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U.S. DEPARTMENT OF THE NAVY
CARDEROCK DIVISION,
NAVAL SURFACE WARFARE CENTER
<table>
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U.S. SHIPBUILDING STANDARDS PROGRAM
LONG-RANGE PLAN

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New York, New York

ABSTRACT

Ishikawajima-Harima Heavy Industries/IHI-Marine Technology is developing a long-range plan for the U.S. shipbuilding standards program under a sub-contract with Bath Iron Works Corporation acting in its capacity as manager of the Ship Producibility Program.

Primary emphasis of the long-range plan is directed at near term (2 to 3 year) priorities to achieve maximum benefits at both industry and individual shipyards levels. Secondary emphasis is aimed at developing midterm (5 to 7 year) and long-term (10 to 20 year) goals to serve as planning guidelines for ongoing efforts.

The basic goals and objectives of the U.S. shipbuilding standards program long-range plan are summarized. Included are such examples as the need to reduce design and engineering cycle time costs, the need to shorten manufacturing lead times for critical materials, and the desirability of implementing outfit unit construction and accuracy control concepts. The recommended organizational infrastructure for standards development is addressed, and appropriate divisions of responsibility among ASTM Committee F-25 on standards, SNAME Panel SP-6 on standards and specifications, the government, shipbuilders, regulatory agencies, supporting industries and other concerned parties are discussed.
1. TASK OBJECTIVE

A. PROVIDE GUIDELINE FOR THE U.S. SHIPBUILDING INDUSTRY TO ESTABLISH THEIR SHIPBUILDING STANDARDS LONG-RANGE DEVELOPMENT PLAN, BASED UPON THE KNOWLEDGE AND EXPERIENCE OF THE JAPANESE SHIPBUILDING INDUSTRY ON STANDARDIZATION.

B. DIRECT PRIMARY EMPHASIS AT SHORT-TERM (2-3 years) PRIORITY GOALS TO ACHIEVE MAXIMUM BENEFITS AT BOTH INDUSTRY AND INDIVIDUAL COMPANY LEVELS.

C. PLACE SECONDARY EMPHASIS ON DEVELOPMENT OF MID-TERM (5-7 years) AND LONG-TERM (10-20 years) GOALS TO SERVE AS PLANNING GUIDELINES FOR ONGOING EFFORTS.
2. **APPROACH**

   A. **CONDUCT A BACKGROUND SURVEY OF THE SHIPBUILDING INDUSTRY TO INVESTIGATE THEIR NEEDS FOR STANDARDIZATION, AND THE STATUS-QUO OF STANDARDIZATION EFFORTS IN U.S.A.**

   B. **CATEGORIZE STANDARDS BY THEIR INFLUENCE TO THE INDUSTRY (I.E., NATIONAL, INDUSTRY, COMPANY LEVELS) AND BY THEIR FUNCTIONS (I.E., PRODUCTS, DESIGN/ENGINEERING, PERFORMANCE, TESTING/INSPECTION, PRODUCTION, ACCURACY STANDARDS).**

   C. **ORGANIZE AND CATEGORIZE STANDARDS ITEMS IN A FORM OF A "TREE STRUCTURE".**

   D. **SELECT AND PRIORITIZE STANDARDS ITEMS FROM THE "TREE STRUCTURE, AND CLASSIFY INTO SHORT-TERM, MID-TERM, LONG-TERM GOALS.**

   E. **PROVIDE GUIDELINES FOR RESPONSIBLE ORGANIZATIONAL STRUCTURES TO DEVELOP AND IMPLEMENT STANDARDS, CODING, ETC.**
3. **STANDARDS CATEGORIES BY PREDOMINANT LEVELS**

**NATIONAL STANDARDS**

STANDARDS ENFORCED BY GOVERNMENT RULES/REGULATIONS.

**FEATURES:** STANDARDS INTERRELATED TO INTERNATIONAL STANDARDS, RULES/REGULATIONS (ISO, IMO, IACS, ETC.) AND/OR FEDERAL REGULATIONS (USCG, USN, ETC.)

