

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

Employee Involvement/Safety

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The National Shipbuilding Research Program is a joint government and industry program dedicated to improving productivity of shipbuilding, overhaul, modernization and repair by seeking, developing and implementing new ideas, technologies and equipment in the Nation's shipyards. This research project was conducted under the auspices of Panel SP-5, Human Resource Innovation, of the Ship Production Committee of the Society of Naval Architects and Marine Engineers (SNAME). Frank Long, principal consultant of the consulting firm Win/Win Strategies was the Chairman and Program Manager of Panel SP-5 when this project got underway and he is the author of this report.

The purpose of this project was to test, in a shipyard environment, the effectiveness of problem solving teams in improving safety performance, thereby reducing the injuries to trade personnel and the associated costs of medical treatment and claims due to occupational injuries and illnesses. Of particular interest are the interaction and accomplishments of union-management teams using union leadership. This employee involvement effort could not have worked without the support and cooperation of the Metal Trades Council (MTC) of New London County which represents the hourly workforce. Michael Fitts, MTC Safety Committee Chairman, served as Chairman of the Safety Action Teams. We are grateful for his insight and guidance throughout this project. Chuck Rupy, Special Assistant to the Vice President-Operations, deserves special recognition. Without any prior experience with the employee involvement process, he assumed responsibility for this project when the prior Project Manager was reassigned to other duties within the organization. Chuck's initial involvement could not have come at a more difficult time in light of the strained union-management relations then extant and continuing. A significant measure of the success of the Safety Action Teams results from his sensitivity to the labor relations problems, his sincerity and integrity, his availability as a sounding board and his skill in removing barriers and lowering hurdles.

The contributions of John Bjorge, Supervisor of Management Development, also deserve kudos. He imparted leadership skills to the team leaders, trained the teams in team building and problem solving techniques and served as their training consultant throughout the campaign.

And finally, highest tribute is owed to C. B. Shellman, Division Vice President-Operations, without whose constant interest and support the Project would have failed.

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SECTION I

ABSTRACT

The purpose of this report is to document General Dynamics - Electric Boat Division's efforts in employing problem solving teams, under the leadership of union representatives, to improve safety performance, thereby reducing injuries to their personnel and the associated costs of medical treatment and claims due to occupational

injuries and illnesses. Electric Boat was awarded a grant from the Human Resource Panel - Panel SP-5 -of the Ship Production Committee of the Society of Naval Architects and Marine Engineers (SNAME) to test, in a shipyard environment, the effectiveness of such problem solving teams in the safety area.

SECTION II

EXECUTIVE SUMMARY

Five groups of employees led by and comprised mainly of representatives of the unions which form the Metal Trades Council (MTC) of New London County were organized and trained as problem solving teams. In spite of the lingering bitter aftertaste of a strike, their efforts resulted in a significant number of injury and accident reducing initiatives.

The cessation of the three and one-half month long strike on October 12, 1988, did not diminish the anger, resentment and distrust of management and co-workers who had crossed the picket lines which was felt by much of the production and maintenance workforce.

In this atmosphere, a management suggestion of a revival of a proposed Safety Action Team project to investigate the causes of accidents and injuries was met initially by negativism on the part of local union and MTC leadership. After much deliberation, however, that negativism was overcome due to the fact that the entire focus of the project would be on reducing accidents and injuries and not on productivity improvement.

Those considerations led to a conclusion that the end result of such an effort could only be of greater benefit to the membership than to the management. Put another way, there was more for the union to lose in refusing to participate than there was for the management to gain in going along. Somewhat reluctantly and with considerable suspicion on the part of the local unions and the MTC, the effort got under way.

As team building and problem solving training was completed and data gathering began, suspicion gave way to cautious optimism. As the Teams' perception of the management's sincerity *in this project* improved through the management's support of the teams efforts and its responsiveness to their requests, cautious optimism gradually evolved to enthusiasm. Within six months of the real beginning of the effort a significant number of

injury and accident reducing recommendations had been generated.

The Steel Trades Safety Action Team chose, on the basis of its study of the steel trades accident statistics, to pursue the causes of eye injuries. It is confidently anticipated that when their recommendations as to new types of goggles, safety glasses securing devices, flip-up welding lenses et al., are implemented eye injuries will be significantly reduced.

The Electrician Team selected hand and finger injuries on the basis of the record of 3,534 hand and finger injuries and 397 Workers' Compensation claims in the work units under its study in the period from January to October 1989. The implementation of their recommendations will result in a significant reduction in hand and finger injuries, a better quality electrical cable band and increased cable banding productivity.

The Painters Team also attacked the frequency of eye injuries within the Division -3,046 eye injuries out of a total 11,273 injuries of all types during the first six months of 1988. Its recommendations including personnel eye wash stations for painters and blasters whose eyes become injured from the intrusion of solvents and paints and from sand blasting activities, new types of safety glasses with different side shields and roping off all spray rigs and blast pots are all documented in the report.

The Pipefitters-Pipe Hangers Team also investigated hand and finger injuries and made recommendations based on the identifiable causes of those injuries due to the improper use of knives, sharp edges on pipe caps and blanks and the lack of availability and consequent lack of use of suitable personal protective equipment.

The Carpenters Team pursued back injuries primarily because of their frequency and because of the severity permanent nature of so many of them. Its study resulted in, among other things, a training course designed to reduce back injuries. That two hour course was designed

and will be taught by the Carpenters Safety Action Team members themselves.

Because of the success of all of the Teams' research it is

planned that the Teams will be asked to continue their efforts independent of and beyond the scope of this Project.

SECTION III BACKGROUND

The Electric Boat Division (EB) of General Dynamics is an internationally-known pioneer designer and builder of submarines. Founded in 1899 to complete construction of the U.S. Navy's first submarine, HOLLAND, Electric Boat continued to lead the way to subsequent technological breakthroughs, including the first nuclear-powered submarine, NAUTILUS, in 1954, and the first nuclear-powered, missile-firing submarine, GEORGE WASHINGTON, in 1959.

Today, Electric Boat is involved in the construction of TRIDENT, LOS ANGELES, and SEAWOLF class submarines. Major submarine assembly is performed at the unionized Groton, Ct. main yard. A non-union Automated Submarine Frame and Cylinder Manufacturing Facility located at Quonset Point, Rhode Island performs an increasing amount of hull cylinder outfitting prior to shipment for final assembly at Groton.

Current employment at Electric Boat facilities in Connecticut and Rhode Island totals approximately 20,000. Stanley C. Pace is Chairman of the Board and Chief Executive Officer of General Dynamics. Herbert Rogers is President of the Corporation, and James Turner is Vice President and General Manager of the Electric Boat Division.

In June 1945, the Metal Trades Department of the

American Federation of Labor succeeded in an election to represent the production and maintenance workers at the shipyard.

The day-to-day activities of the Metal Trades Department at the shipyard are carried out by the Metal Trades Council of New London County (MTC), acting, under certain circumstances, as the Department's agent. The first labor agreement between the parties was negotiated by the MTC in September, 1945.

The MTC consists of six representatives of each of ten local unions whose parent organization is a member of the Metal Trades Department. The ten local unions are locals of the following:

Boilermakers	Machinists
Carpenters	Painters
Clerks	Pipefitters
Electricians	Teamsters
Laborers	Molders

Those sixty representatives are elected by the rank and file of their respective locals and among themselves they elect the officers of the MTC. The MTC acts as the representative of the P & M workers when the entire body of workers (all ten locals) are involved, e.g., it negotiates the labor contract which must be ratified by the rank and file.

SECTION IV INTRODUCTION

In the Fall of 1985, the Division began its first formal venture in employee involvement with the establishment of five productivity oriented problem solving teams. That activity was the subject of a project at this yard also sponsored through the National Shipbuilding Research Program and is reported on in NSRP Booklet #0283, **Problem Solving Teams in Shipbuilding**, dated May 1988.

In the five years prior to that experiment in employee involvement, the Management of the Division had instituted a number of traditional methods in its efforts to increase productivity. While those traditional approaches led to some successes they did not deliver the significant increases

in productivity which Management was convinced were somewhere to be found. It concluded that those increases were going to have to come from a resource - the labor force, itself - that had not, up to that point, been developed to its fullest. Huge numbers of labor hours are involved in the submarine building process. Modest increases in productivity and/or decreases in labor costs can translate into enormous dollar savings. If a changed approach to managing the work force was implemented and, as a result, substantial dollar savings were realized an important step in solving the productivity puzzle would be accomplished.

