or the private sector the results of which would be available on a timely basis and at a fair and reasonable cost to the U.S. **shipbuilding** industry.

Beyond the Normal Risk of Industry. Projects will not be undertaken when it is reasonable to assume that the degree of risk is such that a typical private firm would have sufficient economic incentive (improved profitability) to complete the development without government assistance.

Transportability of Project Results. Normally projects will not be undertaken which can be implemented by only one or two yards. At a minimum three yards must express a strong interest in implementing the planned results of a project.

Audit of Actual Cost Reduction. It is not in the interest of the government to impose auditing rules or procedures which will act as an impediment to the timely implementation of cost reduction innovations by government contractors. Nevertheless, as consideration for government financial support of the Program, there is an expectation that participating organizations will cooperate in furnishing the government with nonproprietary information which (a) will assist in the evaluation of Program performance and (b) will be useful to other shipbuilding and ship repair firms considering implementation of project results.

NSRP OBJECTIVES

The NSRP is concerned with improving the process of ship production, overhaul, and repair. The Program objective is to identify, develop, test and disseminate improvements in ship production, technology and management practices which would contribute to industry's efforts to be competitive in world shipbuilding and repair markets.

Improvement is defined as that which will:

- a) reduce the cost of ship construction, repair and overhaul
- b) improve construction quality
- c) reduce the time from the start of ship design to ship delivery
- d) reduce safety and environment hazards in shipyards
- e) reduce life cycle of ship operations
- f) improve the quality of working life in shipyards
- g) improve and promote ship production, education and training
- h) introduce engineering and design standards which enhance producibility
- i) improve the capability of the industrial base to Implement new production technologies necessary to meet national security requirements

An Important aspect of the NSRP is that the Program is earned out in collaboration between the government and the U.S. shipbuilding industry. Participation in the NSRP includes the responsibility of both parties to assure that this collaboration is preserved and nurtured and is considered to be an objective of the Program.

Elements of this collaboration are”

- a) Assurance that industry participants place the highest priority on recommending projects which have a high probability of being implemented in shipbuilding firms or will provide information that has the potential for reducing the cost of shipbuilding/ship repair operations.
- b) Voluntary support of NSRP activities to develop, maintain, and disseminate a shipbuilding technology information base.
- c) Through the auspices of SNAME maintain an open technical forum in which all legitimate interests of the public and private sector have the opportunity to participate in the exchange of technical information.
- d) Foster and maintain a dynamic and self sustaining person-to-person technology transfer network across organizational and company boundaries.
- e) Appoint senior managers to an Executive Control Board that can provide the guidance to ensure that the NSRP accurately reflects the goals and priorities of the shipbuilding industry and have the management expertise to ensure that the SPC conducts the NSRP business in an efficient and professional manner.

THE NSRP ORGANIZATION

There are three organizational components of the NSRP. The Ship Production Committee consisting of representatives of government and industry is responsible for initiating the program and overseeing its execution. The government represented by the NSRP Program Office at the David Taylor Research Center (DTRC) provides funding and is generally responsible for the administration of the program. Several shipbuilding firms acting as cost sharing sponsors of the program are responsible for conducting the research and assisting in the implementation of the research results. (See Chart 11, OPERATIONAL OVERVIEW)

I.a. The Ship Production Committee

The SPC is the central body representing all elements of the shipbuilding industry. It is through this organization that the private and public sectors of the U.S. shipbuilding and ship repair/overhaul community are provided the exposure to the NSRP to ensure the maximum degree of technology transfer. In accordance with SNAME By-Laws and regulations membership in the SPC is open to any professionally qualified individual at the invitation of the SPC Chairman. At a minimum all technical panel Chairman and all members of the Executive Control Board are members of the Ship Production Committee.

The role of the SPC members can be viewed as that of the NSRP 'stockholders'. It is in the interest of the government that the financial and technical support provided to the NSRP does not give, or appear to give, a commercial advantage to any firm or group of firms to the exclusion of other firms. To ensure that no exclusivity is practiced within the SNAME organization, the SPC meetings and publications are the instruments used to make public NSRP activities and decisions and to provide a public forum for their review and comment. The SPC meeting agenda, attendance list, and minutes are to be maintained by SNAME as the NSRP public record.