**EXAMPLES:** UNITS, CODES, LIFE SAVING EQUIPMENTS, FIRE APPLIANCES, ANCHORS, VALVES, ETC.

**INDUSTRY-WIDE VOLUNTARY STANDARDS**

STANDARDS ESTABLISHED BY PRIVATE ORGANIZATIONS ACCEPTED BY THE INDUSTRY (ASTM, SNAME, IEEC, ETC.)

**FEATURES:** STANDARDS USED NATION-WIDE BY THE INDUSTRY AS CRITERIA OR YARDSTICKS,

**EXAMPLES:** DESIGN CRITERIA/SPECIFICATIONS, FITTINGS, EQUIPMENT, QUALITY, TESTING/INSPECTION, PERFORMANCE.

**COMPANY IN-HOUSE STANDARDS**

STANDARDS ESTABLISHED BY INDIVIDUAL COMPANIES.

**FEATURES:** STANDARDS TO MEET COMPANY'S PECULIAR REQUIREMENTS.

**EXAMPLES:** DESIGN ENGINEERING, PRODUCTION, TESTING/INSPECTION, MATERIALS, MODULES, MANUALS, ETC.
4. **CATEGORIZATION BY FUNCTIONS**

**PRODUCTS STANDARDS**

- **EXAMPLES:** BASIC FITTINGS, EQUIPMENTS, ETC., COMMONLY USED IN SHIP'S SYSTEMS.
- **EXAMPLES:** ANCHORS, BITTS, DOORS, PIPE JOINTS, LIGHTING FIXTURES, ETC.

**DESIGN/ENGINEERING STANDARDS**

- **EXAMPLES:** DESIGNS CRITERIA, SPECIFICATIONS, ETC., FOR SHIP'S SYSTEMS.
- **EXAMPLES:** STANDARD SPECIFICATIONS, CALCULATION FORMS, ANALYSIS METHODS, ETC.

**FUNCTIONAL PERFORMANCE STANDARDS**

- **EXAMPLES:** STANDARD SPECS FOR MACHINERY AND EQUIPMENT, MATERIALS, COMPONENTS.
- **EXAMPLES:** STANDARD PERFORMANCE SPECS FOR LIFEBOATS, NAVIGATION EQUIPMENTS, PUMPS, GENERATORS, SWITCHBOARDS, VALVES, PAINTS, ETC.

**TESTING/INSPECTION STANDARDS**

- **EXAMPLES:** TESTING/INSPECTION PROCESSES, ACCEPTANCE LEVELS, ETC.
- **EXAMPLES:** STANDARD PROTOCOLS OF SEA TRIALS, SYSTEMS, STANDARDS FOR SURFACE TREATMENT AND PAINTING, ETC.

**PRODUCTON PROCESS STANDARDS**

- **EXAMPLES:** CONSTRUCTION METHODS, OUTFITTING METHODS, WELDING PROCESSES, ETC.
- **EXAMPLES:** STANDARD PROCESSES FOR HULL CONSTRUCTION, PIPE FABRICATION, SHAFT ALIGMENT, ETC.

**ACCURACY/TOLERANCE STANDARDS**

- **EXAMPLES:** ACCURACY OF HULL STRUCTURE, PIPE JOINTS, SHAFT ALIGNMENT, ETC.
5. **STANDARDS TREE STRUCTURE**

**PURPOSE:**
To organize and systematize all standards items, and classify them into standards categories in a form of a tree structure to identify the family group they belong to.