The reason for a changed approach is also described in NSRP Booklet #0283 on page 3 as follows:

"This approach was rooted in a belief that a significant difference existed between the shipyard work environment of today and that of a generation ago. Today's worker has a larger fund of knowledge than his parents because of his education, (as that term is used in the broadest sense). The American lifestyle is now characterized by different sets of values, greater social awareness and a lower respect for authority, per se, by the typical employee. Accordingly, the traditional management philosophy as to its relationship with the workforce needed to be reconsidered."

At about the time those Problem Solving Teams were concluding their activities and presenting their recommendations to management, the Metal Trades Council's Safety Committee Chairman suggested to the Project Manager that he pursue the possibility of starting another round of problem solving activities but this time revolving around safety rather than production issues. He also suggested that the union be given a greater role in such an effort.

The experiment with the Problem Solving Teams detailed in NSRP #0283 and other problem solving team activities not detailed there convinced management of the efficacy of continuing this approach, albeit with some modifications, alterations and fine tuning.

As a result the Project Manager and the MTC Safety Chairman, working together, designed a problem solving team injury reduction program which had as its focus the body part injured.

As indicated earlier, however, a strike at the expiration of the labor agreement began on July 1, 1988 and continued until October 12, 1988. Prior to that strike the Chairman of the MTC Safety Committee was involved in the planning of the safety action team concept, the implementation of which is the subject of this report. Because of the bitterness of the strike and the intensity of the animosity between the parties after the strike the project was put on hold for sometime.

It should be pointed out that, in this problem solving effort and the one that preceded it, negotiations as to the conduct of the experiment, the make up of the teams and their leadership, etc. were conducted between the unions and the office of the Division Vice President-Operations rather than the office of the Division Vice President-Human Resources which has overall responsibility for union/management relations. This approach was taken at that time and also in this instance in an effort to remove, insofar as practicable, the subject matter from this more adversarial arena.

Unfortunately, the cessation of the strike on October 12, 1988 did not diminish the anger, resentment and distrust of division management and of co-workers who had crossed

the picket lines which was felt by the unions and much of the production and maintenance workforce. For reasons not relevant here, strained feelings at the highest union/management levels have persisted long after the end of the strike.

Given this atmosphere, it is not surprising that a management suggestion (indeed, even an operations management suggestion) that discussions concerning Safety Action Teams be revived was initially rejected by the leadership of the MTC and the local unions. In the unions' eyes, the distinction between human resource management and operations management had become blurred as a result of the struggle.

Nevertheless, the pattern established and the satisfying experiences realized in the first SP5* project at least allowed the parties at the operations level to establish a dialogue about resuming the effort.

Eventually, beginning in May of 1989, the project was resumed principally because the union viewed the efforts as being potentially more beneficial to the membership than to the management. Its focus was to be narrowly limited to studying ways to reduce accidents, injuries and illnesses, and would not include productivity enhancement.

The following article appeared in the June 1989 issue of Labor Views, the house organ of the Metal Trades Council of New London County:

New SP-5 Project:

Safety Action Teams Have Begun

"On May 11, 1989 a kick-off meeting was held to begin a new SP-5 Project called 'Safety Action Teams.' This SP-5 Project will be drastically different than those we have worked on in the past for 2 reasons. First, because past SP-5 Projects have dealt strictly with increasing productivity. This project will not. It will deal strictly with Safety Issues, like reducing injuries and helping to create safer working conditions. The second and most important difference is that this project will be run by the union!

"The Project will run from May until the end of the year. There will be five Safety Action Teams. Each one will be run by a union member, known as a "Team Leader." Fred Stula, Dept. 229, will lead the Steel Trades Team; John Algiere, Dept. 252, will lead the Carpenters Team; Roger Lamonth, Dept. 251, will lead the Painters Team; Ken O'Brien, MTC Safety will lead the Electricians Team and Wayne Peccini, MTC Safety, will lead the Pipefitters Team.

*At EB-GD, generally, and among those involved in the problem solving team efforts, in particular, the term SP5 refers, interchangeably, to any one or all of the Safety Action Teams and to the problem solving team concept. It is used here in that context and is not a reference to Panel SP-5.

Each team will also have a line foreman, a company safety person, and four union members. The Team Leaders have already chosen their teams and they are currently receiving training. By early June all of the teams should be meeting weekly to try and solve some of the problems that cause the serious injury problem we are facing today. The company has pledged full support to this Project and will kick in some funding to go along with the money already put up by the Society of Naval Architects and Marine Engineers.

"This Project, if successful, would be beneficial

to both the company and the union. The company is hoping that this project will help reduce their multi-million dollar compensation costs. Our hope is to keep our members from getting hurt on the job. As we all know, it's bad enough to get hurt on the job and suffer through the pain of the injury, but this is often complicated by the difficulties and aggravation of trying to collect your workers' comp. money. "Our goal is to have our members come to work with all of their body parts working and to go home that way at the end of their shift!"

SECTION V

ESTABLISHING THE SAFETY ACTION TEAMS

The Chairman of the Metal Trades Councils' Safety Committee was charged with the responsibility of selecting and appointing the Safety Action Team Leaders. It was originally intended that there would be three Safety Action Teams and that each Team Leader would be a Shop Steward in his respective department and, where possible, would have had problem solving experience in the prior SP-5 effort. Before any teams were organized, however, the number increased to four and then to five and, as a result, the qualifications re shop steward and prior SP-5 experience were, in certain instances, waived without any adverse impact. For example, it was initially intended that the MTC Safety Chairman would also be one of the Team Leaders. When the number of teams expanded to five, however, it was felt that he would be spread too thin doing both team leadership and overall project coordination. He was, therefore, replaced on the Steel Trades Safety Action Team by an individual who was not a Shop Steward but who had, had SP-5 experience.

The MTC Safety Chairman and the Project Manager established the size and composition of each team, as follows:

Each team would have six members in addition to the Team Leader and four of those six would be hourly employees, one would be a member of management and one would be a representative of the Safety and Health Department of the Human Resources Division.

It was intended that the Safety and Health representative would be a resource in his area of expertise and would provide access to the formal and informal safety and health organizations in the yard. The member of management was to be a door opener in areas not normally available to hourly employees and a facilitator through the organizational maze with which hourly

employees do not normally deal on a day-to-day basis.

With guidance from the MTC Safety Chairman, the Team Leaders were given responsibility for selecting their team members within the above guidelines and with due consideration being given to geographical area representation within the yard.

The Team Leaders were also given responsibility for selecting the area of research their respective teams would pursue.

They scheduled the times and places of their team meetings, insured that minutes of the meetings were kept, followed-up on action items and met monthly with the MTC Safety Chairman to report on their respective team's activities.

The MTC Safety Chairman had overall responsibility for the teams' organizational efforts and for the scheduling of the Team Leaders' team building training, and the teams' problem solving training.

Functional problems were up to the MTC Safety Chairman, the Team Leaders or the teams themselves to resolve; problems caused by or because of management organization or jurisdictional constraints were brought to the attention of the Project Manager for resolution.

The five Safety Action Teams and their areas of research were as follows:

- Steel Trades - Eye Injuries
- Pipefitters - Hand and Finger Injuries
- Electricians - Hand and Finger Injuries
- Painters - Eye Injuries
- Carpenters - Back Injuries

The areas of research were selected on the basis of accident and injury statistics maintained in the dispensary and Workers' Compensation statistics maintained by the Safety and Health Department and made available to the Team Leaders at the outset of the project.

It is appropriate to note here that a standing committee, known as the Management Safety and Health Steering Committee (MSHSC), has been in existence in the yard for some time. It operates under the chairmanship of the Director of Operations-Construction and is comprised of members from several functional areas in the yard including, of course, Safety and Health. Its charter is to look ahead for potential safety and health problems, to stay on top of the state of the art in safety and health innovations and to investigate the facts with respect to serious accidents, near misses and narrow escapes.

While the Safety Action Teams did not have a reporting responsibility to MSHSC, they reviewed their activities with them as a matter of courtesy and they brought recom-

mendations to and sought assistance either directly or through the Program Manager or the MTC Safety Chairman from individual members who had functional responsibilities in areas of the specific interest. The Teams also invited MSHSC to observe their formal presentations to management.

The arrangement worked extremely well.

The project was so organized that as a team completed a portion of its research and had recommendations to make as to that portion they were made at that point. They were not accumulated over time and then offered up as a group during the team's formal presentation to management. Implementation, where practicable and appropriate, was also done on a current basis.

It is also important to note that each team's activities, its problems and progress, were the subject of regular dialogue among the Team Leaders, team members and the MTC leadership.

SECTION VI

TRAINING

Those responsible for the design and implementation of this project recognized that adequate up front training of the Team Leaders and Team Members was essential to its success. In January, 1989, the Team Leaders were introduced to the overall design of the project, its goals and objectives and the organizational structure within which they would be operating. They were given training in team building concepts, in the problem solving process, in group dynamics and in conducting and facilitating meetings. They were also introduced to proposal development and presentation which would not come into play, however, until their research had been completed and their recommendations had been formulated.