I.b. The Executive Control Board (ECB):

The planning and decision making body for the SPC is the Executive Control Board (ECB). The ECB can be viewed as the NSRP 'Board of Directors' and as such, is responsible for long range planning, establishing Program priorities, providing "top down" guidance to the technical panels, and overall coordination of the NSRP within the shipbuilding industry. Decisions made by the ECB are considered to represent an industry consensus.

ECB members must be senior industry and government executives who will commit to active participation. Selection of members shall be made by the SPC Chairman with the concurrence of a majority of the ECB members and will be based on the professional and executive qualifications of the candidate and the need to maintain a membership which balances the Program interests of large and small shipyards and of yards engaged in new construction and yards engaged in ship repair and overhaul. Each member shall have one vote. In the event a member cannot attend an ECB meeting a predesignated and approved alternate may attend and act on behalf of the member with prior approval of the Chairman. In the interest of maintaining its effectiveness as a planning and decision making body the ECB should limit its number to between 12 to 15 voting members. The majority of the members should represent a mix of the various types of shipyards with minority membership from a university, a design agent, and the Ship Builders Council of America. There may be two or more government members (selected in the same manner as industry members).

I.c. The SPC Technical Panels:

The technical panels (see Chart 1) are the action or operating arm of the NSRP. The general consensus is that the success of the NSRP is due to the work of the technical panels. They identify projects, oversee their execution, and assist in implementation. In addition, the technical panels are the core of the technology transfer network for the shipbuilding industry and the government. In the interest of continuing the record of success, they should be self-managing and retain maximum autonomy in carrying out their technical mandate. They should be free to select their own members and their chairman with emphasis on strong voluntary technical representation from both the private and public ship building/repair community. An active and orderly panel turnover is encouraged to offer maximum opportunity for individuals to participate in the panel activities. The panels should be encouraged to have a broad industry representation but not to the extent that their membership becomes so large as to stifle the

innovative dynamics which results from the free wheeling participation of individuals within small groups. In the interest of preventing any appearance of conflict of interest, employees of firms that are potential 'for profit' project subcontractors shall not participate in the ranking, or selection of projects to be recommended by the Panel for inclusion in the NSRP. The panel is free to invite anyone with something to contribute to a panel meeting on a case by case basis.

II The NSRP Program Office

The NSRP Program Office located within the DTRC Manufacturing Systems Division (Code 185) acts for the government in the management of the NSRP. The Program Office will act as the single point of contact for all Navy participation in the NSRP. The office will assign an NSRP Program Manager who will serve as the Contracting Officers Technical Representative (COTR) for all projects carried out with government funding. On matters dealing with contracts and funds administration the office is bound by the various laws and regulations governing such matters. The Program Office will act as the government liaison with the SPC to assist the SPC to integrate its procedures with government contracting practices and define the program in terms which meet national security objectives as well as commercial objectives. The Program Office will participate in, and, on some occasions, may conduct some projects included in the NSRP. The primary responsibility of this office is the development, promotion and application of advanced economically appropriate technology for ship construction, repair and overhaul

III. The Industry Program Sponsors

The execution of projects under the NSRP will be carried out under contracts with shipyards selected by the Program Office Contracting Officer from a list recommended by the SPC on the basis of (1) their willingness to conduct NSRP projects on a cost sharing basis (2) recognition within the industry of their expertise in shipbuilding production and management technology, (3) their willingness to carry out the project work openly and to share the results of this work with other shipyards on a real time basis. It is expressly understood that the sponsoring shipyard's willingness to absorb some of the project cost results from their interest in applying the project results to their operation. In consideration of the government sharing the expense of the development, they also agree to share the results of the development with other shipyards and the government. The scope of NSRP projects should include the tasks necessary to ensure that the results can be reduced to commercial practice expeditiously with minimal additional development or testing. As a condition of the contract,

the sponsoring shipyard agrees to assign a senior technical employee as Program Manager. In collaboration with the NSRP Program Office these Program Managers assume the role of productivity advocate for the shipbuilding industry taking a proactive role in promoting the implementation of production and organizational innovations. These Program Managers are expected to be the principal industry resource in their area of responsibility.

PROJECT SUBMITTAL

The nine Ships Production Committee (SPC) Panels of SNAME meet in the late fall to 'Brainstorm' ideas for funding in the following fiscal year. They do the Brainstorming in the context of NSRP objectives and guidance provided by the DTRC Program office and the Executive Control Board of the SPC. The guidance is broad, but usually includes preliminary budget planning information as well as project evaluation criteria.