**FORMAT:**
At each standards level (national, industry, company levels); classify standards items into functional groups (products, design/engineering, etc.) and then into systems or work processes (hull structure, hull outfitting, etc.), and finally into individual items.
EXAMPLE OF TREE STRUCTURE

International Standards (A)
  ---
  IMCO
  SOLAS
  ISO
  IEC
  IACS
  ILO
  Others

National Standards (B)
  Industrial Standard (C)

U.S. Shipbuilding Standards

Company In-House Standards (D)

Raw material
  - General provisions
  - Products Standards
  - Functional performance standards
  - Testing/inspection standards
  - Production process, accuracy standards

Raw material
  - Secondary material
  - Common basic components
  - Products standards
  - Design/engineering standards
  - Production process, accuracy standards
  - Testing/inspection standards
  - Basic standard drawings
Company In-House Standards (D)

- Ferrous
- Non-ferrous
- Chemicals
- Ceramics

- Secondary Material

- Hull Structure
  - Large castings
  - Components

- Hull Outfitting
  - Wood Structure (excl. ref. & accom.)
    - Deck covering
    - Paint, corrosion protection
    - Navigation communication
    - Mooring, towing
    - Masts, cargo gears, hatch covers
    - Other outboard outfitting
    - Lighting, Ventilation
    - Hull piping
    - Cargo oil & ballast piping
    - Refrigeration
    - Accommodation wood structure
    - Accommodation furnitures
    - Deck machinery

- Machinery Outfitting
  - Main engine
    - Boiler
    - Shafting, propeller
  - Auxiliary machinery
    - Smoke stack, vent ducts
    - Machinery piping
    - Instrumentation

- Electric Outfitting
  - Primary electric source
  - Secondary electric source
  - Lighting, signal lamps
  - Communication, nav. equip., instr't.
  - Cable fixtures
  - Cable
  - Wireway fixtures
  - Wireless telegraph
Company In-House Standards (D)

Basic Components (Common)
- Bolts, nuts
- Valves
- Shackles
- Pipes

Design/ Engineering Standards
- Symbols
- Protocols
- Drafting
- Basic provisions
- Computer application
- Administration, engineering

Engineering, General
- Basic design
- Hull structure design
- Hull outfitting design
- Mach. outfitting design
- Electric outfitting design
- Instrument, control design
- Welding, surface prep'n, painting

Functional Design
- Hull outfitting
- Machinery outfitting
- Electric outfitting
- Instrumentation

Working Plan Design
- Outfitting (common)

Module Design
- Hull structure
- Hull outfitting
- Machinery outfitting
- Electric outfitting
- Instrumentation
6. STANDARDIZATION GOALS

SHORT-TERM GOALS (2-3 YRS):

- PRODUCTS STANDARDS
- FUNCTIONAL PERFORMANCE STANDARDS
- DESIGN/ENGINEERING STANDARDS (BASIC)

MID-TERM GOALS (5-7 YRS):

- DESIGN/ENGINEERING STANDARDS (LONGER TERM)
- TESTING/INSPECTION STANDARDS (BASIC)
- PRODUCTION PROCESS STANDARDS (BASIC)

LONG-TERM GOALS (10-20 YRS):

- DESIGN/ENGINEERING STANDARDS (LONGER TERM)
- TESTING/INSPECTION STANDARDS (LONGER TERM)
- PRODUCTION PROCESS STANDARDS (LONGER TERM)
- ACCURACY/TOLERANCE STANDARDS
<table>
<thead>
<tr>
<th>Type of Standards</th>
<th>Major Users</th>
<th>Benefits</th>
<th>Circumstances</th>
<th>Development Time</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product Standards</td>
<td>Shipyard Vendor Regulatory Bodies</td>
<td>Design Purchasing Inspection</td>
<td>Can be developed independently</td>
<td>Short</td>
<td>Short-term</td>
</tr>
<tr>
<td>Functional Performance Standards</td>
<td>Shipyard Vendor Regulatory Bodies</td>
<td>Design Purchasing Inspection</td>
<td>Can be developed independently</td>
<td>Short</td>
<td>Short-term</td>
</tr>
<tr>
<td>Design/Engineering Standards</td>
<td>Shipyard</td>
<td>Design Production</td>
<td>Should be based on proven standardized products</td>
<td>Need time to coordinate within industry or company</td>
<td>Short-term Mid-term</td>
</tr>
<tr>
<td>Testing/Inspection Standards</td>
<td>Shipyard Vendor Shipowner Regulatory Bodies</td>
<td>Inspection Production</td>
<td>No restraints</td>
<td>Need time for coordination with the groups concerned</td>
<td>Mid-term Long-term</td>
</tr>
<tr>
<td>Production Process Standards</td>
<td>Shipyard Shipowner Regulatory Bodies</td>
<td>Production Inspection</td>
<td>Will be enhanced if products/functional/design standards, etc. are established</td>
<td>Need time for coordination with the groups concerned</td>
<td>Mid-term Long-term</td>
</tr>
<tr>
<td>Accuracy Standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7. **ORGANIZATIONAL FOR STANDARDIZATION.**