When the Safety Action Team process was restarted after the strike-related hiatus and the Team Members had been selected, the five Safety Action Teams, with their Team Leaders also in attendance, were in May, 1989, similarly introduced to the design of the project, its goals and objectives and the roles to be played in support of their efforts by the Divisions' Safety Steering Committee, the Medical, Safety and Health and Management Development Departments of the Human Resources Division as well as the roles of the MTC Safety Chairman and the Project Manager. They then underwent training in group dynamics and problem solving.

That training also served as an excellent refresher for the Team Leaders who had not had the opportunity to exercise

their new-found skills since their initial training in January.

The Supervisor of Management Development, who conducted all of the training sessions and insured that each team successfully worked through its initial organizational problems, then acted as the team consultant, on call whenever they needed training assistance. Periodically, he sat in on individual team meetings to evaluate performance in the concepts covered in the initial training sessions, to determine if retraining was called for and to identify specific additional training if needed. In sum, he functioned as an ad hoc member of each team.

One of the lessons learned from the prior SP-5 effort was that each team should select a problem with a very clear identity. None of the teams experienced the frustration of attacking a problem that was inappropriate for it to address, was beyond the scope of the project or was so broad as to defy precise definition and, therefore, a suitable problem solving approach. They also were able to avoid chasing a perceived problem only to find that it either was not a problem or had already been resolved.

As the work of the Safety Action Teams neared fruition, the Supervisor of Management Development trained the teams in proposal development and presentation. He also trained and certified the Carpenter Team members to teach the training program they developed as part of their project.

SECTION VII

THE SAFETY ACTION TEAMS

The Steel Trades Safety Action Team	
Fred Stula - Leader	James Clemens
Gene Stirlen - General Foreman	Sally Textor
"Red" Boiler - Safety Department	Joel Russell

The Steel Trades consist of welders, shipfitters, grinders, riggers, crane operators, burners and drillers. Stula was chosen because he had been involved in the initial SP-5 project on the Welders Problem Solving Team and had made a significant contribution to that Team's success. He was not a Shop Steward.

His prior SP-5 experience and the relationships which he developed with fellow members of the Problem Solving Team played an important part in the way in which this team functioned vs. the other Safety Action Teams.

In the initial Team Leaders meeting after the kickoff meeting on May 11, computer printouts were distributed to the Team Leaders showing the frequency of types of injuries for employees in each Team Leader's departments or areas of interest. While the ground rules provided that each Team Leader could select the type of injury he wanted to pursue, Stula noted that the frequency of eye injuries among Steel Trades personnel jumped off the page - out of about 3,000 injuries in the period being examined, 2,000 were eye injuries. The selection issue resolved itself.

Stula's next step was to select his Team Members. The ground rules called for three additional people from the trades (not necessarily Shop Stewards or Union officials), one representative from the Safety and Health Department and one member of management. It bears repeating that even the selection of the specific member of management was the exclusive prerogative of the Team Leader. Because the records indicated that eye injuries were very prevalent among shipfitters who represented a large segment of the Steel Trades, Stula selected a foreman from shipfitting as the management member.

After the team members had been selected the next order of business was for Stula to conduct what he terms "identity meetings" in which team members get to know each other. The Team then moved into professionally conducted training sessions in group dynamics and group

problem solving techniques. The Supervisor of Management Development had been assigned as a consultant to the Union in this project and was available, on demand, for these initial training sessions and for subsequent refresher sessions as well.

Having gained some expertise in group problem solving and data analysis techniques the Team set to work. The first order of business was to become familiar with the Health-Net which contained computerized information covering all dispensary visits.

The Team was given access to the Health-Net computers on a prearranged schedule and team members were able to read employees' descriptions of how their injuries occurred and the nurses' description of the injuries themselves. In most instances the facts were described so tersely that many needed further explanation which was, of course, provided. For example, the Team learned that an eye injury described simply as "rust" meant that a piece of metal had entered the eye and the chemicals in the eye immediately began the oxidation process. In other words, "rust" meant metal, not wood or dust or some other wind blown object. The team was also surprised at the frequency of the appearance of the word "overhead" in the notations. They discovered that that covered a whole host of situations where dust or other particulate matter would fall from overhead onto a shipfitter's or grinder's shield or goggles and that, when the shield or goggles were removed, matter simply fell into the workers eyes, as opposed to the common occurrence of an object being blown or otherwise forcibly driven into the eye. "Overhead" entries occurred so frequently that the team decided to make them a separate area of inquiry.

Set forth below are the statistics covering dispensary visits due to eye injuries, by trade, in the Steel Trades for the years 1988 and 1989 which formed the background for the Team's investigation.

Year	Shipfitters	Grinders	Welders	Riggers	Crane	Burners	Drillers
1988	548	1010	884	91	9	33	57
1989	356	746	830	16	3	9	26

The Team studied 245 of those injuries which they broke down as follows:

Trade	Loose Debris	Foreign Bodies	Overhead	Rust	Slag	Flashes	Abrasions
Shipfitters		47		1		4	2
Grinders		78	18	4		2	2
Welders		64	6	2	7	8	

It is not surprising that the 189 cases attributable to loose debris and foreign bodies received the Team's greatest attention.

There is wide acceptance of the theory that there is a direct correlation between the number of eye injuries and failure to wear safety glasses. The Team did not fully accept that theory. There was, in fact, general agreement among the team members that reliable estimates of compliance with the yard's mandatory eye protection program did not exist and, for the Team's purposes, that matter was irrelevant. As indicated above, the Team found that many foreign-body eye injuries occurred in spite of the wearing of safety glasses or goggles and, in fact, some occurred because of them.

After considerable research on goggles currently available and in use in the yard, it was concluded that all of those goggles were constructed with vent holes which were designed to prevent fogging but which, unfortunately, allowed particulate matter to enter. A research of vendors catalogues available in the Safety and Health Office revealed the availability of a type of goggle having one-way air vents and meeting the ANSI standards for a combination of impact and chemical splash resistance. The Team suggested that a small supply of those goggles be purchased and made available for testing. That suggestion was implemented immediately and a dozen pair were purchased and distributed. Sometime after the distribution the team conducted a survey of their acceptance.

Pertinent parts of that survey, along with responses, are set forth below:

1. How do you like these goggles? 7 liked better.
2. Do they fog up? 6 No, 3 Yes.
3. Did debris enter? 6 No.
4. Do they interfere with your personal eyewear? 1 Yes, 6 No.
5. If these became the yard issue, would you wear them? 7 Yes, 1 No, Depends on job.
6. How is the general fit of the goggles and strap? 9 OK.
7. Do they cause headaches? 9 No.
8. Do they cause distortion, magnification, or double vision? 9 No.
9. Are they prone to scratching? 9 No, Not while in bag. "

The Team concluded that the survey indicated that the majority of those who tried them favored them. They seemed to perform as advertised - fog proof lens, soft side frames, more comfortable fit and replaceable lens which exceeded applicable safety glass standards.

Another four dozen pair have been purchased and are currently being monitored for demand and usage.

The Team also believed that it would be beneficial to explore some of the reasons that, despite an awareness of

the importance of eye protection, employees sometimes do not wear safety glasses or goggles. One of the most common reasons, of course, is the constant fogging of the goggles which was addressed above.

Another common reason is frustration with glasses which constantly slip down and slip off a sweaty nose. A device called a "bonker" has been available in the shipyard for some time on a limited basis. A "bonker" is a strap which, attached to the ends of the frame of safety glasses and goggles, fits around the head and is capable of adjustment as to fit. Positive aspects of "bonkers" are that they eliminate the frustration caused by slipping, reduce the number of glasses damaged as a result of slipping off, aid in the fit of the glasses and act as a reminder to wear them.

The Team recommended to the Chairman of the Management Safety and Health Steering Committee (who is also Director of Operations) that "bonkers" be made available to all production and maintenance employees and that they become permanent free issue items. As a result several thousand pairs were ordered and made available throughout the yard. Demand originally outweighed supply. The Team further recommended that consideration be given to imprinting them with a safety logo.

The Teams' research also led it to observe an inconsistency in the types and quality of safety eyewear then being issued in the year. Some glasses are more protective with wider sideshields, more contoured fit around the brow, side vents, etc. While some pairs are suitable for some trades, other trades need greater or different protection. It was noted that an effort should be made to suit the eyewear to the need. The group also recommended that the Purchasing Department be made more aware of the specific needs of the various trades. In this instance one size does not fit all.