Individual Panel members then write the Project Abstracts for each of the ideas which were selected by the Panels. See Chart IV for instructions for writing Project Abstracts.

Abstracts are mailed to the Panel members for review at the late winter meeting. The Panel collectively screens each project at this meeting to modify, or agree with the project scopes, cost and time to complete. From a Panel vote the top priority abstracts are then submitted to the ECB, via DTRC Program Office, for action by the ECB in April or May.

The ECB reviews the panels recommendations and selects (by formal vote) the projects to be included in the Annual Program based upon the target budget. The ECB submits this 'slate' of proposed Research Projects to SNAME and the DTRC Program Office.

DTRC Program Office informs the Lead Sponsoring Shipyards of the selected projects and budgets.

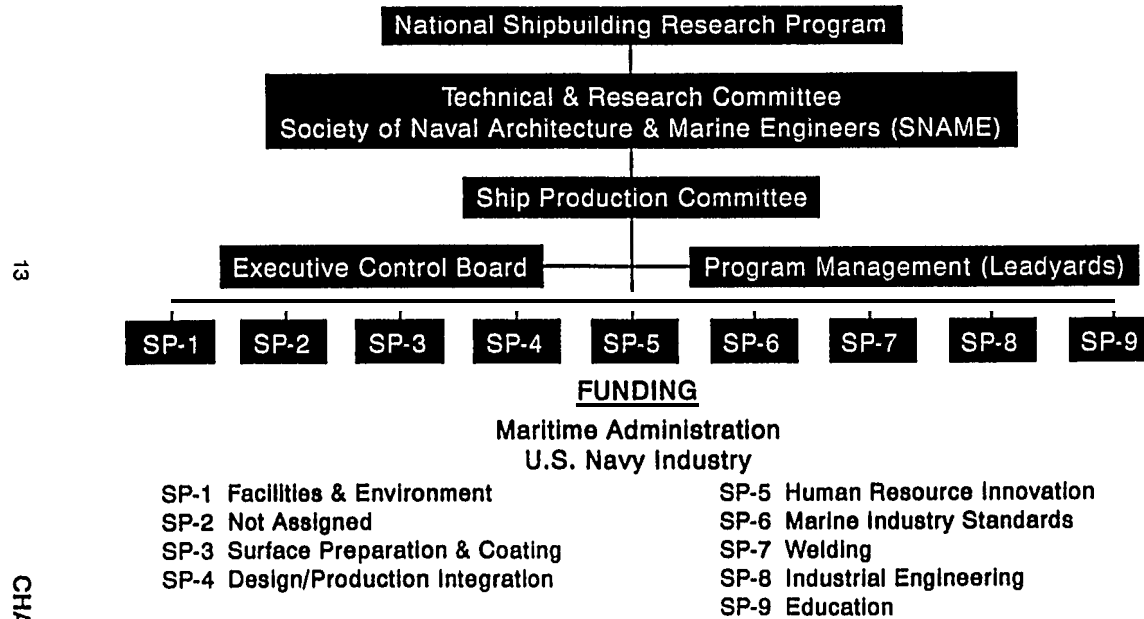
Each of the Sponsoring Shipyards, for the Panel it sponsors, prepares RFP (Request for Proposal) packages and solicits requests. The proposals received are then submitted to an Ad Hoc Committee (usually the panel members) for each separate project who individually evaluate and send their evaluation sheets to the Sponsoring Yard Program Manager. Based upon the Ad Hoc Committee recommendation and any other pertinent information, a contractor is selected to perform the research.