**OBJECTIVE:** TO DEFINE RESPONSIBILITIES AT EACH LEVEL FOR STANDARDS PLANNING, DEVELOPMENT, IMPLEMENTATION AND FOLLOW UP.

**FUNCTIONS REQUIRED:**

- PLANNING & DETERMINATION OF LONG-RANGE PLAN
- DEVELOPMENT OF STANDARDS
- APPROVAL AND ENACTMENT OF STANDARDS
- PUBLICATION OF STANDARDS
- FOLLOW UP & MAINTENANCE OF STANDARDS

**BASIC TASK GROUP STRUCTURE:**

- **STANDARDS COMMITTEE:** DETERMINE LONG-RANGE AND ANNUAL DEVELOPMENT PLANS, APPROVE FINAL DRAFT STANDARDS.

- **DIVISIONAL COMMITTEES:** ORGANIZED UNDER STANDARDS COMMITTEE BY FUNCTIONS TO DRAFT LONG-RANGE & ANNUAL DEVELOPMENT PLANS, EVALUATE DRAFT STANDARDS DRAFTED BY WORKING COMMITTEES.

- **WORKING COMMITTEES:** ORGANIZED UNDER EACH DIVISIONAL COMMITTEE TO DRAFT STANDARDS.
8. RECOMMENDED U. S. SHIPBUILDING STANDARDS LONG-RANGE PLAN

A. FINAL REPORT: FORMAT

VOLUME I: EXECUTIVE SUMMARY

BACKGROUND CONSIDERATIONS & GUIDELINES FOR STANDARDIZATION.

APPENDICES: BACKGROUND SURVEY RESULTS.
JAPANESE APPROACH TO STANDARDIZATION IN SHIPBUILDING.

VOLUME II: RECOMMENDED U. S. SHIPBUILDING STANDARDS LONG-RANGE PLAN.

GUIDELINES FOR SELECTION AND ASSESSMENT OF STANDARDS.

GUIDELINES FOR CODING AND COMPUTER APPLICATION.

APPENDICES: STANDARDS TREE STRUCTURE.
LIST OF STANDARDS ITEMS CATEGORIZED BY PRIORITY ORDERS.
STANDARDS PUBLICATION FORMAT EXAMPLE OF SYSTEM CODES

VOLUME III: CATALOGUE OF EXISTING SHIPBUILDING STANDARDS, COMMERCIAL & NAVY,
1. **RATIONALE**

This column indicates the effects or benefits of standardization.

2 to 4 most effective rationales are selected for each standard.

01 - Improve communication, save labour  
(e.g. smoother negotiations, minimize conflicts)

02 - Improve approval work, save labour  
(e.g. simplify plan approval, shorten approval time)

03 - Improve inspection work, save labour  
(e.g. simplify/eliminate inspection, shorten inspection time, eliminate duplication)

04 - Improve design/engineering work, save labour  
(e.g. reduce engineering manhours, minimize design changes, improve accuracy of drawings)

05 - Improve purchasing work, save labour  
(e.g. simplify ordering, minimize estimation work)

06 - Improve production, save labour  
(e.g. improve productivity, reduce manhours)

07 - Stabilize or improve technology level  
(e.g. stabilize and improve engineering and production technology, eliminate inconsistency in design or specifications)

08 - Maintain or improve quality  
(e.g. maintain quality, improve reliability)

09 - Reduce cost  
(e.g. avoid over design, reduce tailor-made products)

10 - Shorten delivery time  
(e.g. reduce purchasing time, allow stocks)
2. **STATUS**

This column indicates the organization, rule or regulation, institute, etc., issuing and controlling the standard.