The aforecited survey also indicated that vanity played a role in the wearing of safety glasses. That people prefer a variety of styles and colors of frames is attested to by the choices available in businesses that sell eyeglasses on the outside. Consideration to providing a choice of colored frames was recommended to further encourage greater consistent use of safety glasses.

And as its final recommendation from this first phase of its activities as the SP-5 Steel Trades Team, the Team recommended a program of greater safety awareness in the form of, in their words, "non redundant disposable education." This would take the form of eye catching posters on different safety subjects to heighten awareness of saving one's sight so as to continue to enjoy the beautiful sights and scenes which sighted people take for granted.

As a parenthetical notation, throughout this entire effort Stula's Team functioned without the participation of a member of management. Although various foremen were assigned as Stula's selections they simply failed to attend any Team meetings. The reason given was that

they were always too busy to break away from their assigned tasks. In his own way Stula accepted that. That lack, however, did not interfere with the Team's progress. As mentioned earlier Stula had developed a unique relationship with his Superintendent and General Foreman because they were fellow members of the Welding Problem Solving Team. In the course of that activity he had also developed a relationship with the Chairman of the Management Safety and Health Steering

Committee. Because of that and because of the organizational importance* the Team Leaders were beginning to acquire, the need for a member of management on Stula's Team was obviated. Nevertheless, Stula regretted that lack because it meant that his Team functioned with one fewer mind than it should have had to provide and explore ideas.

* This phenomenon is discussed later in Section VIII - Observations.

THE CARPENTERS SAFETY ACTION TEAM

John Algieri - Leader
Harold Tourtelott - Foreman
Don Barnes - Safety Department
Ted Coderre

Don Beeney
Michael Rourke
Ed Fronczek

At about the time the SP-5 Safety Team project was beginning to get organized, Algieri was asked by a representative of the MTC if he would be interested in heading up a Carpenter Department Safety Action Team. The fact that Algieri had had no prior SP-5 knowledge or experience and the then negative union/management relations argued against his acceptance of that offer. Persistence by the MTC representative, however, persuaded him to attend the initial meeting of Team Leaders with the understanding that, if at any time he got turned off, he could walk away. On that basis and after clearing the matter with his local union president, Algieri assumed the role of Carpenter Safety Action Team Leader.

At the first Team Leaders' meeting in which the ground rules concerning the selection of Team Members and type of injury were discussed, Algieri became intrigued with the idea of examining the causes of back injuries because the statistics indicated a need to explore that area and also because Algieri had, himself, suffered three back injuries while at work in the yard. Those injuries were severe enough to require surgery after each occurrence.

In selecting his Team Members, Algieri applied the principles espoused in that matter in the Team Leaders' training session: he gave consideration to length of service in the Carpenter Department and the geographical area of assignment of prospective members. Before making the actual selections he reviewed his choices with his local union president. The atmosphere in the yard was such that he felt compelled to keep his union up to date on what was happening. In determining which member of management to select Algieri chose his foreman not only on the grounds of that individual's competence and commitment but also because he would be constantly aware of what Algieri and the team members were doing, thereby eliminating any "permission to be off-the-job" type problems.

After completing the team building and group problem

solving training described earlier, Algieri's Team was introduced to the Health-Net to gather the information it needed to establish its data base. Unfortunately, as mentioned earlier, the first report of injury records at the dispensary are, in Algieri's words, "vague, inconclusive and devoid of detail as to how the accident happened." The Team gathered back injury statistics for the period from January 1, 1988, through May 31, 1989, as follows:

	No. of Back Injuries	No. of Workers' Comp. Claims	%
Total Yard	2,199	983	48
Carpenters Dept.	219	99	45

Two aspects of those statistics surprised the Team. The first was the frequency of the injuries and the second was the very fact that the statistics were made available to it.

The Team decided that the best way to get a handle on the cause of the back injuries was to interview employees who had suffered them and, to that end, they developed the following questionnaire:

"Name (Optional):

1. How did the injury occur?
2. What were the working conditions?
3. Were safety precautions mentioned to you prior to performing the job?
4. What was the supervisor's attitude towards getting the job done? Was it a rush job?
5. Was the proper equipment available, and was it used?
6. If this was a re-injury, were worker's restrictions disregarded by either the supervisor or the worker?
7. What were the weather conditions at time of injury (if outside)?

8. What was your attitude towards the job? Did you need help, but didn't ask for it? Does your supervisor ridicule you if you ask for help?
9. Was lumber staging brackets (etc.) wet, cover with ice, etc.?
10. Was the job done in proper sequence, or should the job have already been done when it would have been easier or more wide open?
11. Was enough light available for the job?
12. Do you remember the last time you went to a safety class on lifting and handling?
13. Could the job have been done in a safer method, but would have taken more time and your boss said that we didn't have enough time?
14. Do you do this type of work on a daily basis, or were you just there because the job needed to be done "NOW?"
15. Did you have enough room to work, or was it very congested?"

It then selected thirty geographically dispersed employees to be interviewed on a confidential, one-on-one basis, for about one half hour on company time. Two people whose back injuries prevented them from returning to work at the yard were also interviewed by a Team Member outside of working hours. Some of the ground rules for conducting the interview are contained in some rough notes made available to the author, as follows:

- Be sure to get permission from supervisor to talk to employee.
- Ask employee for permission to question him and to see his/her safety record.
- Be thorough in interview. Don't rush.

The following is an excerpt from the minutes of the Team's meeting of July 18, 1989:

"A discussion was held on the outcome of the survey. A preliminary conclusion reflects our concerns that more training is necessary along with better, stronger statements from upper management concerning safety for the employees. "

Not one of those interviewed could remember the last time he attended a safety class on lifting and handling.

In its further deliberations the Team recommended the following actions:

1. Pilot a 2 to 2 1/2 hour training program in proper lifting and handling techniques for all carpenters in the Model Shop. The training program to be developed and taught by the SP-5 Team. (The employees in the Model Shop were selected because the incidence of back injuries is statistically significantly higher than normal and they made an excellent control group because of the regularity of their assignments to one particular area.)
2. Track back injuries among those trained over a significantly meaningful period of time (a minimum of six months).
3. Based on results implement training program for all carpenters.
4. Conduct training for all Department 252 supervisors.
5. Based on results, implement throughout the shipyard.

The Team was given approval to develop and conduct a training program in proper lifting and handling techniques. Each member devoted a considerable amount of his own time to researching and studying material in support of the training course development. The program was reviewed and approved by the yard's Physical Therapist as being accurate and complete. She also participates in the classroom instruction.

Each two hour training session will involve 18 people and consist of a review of the yard's statistics related to back injuries, and a review of the physical, financial and psychological implications of a back injury. This portion of the program will be supported by two brief video tapes -one on the psychological, financial and physical implications of a back injury and one on lifting and handling.

Each team member has been certified by the Supervisor of Management Development to teach the course. Three team members will conduct each two hour session rotating between the roles of lecturer and demonstrator.

Algieri summed it up this way:

"We developed the basis for the program. We developed the course outline. We developed our teaching skills and now we're going to teach the class.

"Coming from their peers, they're going to listen.

"The beauty of our program is not only are we going to tell them how to lift and show them how to lift, but we're going to make them do it. We'll have keel and bilge blocks and staging planks in the classroom and they are going to lift them and get to know what a proper lift feels like. That's important, recognizing the right feel."

THE PIPEFITTERS SAFETY ACTION TEAM

Wayne Peccini - Leader
Fred Wood - Foreman
Calvin McCoy - Safety Department
Stephen Barrett

Alfred Mandler
Vincent Petrarca
Lois Willcox

Peccini had been a fellow member of the MTC Safety Committee with Chairman Mike Fitts. It was only natural, therefore, that Fitts selected him to be the Team Leader. The Pipefitters union numbers around 1500 and includes in its membership in Department 243 employees classified as pipefitter, pipe hanger, pipe bender, pipe inspector and brazer. In calendar year 1988, employees in that department had experienced 537 hand and finger injuries -125 hand and 412 finger. Those injuries represented, by far, the largest injury type in the Department. Eye injuries, numbering 288 in 1988, came in second.

For obvious reasons Peccini chose hand and finger injuries as the area of interest for his Team. After completing the Borge training sessions in Team Building and Group Problem Solving and after becoming familiar with statistical information available to it through the Health-Net the Team decided to examine, in depth, 100 hand/finger injury cases selected at random. It devised a Question Sheet (See Exhibit PF1) and interviewed as many of the employees involved in the particular accidents as were willing to participate on an anonymous basis. Peccini says that over ninety percent of those approached for information provided it.

The Team met for two hours every Friday analyzing the results of their Question Sheet and brainstorming the specific causes of accidents and ways to avoid them.