The selected contractor's proposal is forwarded to the DTRC Program Office for review and funding. Shortly after October 1, the Delivery Orders are awarded to the Sponsoring

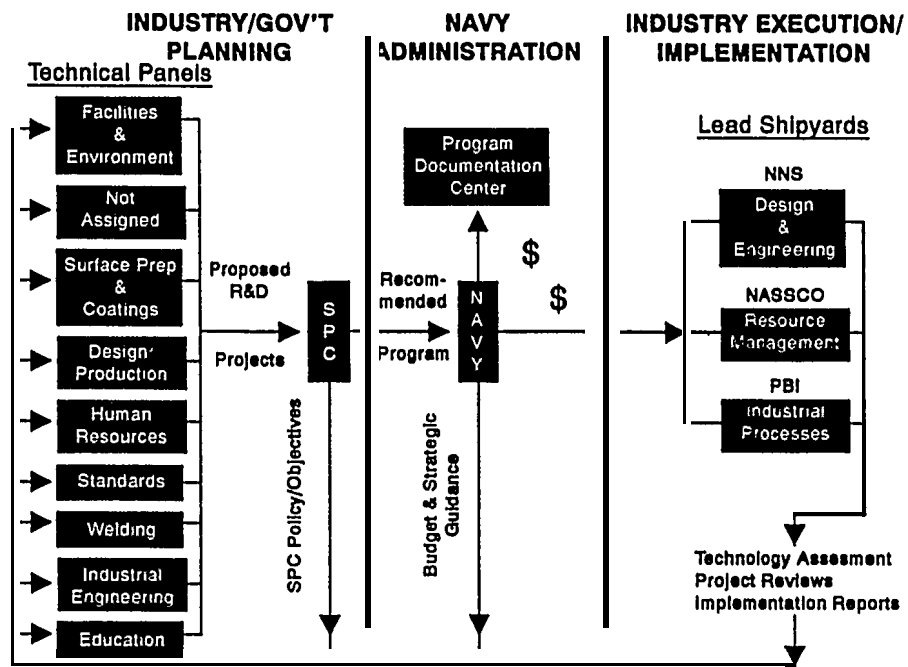
Shipyards for performance of the work. The Sponsoring Shipyard then releases the work to the selected contractor through its procurement system.

All of the foregoing information and charts have been paraphrased from the NSRP Organization and Operations Manual which is the official document governing the National Shipbuilding Research Program.

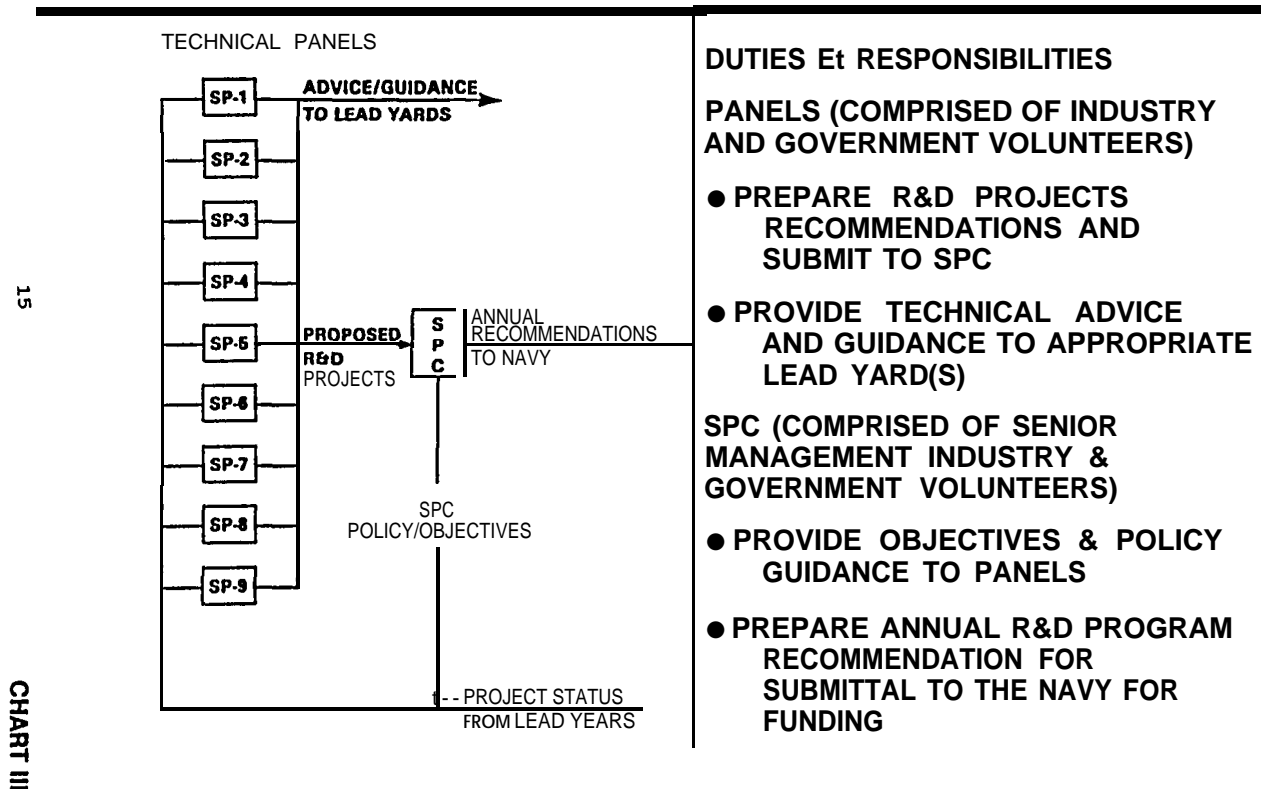
NATIONAL SHIPBUILDING RESEARCH PROGRAM ORGANIZATION