3. **CATEGORY**

This column indicates characteristics of the standard.

   - **N** - National standard
   - **I** - Industry-wide standard
   - **H** - Company in-house standard

4. **F-25 COMMITTEE**

This column indicates the code number of ASTM F-25 sub-committees.
<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Ratio</th>
<th>Status</th>
<th>Category</th>
<th>F-25 COMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Manhole cover, Access hatch cover, etc.</td>
<td>02 04</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ABS ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Rigging, Lines, Blocks</td>
<td>02 04</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Anchor</td>
<td>02 04</td>
<td>MASS</td>
<td>N</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ABS ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Anchor chain</td>
<td>02 04</td>
<td>MASS</td>
<td>N</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ABS ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Anchor chain controller</td>
<td>02 04</td>
<td>MASS</td>
<td>N</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Bitt, Bollard</td>
<td>02 04</td>
<td>PCC</td>
<td>N</td>
<td>03</td>
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<td></td>
<td></td>
<td>05 08</td>
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<td>7</td>
<td>Chocks</td>
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<td>PCC</td>
<td>I</td>
<td>03</td>
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<td></td>
<td></td>
<td>05 08</td>
<td>ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Eye plate, Ring plate</td>
<td>04 05</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>08 10</td>
<td>DIN</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Handrail, Handrail stanchion</td>
<td>04 05</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>08 10</td>
<td>ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Step, Vertical ladder</td>
<td>04 05</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>08 10</td>
<td>ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Pilot ladder</td>
<td>02 04</td>
<td>ISO</td>
<td>N</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>12</td>
<td>Weather tight steel door</td>
<td>02 04</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Round scuttle, Window</td>
<td>02 04</td>
<td>MASS</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>05 08</td>
<td>ABS ISO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Bottom plug</td>
<td>04 05</td>
<td>ISO</td>
<td>I</td>
<td>03</td>
</tr>
<tr>
<td></td>
<td></td>
<td>08 10</td>
<td></td>
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Table 1 Short-term Products Standards
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<tr>
<th>NO</th>
<th>ITEM</th>
<th>RATIO-NALE</th>
<th>STATUS</th>
<th>CATEGORY</th>
<th>P-25 COMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bosun store equipment (bosun chair etc.)</td>
<td>01 04 08</td>
<td>MASS</td>
<td>JIS</td>
<td>I 03</td>
</tr>
<tr>
<td>2</td>
<td>Derrick boom</td>
<td>02 04 08</td>
<td>MASS</td>
<td>ISO</td>
<td>I 03</td>
</tr>
<tr>
<td>3</td>
<td>Goose neck bracket</td>
<td>02 04 08</td>
<td>MASS</td>
<td>ISO</td>
<td>I 03</td>
</tr>
<tr>
<td>4</td>
<td>Topping bracket</td>
<td>02 04 08</td>
<td>MASS</td>
<td>ISO</td>
<td>I 03</td>
</tr>
<tr>
<td>5</td>
<td>Boom rest</td>
<td>04 05 09</td>
<td>MASS</td>
<td>JIS</td>
<td>I 03</td>
</tr>
<tr>
<td>6</td>
<td>Fittings of bitter end of anchor chain</td>
<td>04 05 09</td>
<td>JIS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>7</td>
<td>Fairleader</td>
<td>04 05 09</td>
<td>DIN</td>
<td>JIS</td>
<td>I/H 03</td>
</tr>
<tr>
<td>8</td>
<td>Ladder and platform</td>
<td>04 05 09</td>
<td>MASS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>9</td>
<td>Ladder and platform (tank, hold)</td>
<td>04 05 09</td>
<td>MASS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>10</td>
<td>Ladder and platform (engine room)</td>
<td>04 05 09</td>
<td>MASS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>11</td>
<td>Ladder (in accommodation)</td>
<td>04 05 09</td>
<td>MASS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>12</td>
<td>Ship's side ladder for pilot</td>
<td>02 04 08</td>
<td>PCC</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>13</td>
<td>Door for accommodation</td>
<td>04 05 09</td>
<td>MASS</td>
<td></td>
<td>I 03</td>
</tr>
<tr>
<td>14</td>
<td>Door for store (non-tight door)</td>
<td>04 05 09</td>
<td>JIS</td>
<td></td>
<td>I/H 03</td>
</tr>
<tr>
<td>15</td>
<td>Inventories</td>
<td>04 05 10</td>
<td>MASS</td>
<td>FED MIL</td>
<td>I/H 03</td>
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<tr>
<td>16</td>
<td>Fittings for store and work space (shelf etc.)</td>
<td>04 05 08 09</td>
<td>MASS</td>
<td>FED</td>
<td>I/H 03</td>
</tr>
<tr>
<td>17</td>
<td>Hydrant box, Hose box</td>
<td>04 05 09</td>
<td>MASS</td>
<td>ABS</td>
<td>I/H 03</td>
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Table - 2 Mid-term Products Standards