The Team noticed that a number of cut hands and fingers occurred when employees attached metal I.D. tabs to pipes using wire and plastic tie wraps. The Team discussed two ways to approach the problem. The first was to encourage the greater use of gloves while performing this and a host of other tasks and the other was the elimination of the offending tie wraps. The glove situation is discussed at some length later. The Team decided to experiment with the use of a type of tape in common use in the yard known there as "EB GREEN", to affix the metal I.D. tabs to pipes. It was first necessary to determine whether "EB GREEN" could withstand the approximately 175 degree Fahrenheit temperature the pipes are exposed to during the cleaning process.

It has been shown that the "EB GREEN" can withstand that temperature and is an entirely suitable and safer method of affixing the metal I.D. tabs.

The study of the accident statistics also revealed an unusually large number of knife wounds. Peccini explained that the main reason Pipefitters use knives is to remove tape and stickers from pipes. He continued that

after completion of processing and cleaning in the shop, the ends of the pipes are capped and the caps are then taped over using "EB GREEN". After inspection, the inspectors then affix a cleaning sticker to verify that the pipe has been inspected.

That sticker is attached to the "EB GREEN" by means of cellophane tape. In addition, pipes which either are rejected or are to be moved aboard ship by Riggers (because of their size and/or weight) have very thin, extremely sticky paper identification labels affixed to them. In order to work on the pipes and, after installation, have them accepted, the "EB GREEN" and the cellophane tape and the thin paper stickers must be completely removed. All too often, the process of cutting and scraping the tape and the stickers *with knives* results in cut fingers and hands.

The Team has recommended three methods of attacking this problem. The first is that a tab be placed on the end of a wrap of "EB GREEN" when capping pipes. It would thus be a simple matter to grasp the tab and tear the "EB GREEN" and cellophane tape in a single motion eliminating the need for the knife. Similarly, placing tabbed "EB GREEN" on pipes before reject/move labels are affixed and then having the labels stuck on the "EB GREEN", also eliminates the need for knife scraping.

The second recommendation is that only knives which can be locked in the open position be used. Examination of the injuries revealed that, while in use, the knife blade would fold over and cut into an employee's hand. A blade that locked open would tend to avoid that problem. Peccini feels that it would not be feasible or practicable to place a ban on non-locking knives because of their prevalence throughout the yard. He believes that it is the Team's responsibility, however, to make people aware that a knife with a locking blade is far safer than one without that feature. To that end the Team has also recommended that all new hires be made aware of the importance of locking blades, that the yard's electronic bulletin board regularly feature messages on locking blades and that a hand safety training program be designed and implemented for Department 243.

The third recommendation has to do with the wearing of gloves. Historically, two types of gloves have been available to Department 243 employees: a white cotton glove and a blue cotton glove with a leather palm. Both types of gloves were available in only one size. Based on their own experiences and discussions with fellow employees, the Team concluded that most employees would and, in fact, should wear gloves regularly because of the

DATE

PIPEFITTERS SP-5 QUESTION SHEET HAND AND FINGER INJURIES

1) _____ 2) _____
Name Dept. Badge shift

3) _____ 4) _____
Date of Injury Type of injury and location on body

5) _____ 6) _____
Shop location and boat number Supervisor

7) _____
Explain how injury happened

Suggestions on how injury could have been prevented. Including better safety equipment and training.

hazards inherent in submarine construction due to the ubiquitousness of slivers of metal on decks and other areas where employees place their hands, the cramped quarters which greatly increase the risk of bruises and contusions and the chance encounters with metal made hot from welding and brazing. The Team discerned that one of the principal reasons that gloves are not worn is that they simply don't fit many employees. The Team recommended that a full range of glove sizes be purchased and stocked for use throughout the Department. It also recommended that padded gloves also be stocked for employees who regularly use vibratory tools.

Another common source of finger injuries was the pipe caps in use in the yard. It was discovered that the caps in use were received in the yard with very sharp edges and in an oil soaked condition. Employees not using gloves would

frequently cut their fingers while handling the caps in the normal course of their work. As a result of the Team's recommendation, future pipe cap purchase orders will specify the removal of the sharp edge and oil prior to shipment by the vendor.

Another recommendation that the Team made was the tailor-made hand safety course. This course is being taught to the new hires at the training school and consists of a combination of the Teams other recommendation so that the new employees will be aware of using only knives that lock in the open position, about putting tabs on "EB GREEN" for easy removal and about the need for wearing gloves whenever possible. The course also addresses the proper use of some of the more dangerous tools and equipment used in Department 243.

THE ELECTRICIANS SAFETY ACTION TEAM

Ken O'Brien - Leader
Steven Mailhot - Foreman
Larry Trent - Safety Department
Richard McCombs

Michael Koczwanski
Bill Robarge
Ken Billington

O'Brien inherited the job of Leader of the Electricians Safety Action Team from Gary Fontaine when he replaced Fontaine as a member of the MTC Safety Committee. Because of this transition in leadership there is some uncertainty as to whether the Team selected hand and finger injuries or whether that category was assigned to them for study. In any event, following orientation, team training and introduction to the Health-Net, the Team decided to concentrate its efforts on the hospital reports covering hand and finger injuries suffered by Electricians in the North Yard where pre-launch activities are concentrated.

The study concentrated on 125 hospital reports covering the period from January 1 to May 31, 1989. After categorizing the causes of the injuries as described in the hospital report, the Team determined that most of the injuries occurred: while employees were in the process of banding cable, where the banding material itself caused the injury; while employees were in the process of stripping cable using knives, where the slip of the knife caused a slicing or stabbing injury; and while acting as members of a large team of cable pullers pulling cable onto or throughout a vessel where hands and fingers were smashed against or into panels or hangers, etc., aboard ship.

It should be noted here that the team members believe that a significant number of back injuries are caused by the present method of gang cable pulling but they did not develop statistics in that area because their charge was hand and finger injuries. As to those injuries within the Team's purview, one team member stated, "What shocked me the most was how much money the Company paid for

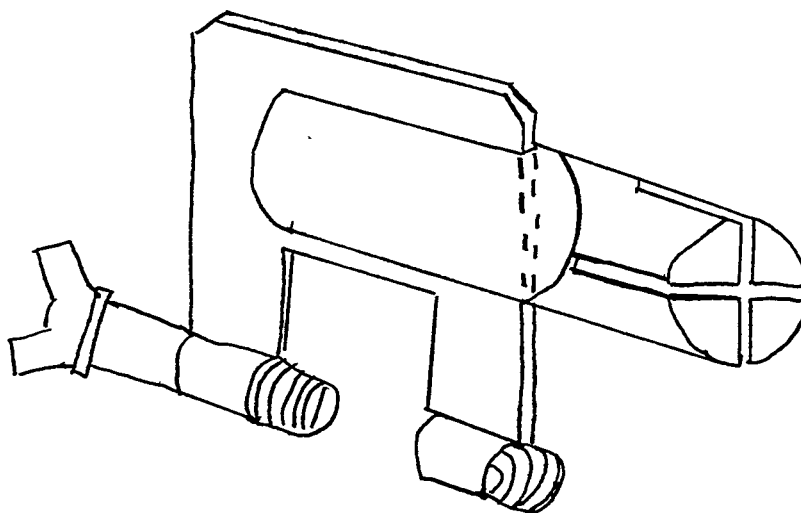
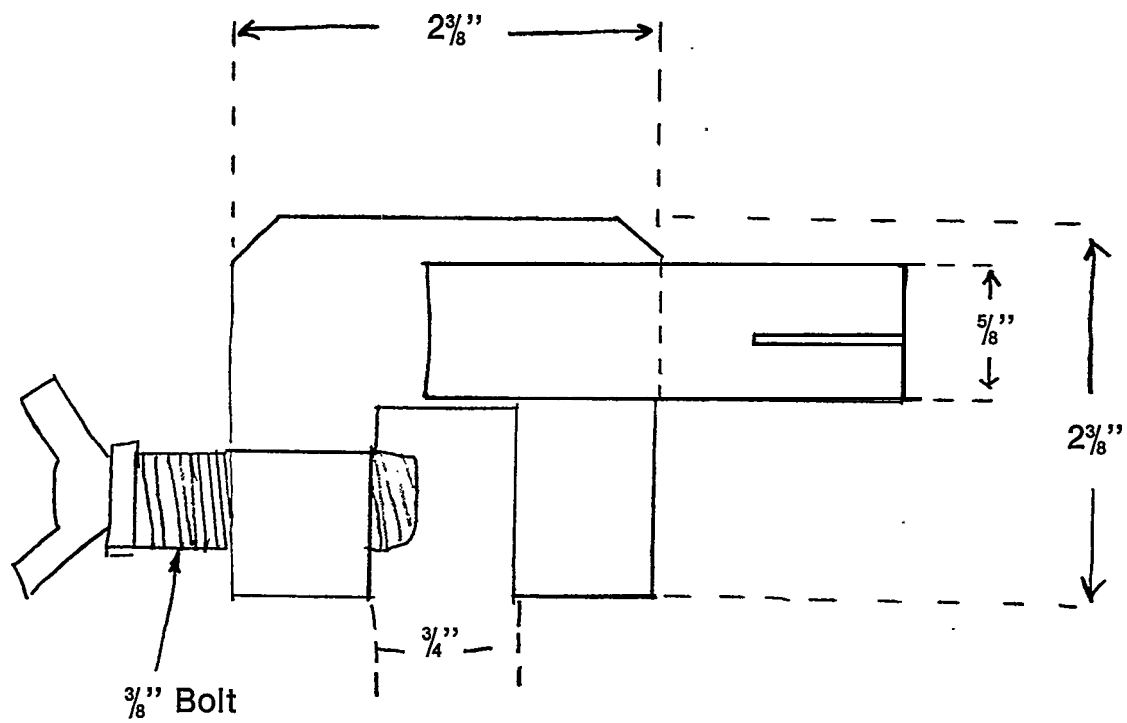
those injuries and how many of them could have been avoided."