OPERATIONAL OVERVIEW



NSRP INDUSTRY/GOVT. PLANNING



NSRP PROJECT PROPOSAL ABSTRACT

Project Title: _____

Objective: (A one sentence statement describing the expected outcome of the project; for example: "Develop an improved widget for use in the manufacture of..." or *"Analyze alternate approaches to...in order to determine the technical and economic feasibility in shipbuilding."*)

Background: (A discussion of the current method problem, issue which is to be addressed by the project. It should include relevant facts [narrative] pertaining to problems which will effect the cost/time of a typical ship construction project or other problems [ie; quality, safety, employee relations, or training] which might effect the successful implementation of the project results. If this is not a general problem within the industry the extent that it is a problem limited to a few specialized shipyards should be clearly described [ie; large surface combatants, submarines, commercial vessels, repair and overhaul]. This would be followed by a description of how the successful product of the project will remove or minimize the problems and the extent that a successful product will be implemented by the industry. If there are special factors not covered by the project which could negatively effect implementation [ie; work rules, high capital cost, long term disruption of work, special skills or training] they should be stated. Half a typewritten page should be sufficient unless the problem is complex and needs a longer explanation to be understood by experienced shipbuilders)

Technical Approach: (This section should be developed to the extent necessary (1) to make a budget quality estimate of the time and cost [material and labor] needed to accomplish the task, (2) describe the sense of the technical panels expectations of how the tasks should be carried out and the level of effort they feel is sufficient (justifiable) and, (3) develop a management plan which estimates the time needed to complete. At a minimum the project should be broken down to the task level)

Estimate: Time/Cost	<p>(Based on the technical approach, provide an estimate of the cost and time necessary to complete the project.</p> <p>Cost: [Guidance on rates will be provided by the NSRP Program Office] Manhours [man days] per task Material [including report preparation in "Camera Ready format", but not cost to publish or distribute] Travel)</p>
Benefits:	<p>There are two elements of benefits:</p> <ol style="list-style-type: none"> 1. A budget level estimate of the anticipated savings [per ship or per yard per year] expected as a result of the successful implementation of the project results [guidance provided by the NSRP Program Office]. 2. The extent to which the project results will be implemented or used throughout the shipbuilding industry. [This should be based on the judgement of panel members representing their own shipbuilding companies]
Deliverables:	<p>(Normally a final report summarizing the entire project from start to finish is the format for the deliverable. However, the deliverable may include any one or a combination of any of the following examples: <i>video tape, computer program, workshop, demonstration, final verbal presentation</i> to Panel, or others. Whatever unique form of a deliverable that is appropriate for the specific project being done should be included)</p>

NATIONAL SHIPBUILDING RESEARCH PROGRAM
PANEL SP-5
TASK N5-92-3

PROJECT ABSTRACT

PROJECT TITLE:

Workers' Compensation Cost Containment

OBJECTIVES:

Review and establish effective programs to reduce escalating workers' compensation costs. These include, but are not limited to, accident prevention, early claims intervention, revised restricted duty programs, etc.

BACKGROUND:

In recent years workers' compensation costs have escalated at an alarming rate. Total 1989 workers' compensation cost nationwide was \$45 billion - 10% increase annually. Increase in general can be attributed to the continued liberal interpretation and application of the workers' compensation law and rising medical costs. At this time, industry must become more proactive in controlling workers' compensation costs. Top management support is needed for the implementation of new initiatives (such as those outlined above) and an accountability system should be developed for a full understanding of everyone's role in this important area.