592
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<tr>
<th>No.</th>
<th>Item</th>
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<th>Status</th>
<th>Category</th>
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<td>1</td>
<td>Side port</td>
<td>02 04 05 08</td>
<td>MASS</td>
<td>I/H</td>
<td>03</td>
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<tr>
<td>2</td>
<td>Water tight door</td>
<td>02 04 05 08</td>
<td>ABS</td>
<td>JIS I</td>
<td>03</td>
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<tr>
<td>3</td>
<td>Securing device for cargo hatch cover</td>
<td>04 05 08 09</td>
<td>MASS</td>
<td>ABS I/H</td>
<td>03</td>
</tr>
<tr>
<td>4</td>
<td>Mast, Derrick post</td>
<td>04 05 08 07</td>
<td>MASS</td>
<td>ABS H</td>
<td>03</td>
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<tr>
<td>5</td>
<td>Ventriser (cargo/inert gas vent)</td>
<td>04 05 08 09</td>
<td>ABS</td>
<td>I</td>
<td>03</td>
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<td>6</td>
<td>Pressure vacuum breaker</td>
<td>04 05 08 09</td>
<td>ABS</td>
<td>I</td>
<td>03</td>
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<tr>
<td>7</td>
<td>Rudder carrier</td>
<td>04 05 08 09</td>
<td>MASS</td>
<td>I/H</td>
<td>03</td>
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<tr>
<td>8</td>
<td>Tanks (miscellaneous use)</td>
<td>04 05 08 09</td>
<td>-</td>
<td>I/H</td>
<td>03</td>
</tr>
<tr>
<td>9</td>
<td>Container lashing device</td>
<td>04 05 08 09</td>
<td>ABS</td>
<td>I/H</td>
<td>03</td>
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</table>

Table - 3 Long-term Products Standards
RECOMMENDED ORGANIZATIONAL STRUCTURE FOR STANDARDS DEVELOPMENT

A) National Standards

<table>
<thead>
<tr>
<th>Work Process</th>
<th>Responsible Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Planning, long-range plan goals</td>
<td>MarAd (commercial, actual planning assigned to SNAME SP-6)</td>
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<tr>
<td>- Development</td>
<td>ANSI (related to ISO)</td>
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<td>ASTM F-25 (others)</td>
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<tr>
<td>- Approval/Authorization</td>
<td>SNAME SP-6.</td>
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<tr>
<td>- Enactment</td>
<td>MarAd</td>
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<tr>
<td>- Publication/Distribution</td>
<td>ANSI or ASTM</td>
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<tr>
<td>- Follow up</td>
<td>SNAME SP-6 (actual work assigned to ANSI or ASTM)</td>
</tr>
<tr>
<td>- Recognition, re-compliance</td>
<td>U. S. C. G.</td>
</tr>
<tr>
<td>with international, Federal laws,</td>
<td></td>
</tr>
<tr>
<td>regulations</td>
<td></td>
</tr>
</tbody>
</table>