After identifying the principal causes of the injuries from the Health-Net data, the Team then surveyed a number of employees for a full description of how a banding or stripping or cable pulling injury occurred. Those interviewed were not necessarily those in the Health-Net statistics but were casual acquaintances of the team members who were known to have suffered hand or finger injuries. The team members identified themselves as members of the 5 Safety Committee and, once SP-5 and the purpose of the interview were explained, they found that the interviewees freely volunteered any information sought.

In examining the banding area, where the hospital reports described the injuries as banding and tie wrap cuts, the team members acted out a typical banding procedure, from taking the banding material out of its box to actually banding up a cable run, in order to determine which steps most commonly caused the injuries. They discovered that the critical step was in making up the buckle because, at that step, it was necessary to slide the banding material through the hand.

Accordingly, they designed a tool, which is depicted in Exhibit E1 hereto, to accomplish the buckle-making task and eliminate bare-handed involvement in the task. The Team fabricated a dozen of these tools which are currently in use in the yard and another one hundred were manufactured. The tool has become an integral part of the Shipyard Standard Procedure for this work.

EXHIBIT E1



Band Making Tool

The Team also recognized that when the ends of temporary banding are not folded over a sharp edge exists and employees of various crafts are exposed to a cutting hazard as to their persons and their clothing. A small can-opener like tool has been available in the yard for some time the purpose of which is to fold over the bitter end of the banding so as to leave a blunt rather than sharp end exposed. That tool had fallen into disuse over the years and has now been resurrected at the Team's suggestion. The bending over of the sharp ends has been incorporated in the Shipyard Standard Procedures for permanent bands and, at the Team's suggestion, is being considered for temporary bands also.

As to injuries which occur in stripping cable the Team identified the use of knives as the culprit. Its investigation of the yard's tool cribs revealed the existence of a variety of cable stripping tools, none of which was completely satisfactory. At the Team's request a representative of a tool distributing firm supplied the Team with a copy of its catalogue of tools appropriate for the purpose and visited with the Team at the yard. The Team selected one of the stripping tools as an experimental model and its performance has been found to be satisfactory. This tool is called an AMI Paladin Cable Stripper.

Because there are situations where a stripper cannot be used and only a knife will do the job, the Team has investigated a variety of types of knives in an attempt to identify the best.

It has come to the conclusion that what the yard needs are standardized tools for these purposes. It has, accordingly, recommended that a procedure be established to

keep abreast of the latest developments in tool design, that training programs incorporate the identity of acceptable tools and that all new hires and employees with less than one year of service be so trained. As a result a program incorporating the Team's recommendations is scheduled for implementation in early 1990.

In response to a question as to why these corrective actions had not taken place heretofore the Team responded that nobody realized that there was a problem. Team members explained that everybody was comfortable doing what he or she had been doing - like using a knife to strip a cable. One Electrician would strip cable as part of his job for a year or two and then would get cut or stabbed. Another Electrician would do the same. So, individually they were rare, isolated cases; but collectively they amounted to a significant number of the same kind of injuries. The problem only surfaced as a result of the SP-5 investigation.

The third type of work that the Electrical Safety Action Team investigated on the basis of the number of hand and finger injuries involved in the process was the gang pulling of electrical cable onto and aboard ship. The Team recommended that, where practicable, a mechanical pulling device, known in the yard as a Greenlee Cable Puller, be employed. It is a device that is in common use in other types of construction and in the yard's Maintenance Department. The Team has demonstrated the injury and labor saving advantages in a non-production environment. A full scale demonstration in a production environment is scheduled for power cable installation on Hull No. 739 in April 1990.

THE PAINTERS SAFETY ACTION TEAM

Roger Lamonthe - Leader
John Lopresti - Foreman
Gary Patterson - Safety Department
Neftali Sostre

Wayne Morse
Paul Paquin
Robert Delaporta

Although the Team Leader for the Painters Safety Action Team has recently been replaced, for the purpose of this description of its activities Lamonthe was the Team Leader. He was selected by MTC Safety Chairman Fitts and he, in turn, selected Paint Department representatives from various areas in the shipyard. Chief among his selection criteria was their demonstrated safety consciousness. A typical of the other teams' modus operandi, however, the selection of the area of investigation itself was a Team effort. The Team selected the area of eye injuries on the basis that it could have the most significant initial impact as it was the Paint Department's most frequent injury

category. The medical records for Division personnel for the first six months of 1988 contain a total of 11,273 injuries which divide up as follows:

Body Part	
Eyes	3,046
Fingers	1,954
Back	1,066
Legs	869
Arms	784
Hands	765
Wrists	360
Head	286
Shoulder	257
Chest	201
Ankles	200
Hips	177
Other	1,308

The Team then analyzed all of the statistics as to where in the yard the injuries occurred, what work day, what shift and what employees by age group.

The seriousness of the eye problem is described by the Team in terms of injuries as follows:

Exclusive of eye injuries which resulted in workers' compensation claims, from January through June, 1989, there were 2,329 eye injuries. Of those, 311 were serious enough to require professional treatment beyond that performed in the yard dispensary.

The Team estimated that the average cost of the 2,018 less serious injuries (and again not including those resulting in Workers' Compensation claims) was between \$50 and \$60 per occurrence for a total non-workers' compensation cost of the less serious eye injuries of between \$101,000 and \$121,000. Included in those costs are the time spent walking to and from the yard dispensary, the pro rata share of the nurses' time, dispensary paper work, supervisors' paper work time and the cost of investigating the accident. Not included in the Team's estimate are the costs attributable to loss of production, the costs of dispensary treatment or the lost time costs.

The Team then decided to conduct a survey concerning the wearing of safety glasses among 150 anonymous hourly and salaried employees representing all trades in the yard. Each interview was conducted by two hourly Team Members and included employees in the Graving Dock, in Buildings 260 and 263 and the North Yard Ways.

The survey questions and answers are attached hereto as Exhibit P1.

The Team decided that, in addition to stressing the importance of wearing safety glasses and other eye protective equipment, it would address certain of the most serious cases of eye injuries which were identified as foreign bodies, like dust and grit from blasting, and burns from paint thinner and other chemicals in paints and solvents. Blasting, cleaning and painting operations are usually performed under high pneumatic pressure which, if something goes amiss, creates hazardous conditions beyond those with which safety glasses (or even goggles) are designed to cope.

It is not uncommon in the yard for lengths of pressurized blasting hose to separate at a joint because of a faulty connection or worn gasket. In that event blasting material escapes at the joint and sprays wildly in any and all directions until depressurization can be accomplished. The Team recommended that in order to squelch the wildly flying debris and thereby reduce the exposure of blasters and others in the immediate area, a heavy rubber sleeve be made up to slip over the joint after the connection has been made. Then, if the joint separates, the area of exposure to

the escaping blast material will be limited by the choking action of the sleeve and thus considerably reduced.

That recommendation was immediately accepted and implemented.

The Team also recommended restricting access to areas where active spray paint rigs and blasting pots are located by cordoning off those areas using red "do-not-enter" tape.

That recommendation was immediately accepted and implemented.

The Team also recommended that an increased supply of "honkers" be made available and their use encouraged.

That recommendation coincided with a recommendation made by the Steel Trades Safety Action Team and has been implemented.