TECHNICAL APPROACH:

Utilize experts from various functional areas to develop a comprehensive cost reduction program. This must be a two-tier approach from both the prevention and intervention aspects of each case on an individual basis.

1. Identify additional resources.
2. Identify suitable alternate employment opportunities.
3. Establish early claims intervention.
4. Implement medical cost containment initiatives.
5. Track and evaluate results.

COSTS:

\$43,000

SCHEDULE

12 months (10/1/91 to 9/30/92)

BENEFITS

(for all private/government yards)

I
I

- o Reduced injuries to tradesmen
- o Reduced lost time.
- o Decreased workers' compensation/medical costs.
- 0 More efficient use of restricted duty work force.
- o Reduced wasted time and material.
- o Reduced benefits coverage exposure.

RETURN ON INVESTMENT:

The average shipyard with 5000 employees spends approximately 12 million dollars per year on workers' compensation. If this project can effect even a 5% improvement it would return \$600,000 on the investment of \$43,000.

DELIVERABLE:

A final report describing different systems used most successful to reduce these costs. This will address early intervention, as well as, reducing the amount of cases already in place.

NSRP Long Range Planning Meeting - Day 3 - December 14, 1990

NSRP MISSION

To assist the U.S. Shipbuilding and Repair Industry in achieving and maintaining global competitiveness with respect to quality, time, cost, and customer satisfaction.

GOALS

Develop ways to improve manufacturing cycle efficiency.¹

Develop cost effective solutions to problems of regulatory compliance.

Foster a commitment to quality through people and processes throughout the shipbuilding industry.

Expand the participation at all levels of industry, government, and academia in the NSRP networking infrastructure.

Develop and maintain information on international customer needs and on competitive benchmarks to identify strategic opportunities.

Actively support the capability to build to international standards.

¹See Appendix I, definition of Manufacturing Cycle Efficiency

NSRP Lena Range Planning Meeting - Day 3 - December 14, 1990

OBJECTIVES

Implement a plan to speed up and make more flexible the time from project identification to project initiation.

By January 31, 1991, have a project evaluation process in place which is consistent with our goals.

Ensure that a framework is established for developing performance benchmarks for the industry.

Increase NSRP funding by 25%.

Formalize Memorandum of Understanding with SCA.

Improve the mechanisms for marketing, disseminating and implementing NSRP product results

- 25% increase in requests from documentation center.
- increased panel participation from new industrial activity.

Hold a meeting(s) CEO's/CO's/Supships to discuss the mission and goals of the NSRP.

Ensure that the panels have appropriate reformation and feedback by annual strategic review and periodic feedback by the Ship Production Committee.

Promote cross fertilization between panels to improve mechanisms for developing projects which cut across lines of technical disciplines.

Establish a plan to improve effective international exchange/interchange relationship.

NSRP Long Range Planning Meeting - Day 3 - December 14, 1990

Food for Thought for Panels

Perform a review of the availability of metric materials and components within the U.S.

Develop a series of SPC/TQM initiatives that focus on functional areas in the shipyard.

Define different measure of productivity.

Increase panel participation by 25%.

Expand SPC/ECB membership to include 2 shipyard CEO's and 2 senior vendor representatives.

Increase the lessons learned 'show & tell' component of Panel meetings to increase sharing of ideas.

Develop an ideal shipyard process model that focuses on M.C.E.

Inventory the list of techniques available that contribute to improving M.C.E.

Appendix I

**Discipline
Manufacturing Cycle Efficiency**

Required Tools

1. Progress of operations
2. Critical path and parallel operations definition
3. Dollar days accounting of labor & material management
4. Real accountability of labor and materials systems

Area of Operation

All aspects of manufacturing facility from order entry to delivery

To reduce cycle time; therefore, reduce WIP.

To cause manufacturing facility to deliver final product in less time; therefore, increasing facility capacity.

To implement best production and management practices for facility; therefore reduce manufacturing and labor costs.

Additional copies of this report can be obtained from the National Shipbuilding Research Program Coordinator of the Bibliography of Publications and Microfiche Index. You can call or write to the address or phone number listed below

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