594
Industry Voluntary Standards

Work Process

- Planning, long-range plans
- Development
- Approval/Authorization
- Enactment
- Publication

Responsible Organizations

- SNAME SP-6
- ASTM F-25
- SNAME SP-6
- ASTM
- ASTM
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<tr>
<th>Type of Potential</th>
<th>Code</th>
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<th>Standard Code</th>
<th>Standard</th>
<th>Synonym(s)</th>
<th>Synonym(s)</th>
<th>Synonym(s)</th>
<th>Synonym(s)</th>
<th>Mod. System</th>
<th>Task</th>
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<td>Bollard and Cleat</td>
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<td>Bollards</td>
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<td>HDW 62134</td>
<td>72</td>
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<td>Bollards</td>
<td>JIS F2621</td>
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<td>Multi-Purpose Chocks</td>
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<td>DIN 81905</td>
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<td>Roller Chocks</td>
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<td>Cast Iron Deck End Rollers</td>
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<td>JIS F2623</td>
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<td>Steel Plate Deck End Rollers</td>
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<td>Closed Chocks</td>
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<td>JIS F2625</td>
<td>75</td>
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<td>Panama Chocks</td>
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<td>Guide Rollers</td>
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<td>JIS F2627</td>
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<td>Fairleads</td>
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<td>Fairleads</td>
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</table>
Figure 1-1  Effects of Standardization
APPENDIX A: IREAPS TECHNICAL SYMPOSIUM AGENDA

TUESDAY, SEPTEMBER 15

8:00 REGISTRATION GRAND FOYER
- 3:30

9:15 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: J.R. Vander Schaaf Bath Iron Works

- WELCOME
  J.C. Etta, Bethlehem Steel Corp.
- SHIP PRODUCTION COMMITTEE OVERVIEW
  E.L. Peterson, Peterson Builders, Inc.
SHIP PRODUCTION COMMITTEE PANEL OVERVIEWS:
  - SP-2 — Utrfitting and Production Aids
    L.D. Chirillo, Todd Pacific Shipyards Corp.

10:30 INFORMAL DISCUSSION PERIOD

11:00 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: E.L. Peterson Peterson Builders

SPC PANEL OVERVIEWS (contd)
  - SP-1 & 3 — Facilities and Environmental Effects
    R. Price, Avondale Shipyards, Inc.
  - A PROGRESS REPORT ON THE IREAPS PROGRAM
    E.R. Bangs, IIT Research Institute

12:00 LUNCH

1:30 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: L.D. Chirillo Todd Pacific Shipyards

SPC PANEL OVERVIEWS (contd)
  - SP-4 — Design/Production Integration
    T.J. O'Donohue, Newport News Shipbuilding
  - Introduction-Ship Productivity Research Program
    J.C. Mason, Bath Iron Works Corp.
  - SP-6 — The National Shipbuilding Standards Program
    S.Woldow, Bath Iron Works Corp.
  - SP-8 — The Shipbuilding Industrial Engineering Program
    J.R. Fortin, Bath Iron Works Corp.