In order to provide more immediate relief for employees who suffer chemical burns to their eyes, the Team has recommended that twenty personal eye wash stations be located throughout the yard, and that portable safety sheds be placed in each basin during outfitting. The safety sheds would contain, in addition to eye wash stations, fire protection equipment, a first aid kit and potable water.

The Team has noted that in addition to providing immediate, albeit temporary, treatment for serious eye burns, with all the medical and curative benefits which flow from such rapid treatment - as well as the easing of the excruciating pain which accompanies such burns, the stations would also enable employees with less than serious foreign body problems to rinse their eyes and return to work in a fraction of the time currently the norm.

In no instance are the eye wash stations intended to substitute for proper yard hospital medical attention.

The Team estimates that the twenty eye wash stations could be made operable at a total cost of \$6,100 (not including subsequent maintenance costs), and that the benefits of potentially fewer hospital visits (hence time off the job), higher productivity and reduction in severity of the injury far outweigh that cost.

Similarly, the Team estimates that a "safety shed" could be built, equipped and made operable at a cost of about \$2,000 and that the benefits to be realized from such easy access in a building basin and compared to present procedures also far outweigh that cost.

The Team also made a number of suggestions aimed at reducing the number of reasons employees fail to wear safety glasses. Many of those suggestions are duplicative of those offered by the Steel Trades Safety Action Team and are currently being evaluated.

**PAINTERS
SAFETY ACTION TEAM

SURVEY RESULTS
150 EMPLOYEES SURVEYED**

1. DO YOU NORMALLY WEAR SAFETY GLASSES?
—80% YES
2. WHY DO YOU WEAR SAFETY GLASSES?
— EYE PROTECTION
— COMPANY REQUIRED
3. WHY DON'T YOU WEAR SAFETY GLASSES?
— FOGGING OF LENSES
— SLIP OFF NOSE WHEN SWEATING
— GIVE HEADACHES
4. DO YOU THINK SAFETY GLASSES ARE COMFORTABLE?
— YES, LIGHT WEIGHT IS A MAJOR FACTOR
5. DO YOU HAVE ANY SUGGESTIONS ABOUT OUR SAFETY GLASSES?
— PERFORATED SIDE SHIELDS
— BETTER NOSE PIECES
— DIFFERENT COLORS, STYLES, ETC.
— PURCHASE ONE PAIR OF PRESCRIPTION GLASSES EACH YEAR
FOR THOSE EMPLOYEES NEEDING PRESCRIPTION GLASSES
6. DO YOU HAVE A STRAP FOR YOUR SAFETY GLASSES?
—98% SAID NO

SECTION VIII

OBSERVATIONS

It is not surprising that the element that made the single greatest contribution to the success of the project was the complete and obvious support given to it by Operations management at its very top. Given the Union/-Management climate at the start of the campaign, support for all of the Teams' efforts, attentiveness to their needs and responsiveness to their problems were essential to develop, establish and maintain the trust the Union representative desperately needed to address their projects with the enthusiasm and dedication that became their hallmark.

At the risk of being overly repetitious, in worker driven projects of this nature management support is crucial and must include all levels of management. If any level of management in the chain of command does not support the effort it will fail. Each level of management takes its cue from the level to which it directly reports. When that cue is sent from the top, as it was in this project, the entire chain of command gets the message and priorities are established accordingly.

There must be a mechanism in place, however, to ensure that top management's commitment is regularly reinforced and that the fact of that reinforcement is communicated down the line.

It was established from the outset that the Vice President-Operations was committed to the success of this project and that, in the day-to-day administration of the project, the project manager acted on his behalf. It was essential that whoever functioned as project manager be and be perceived to be impartial and apolitical. The project manager saw to it that the Teams had access to the resources, both human and material, to accomplish their tasks as they saw fit. He acted as coordinator of events, counselor to the Team Leaders, advisor to the Vice President-Operations on the day-to-day workings of the Teams, arbitrator of disputes between the Teams and others who might otherwise have been less than cooperative. That function was absolutely essential in the early stages of the Teams' development to convince the Team Members of management's sincerity and support and to overcome hurdles and break down barriers the Teams encountered, whether real or imaginary, and to continually reinforce among members of management the Vice President's support for the project. He also regularly publishes and updates status reports of the Teams' recommendations. A sample status report is contained in Exhibit 01 hereof.

As the SP-5 concept itself and the Teams evolved and matured the need for the intensity of the Project Manager's participation diminished.

Also of critical importance in the Teams' development was the up-front training that the Team Leaders and team members received. In that connection, the following is an excerpt from NSRP Publication #0283, cited earlier:

"Each team should receive formal training in problem identification and problem solution techniques, as well as team building techniques, in advance of beginning its work. It is important that the Team Members understand that the training is formal and not just a 'helpful hint' session. Time off the job for training is costly. The amount and quality of training provided can be an indication of Management's commitment to the process. Team Members should understand that the training is being given because it is considered critical to the accomplishment of the Team's work and not just a nice diversion from the day-to-day routine.

"The training should include guidelines as to the methods by which problems are identified, for determining whether they are appropriate for a Team to address, are capable of resolution by the Team, or, if not, whether they lend themselves to analysis and recommended solution for implementation by a decision maker at another level.

"Periodically, during each Team's life it should be audited by a professional trainer from the Human Resources Department to evaluate its performance in the concepts covered in the initial training sessions, to determine if retraining is called for and to identify specific additional training that may be required."

The thrust of those comments was not lost on this effort and a large measure of the project's success is owed to that training and follow-up.

Coincidental to the evolution and maturation of the SP-5 concept and the Safety Action Teams was a unique status acquired by the Team Leaders in the yard organization. Evidence of this unique status is their ready access to levels of higher management not normally available to hourly employees and a general leadership role inferred to be theirs by the rank and file. It has become common for each Team Leader to be sought out and approached by production and maintenance workers and even supervisory employees on a host of matters beyond the scope of his Team's efforts. That status will become more apparent and will continue to grow as the Teams move into the next stages of their mission.

Consideration should be given to formal recognition that fact and to the institutionalization of the elevated status of the Team Leaders.

The Team Leaders, as a group, have developed into a valuable resource the utility of which has not been fully developed. While the Team Leaders, as a group, met with the Chairman of the MTC Safety Committee and the Project Manager on a somewhat regular basis about once per month, it was for the purpose of each Team Leader's reporting on his Team's current and sometimes future activity. The group itself does not act as a Team; as a group, it does not have a function. Consideration should be given to greater utilization of this valuable resource.

The Team Leaders are unanimous in their firm opinions that, although an extension of this effort is in order, the number of Teams is sufficient to accomplish the desired result and that the current membership of the Teams is sufficient to cover all areas. The Leaders also expressed the opinion that it is important to the process that, insofar as practicable, team membership remain intact and turnover kept to a minimum. Changes in members stall a team effort during the inevitable familiarization and trust-building period.

It was also their consensus that more frequent meetings among themselves and with the MTC Safety Chairman and

the Project Manager in the early stages of the campaign would have tended to reduce their natural hesitancy in asking for help when it was needed rather than waiting for the next meeting.

Notwithstanding the above, a resource that has been underutilized is a pool of employees in the yard that has interest in contributing to the safety action Team process but has been unable to do so because of the small number of Teams and the low turnover of members of them. Consideration should be given to determining the size and quality of this pool of talent and providing a vehicle for those who are interested to make a contribution.

And finally, there has to be a lesson to be learned in the manner in which the Teams exploited the data made available to them through the Health-Net. It is generally believed that that data had not theretofore been organized and scrutinized the way the Teams did. Although that has been described by Team Leader Algieri as "vague, inconclusive and devoid of detail as to how the accident happened" it formed the base on which each Team built its investigation and determined the specific causes of some of the injuries.

EXHIBIT 01

GENERAL DYNAMICS ***Electric Boat Division***

Inter-Office Memo

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To: J. Algieri, K. D. Brown, M. Fitts, V. Grybauskas, R. C. Januska, R. Lakowski, R. Lamonthe, D. G. Norman, K. O'Brien, W. Peccini, C. B. Shellman, Jr., F. Stula

Subject: SP-5 Safety Study-Status of Actions

Enclosure: (1) SP-5 Safety Recommendations - Status of 1/17/90

The recommendations presented by the SP-5 Safety Study Teams during the 12/18/89 presentation are depicted in Enclosure (1) which is submitted for your information. It is intended to periodically update this status as changes occur. Changes to the previous report are depicted in "bold" letters.

Any questions on this subject may be addressed to the undersigned.

C. F. RUPY

CFR: skw

SP-5 SAFETY RECOMMENDATIONS - STATUS

as of 1/17/90

RECOMMENDATION	STATUS
"BOLD" INDICATES A CHANGE SINCE LAST REPORT	
1. Stock various glove sizes in tool cribs.	Smaller size gloves are on order to test requested usage. (Not yet received.)
2. Issue padded gloves for use with vibratory tools.	Present stock is being increased and S.Y. tool crib will also issue (not just 260)
3. Utilize EB "Green tape" under rejection/move stickers.	OJT course will address and a change to the SSP is being initiated.
4. AftIx metal I.D. tabs to pipes with EB "Green" vs wire or tie wraps.	Samples are being made to demonstrate to Quonset Point/Groton personnel.
5. Change SSP 1.8 to dictate that a "tab" will be made on the end of the EB "Green" when capping pipes.	Change to SSP 1.8 being initiated; samples are being made to demonstrate change in method.
6. Have pipe-cap purchase order changed to: (a) remove sharp edge prior to shipment. (b) remove oil from pipe-caps prior to shipment.	Purchasing has supplemented existing purchase orders for metal pipe caps to eliminate these conditions.*
7. Only allow knives that have blades that lock in the open position in the S.Y.	OJT will stress the importance of only using locking type knives. Safety dept are developing posters to stress importance. Electronic signs will also deliver the same message.
8. Create a training course on "Hand Safety".	OJT program will be developed.
9. Conduct "Hand Safety" training.	Schedule to be developed early 1990.
10. Fabricate 100 "new" banding tools. (Refer to Employee Suggestion 030306)	Presently fabricating 50@ Grasso Tech. (Not yet received.)
11. Change P.O. for stainless steel bands to have vendor bevel or file sharp edges.	Vendor claims that edges are dulled prior to shipment.
12. Purchase more "standard" cable strippers.	Presently evaluating a sample lot of new cable strippers. Additional models are being ordered.
13. Purchase Greenlee Cable Puller and cableway rollers to support cable installation (Refer to Employee Suggestion 030355)	First test usage is scheduled for power cable installation on 739 in April with the SP-5 team.
14. Conduct on-the-job-training for new banding tool, cable strippers and cable pullers.	Same as "8" above.
15. Purchase and issue "Vented" goggles.	Four (4) dozen being purchased to monitor demand/usage. (Not yet received.)
16. Increase availability of "Bonkers".	Complete.
17. Purchase and issue "Flip-up" welding lens.	Complete.
18. Obtain various "colored" safety glasses.	Dept 223 is continuing evaluation with vendors.

RECOMMENDATION	STATUS
“BOLD” INDICATES A CHANGE SINCE LAST REPORT	
19. Develop “eye-catching” safety posters e.g. attractive/daring types.	Safety personnel presently initiating action including possible use of talking signs.
20. Purchase “more effective” eyewear for those trades more prone to eye injuries.	Same as “18” above.
21. Conduct a training program on back injuries for carpenters (initially). Proper lifting techniques, video tapes, etc.	Course content and video tape are nearing completion.
22. Build portable safety sheds for each basin. Sheds would contain tire equipment first aid kits, eye wash stations and potable water access outside the shed.	Meeting was held to define the intended use and basic design of shed. D223 will recommend either a purchase or locally fabricated structure to manage mt/SP-5 tear
23. Purchase one pair of “prescription safety glasses” per year for trade employees.	Memo written to Human Resources requesting evaluation.
24. Install rubber protection over blast pot hoses to insure secondary protection against steel shot release due to hose rupture.	Complete.
25. Rope-off all Spray Rig and Blast Pot areas with red tape to prevent eye injuries.	Complete.
26. Establish approximately twenty (20) personnel eye wash stations throughout the yard.	PEWO’S have been written to install stations in select bathrooms.
27. Fabricate or purchase a tool that will grab banding so that it can be pulled without contact with the person’s hand. (Refer to Employee Suggestion 030428)	This suggestion has been withdrawn by the cognizar team. COMPLETE
28. Fabricate or purchase a tool that will bend the sharp edge of banding over other than using pliers. (Refer to Employee Suggestion 030305)	500 being fabricated and will be distributed to employees.
29. Place instructions on spray-rig/blasting machines depicting proper stati-up/shutdown procedure.	Complete.
30. Investigate the use of longer hoses for spray-rig/blasting equipment to reduce the number of couplings that could fail.	D252 has determined that hose length should not be altered i.e. safety risk is low. COMPLETE
31. Ends on temporary bands should be bent over.	This will be added to OJT course.
32. Banding buckles should be tumbled to remove sharp edges.	Purchasing is contacting vendor to initiate action.

*Present stock of pipe caps are being sent to the Pipe Laundry for cleaning.

**PAPER NO. 1 SUBMITTED BY S. F. SULLIVAN
HUMAN RESOURCES MANAGER
BETHLEHEM STEEL CORPORATION
BALTIMORE MARINE DIVISION
SPARROWS POINT, MARYLAND**

"Our goal is to have our members come to work with all of their body parts working and to go home that way at the end of their shift !"

A more eloquent articulation of a safety mission I have not encountered. What's more, it proved to be the link which united two parties, one of whose every instinct under the circumstances was inimical to cooperation, in a cooperative effort which has produced results of which they should jointly be proud and which shows strong promise of producing more and better such results.

We managers who constantly parrot the truism that there is nothing complicated about safety should pay particular heed to this report, because it illustrates the execution by the EB/MTC ad hoc partnership of what we have probably been talking too much about and doing too little about.

While imitation may be the "sincerest" form of flattery, hearing "Why didn't I think of that?" in response to one's suggestion must be a close runner-up. If there is a single recommendation among those generated by the Safety Action Teams that is not grounded in pure common sense, buttressed by down-in-the-trenches, real world experience, I can't find it; nevertheless, it is clear to anyone who

operates in a shipyard environment that the modest investment which generated those recommendations is likely to produce returns that will dwarf it.

The answer for the rest of us to the "Why didn't I think of that?" question is, in all probability, that we are not using the right consultants or, if we are, we are not properly equipping those consultants.

EB and the MTC have shown us how to do it. They chose as their consultants those who have both the occupations and the occupational injuries. They imparted to them the basic skills necessary to their consultant roles, made available to them the data and other resources that they needed, then got out of their way, intervening only when necessary to remove impediments. The results speak profoundly for themselves.

Strong commitment to this continuing effort has been both expressed and demonstrated by EB and the MTC and, as one who has witnessed the palpable enthusiasm tempered with hard-nosed realism with which Mike Fitts and Chuck Rupy have presented the periodic project status reports, I look for an ongoing success story.

Our hats should be off to them.

**PAPER NO. 2 SUBMITTED BY N. C. HARRIS
DEFENSE LOGISTICS LIAISON OFFICER FOR MARITIME AFFAIRS
MARITIME ADMINISTRATION
WASHINGTON, D.C.**

The fact that union-managed problem solving teams can effectively improve safety was well proven by this project. The author, the team members, and the Electric Boat Division of General Dynamics are to be commended for producing an excellent, widely applicable, and easily assimilated methodology for addressing the causes of accidents and thereby reducing shipyard injuries.

In general, it takes considerable dedication on the part of both union and management to make any employee involvement project successful. On this project in particular, both the superlative efforts of the union team members and the solid support of management were critical. The author's candid discussion of the difficult labor relations atmosphere into which this specific project was born serves only to illustrate how significant accomplishment can be achieved when men of good faith work together. Although we can look at decreased injuries and worker compensation costs from a philosophical perspective as the overarching goals of this project, the bottom line is still the health of the individual worker. All study participants believed that to be of the highest importance which made this project work.

I was most impressed by the team members' use of the yard's computerized accident reporting system, Health-Net. Obviously, for any shipyard these statistics contain a wealth of information and, with just a little diligent investigation, can provide tremendous insight into safety

areas which need improvement. Perhaps one suggestion as a fallout from this study might be that more consistent and detailed information be entered into this or any similar system to facilitate identification of specific problem areas.

Personally, I was surprised at the sheer number of accidents and their similarities across the trades. Yet, by making seemingly small changes to gloves, glasses, and tools, this study shows that geometric advances can be made in safety performance. I also find it hard to believe that such common sense approaches to self protection are not already part of the system. As we are all well aware, however, the exigencies of day-to-day business often cause us to do what is most expedient—not necessarily most wise. The suggested training courses will be an excellent way to counter that urge by heightening awareness within the trades of the dangers which always surround them and giving them the tools for coping safely. The most significant part of this training is that it was developed by and will be taught by tradesmen—the people who best know their peers and their environment.

In today's highly competitive shipbuilding market, U.S. shipyards must find ways to continue to reduce costs and increase productivity. As these safety initiatives are implemented at the Electric Boat Division of General Dynamics, that shipyard will have healthier workers — an essential key to achieving those goals.