3:00 INFORMAL DISCUSSION PERIOD

3:30 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: E.R. Bangs IIT Research Institute

SPC PANEL OVERVIEWS (contd)
  - SP-7 — Shipyard Welding
    B.G. Howser, Newport News Shipbuilding

5:15 RECEPTION GRAND FOYER
- 6:15

Sponsored by: IIT Research Institute

WEDNESDAY, SEPTEMBER 16

8:00 REGISTRATION GRAND FOYER
- 3:30

8:30 Concurrent Sessions

SESSION 1 FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: P.M. Cofoni General Dynamics

- THE AUTOFIT CAD/CAM SYSTEM FOR PIPING ENGINEERING: OPERATIONAL EXPERIENCE AND DEVELOPMENT STATUS
  F. Dahle, Shipping Research Services A/S

- AUTODRAW: AUTOKON'S INTERACTIVE GRAPHICS SYSTEM FOR VIEWING AND MANIPULATING STRUCTURAL MODEL DATA INTO COMPLETE DRAWING DOCUMENTATION
  F. van Cullenborg, Shipping Research Services A/S

- USING AUTOKON FROM EARLY DESIGN: RECENT EXPERIENCE FROM ACTUAL SHIP DESIGNS
  H. Oigaarden, Shipping Research Services A/S

SESSION 2 FRANCIS SCOTT KEY BALLROOM, SOUTH
SESSION CHAIRMAN: R. Price
- JAPANESE SURFACE PREPARATION AND COATING METHODOLOGY AND MATERIALS
  G. Sotza, Consutants

- IMPLEMENTATION OF PRODUCTION ENGINEERING TECHNIQUES
  M. Bell, A & P Applecore, Ltd.
  L. Flora, Norshipco

- A MANAGEMENT SIMULATOR FOR SHOP STORES IN THE U.S. NAVAL SHIPYARDS
  H.E. Warren, California State University — Los Angeles

10:00 INFORMAL DISCUSSION PERIOD

11:30 Concurrent Sessions

SESSION 1 FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER
SESSION CHAIRMAN: J. Wasserboehr  
National Steel  
Shipbuilding  
U.S. NAVY CAD/CAM PROGRAM HULL STRUCTURE (HULSTRX) DEVELOPMENT OVERVIEW  
D. Helgerson, Advanced Marine Enterprises, Inc.  
E. Byler, Advanced Marine Enterprises, Inc.  
I. BRITISHPS - SHIPBUILDING CAD/CAM I N PRODUCTIVE APPLICATION  
I. M. Tolmie, British Ship Research Association  
SESSION 2  
FRANCIS SCOTT KEY BALLROOM, SOUTH  
SESSION CHAIRMAN: J. Peart  
Avondale Shipyards  
ECONOMIC BENEFITS AND TECHNOLOGY OF CUN SHIP HULL SHEATHING  
L. W. Sandor, The Franklin Research Center  
M. C. Cheley, International Copper Research Association, Inc.  
E. W. Thiele, Copper Development Association  
A. CNC SHEETMETAL FABRICATION SYSTEM FOR PRODUCTION OF SHIPS VENTILATION COMPONENTS AND FLATWORK  
T. R. Galle, Naval Ship Systems Engineering Station  
D. Bais, Bath Iron Works Corp.  
A SHIP STRUCTURAL COST PROGRAM  
A. Furio, David W. Taylor Naval Ship Research and Development Center  
12:00 LUNCH  
1:30 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER  
SESSION CHAIRMAN: R. C. Moore  
Newport News Shipbuilding  
IMPLEMENTATION OF INTERACTIVE GRAPHICS FOR STRUCTURAL DESIGN AND PART DEFINITION  
G. Panciera, General Dynamics  
D. Palmer, General Dynamics  
HUMAN PERFORMANCE ENGINEERING AS A GUARANTEED METHOD OF PRODUCTIVITY INCREASE  
D. C. Anderson, University of Notre Dame  
3:00 INFORMAL DISCUSSION ON PERI OD  
3:30 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER  
SESSION CHAIRMAN: T. I. O'Donohue  
Naval News  
SHIPBUILDING NAVY STYLE  
J. W. Tweeddale, U.S. Navy  
QUALITY CIRCLES... DOING BUSINESS BETTER AT THE PHILADELPHIA NAVAL SHIPYARD  
R. Bradley, Philadelphia Naval Shipyard  
THURSDAY, SEPTEMBER 17  
8:00 REGISTRATION GRAND FOYER  
10:30 Concurrent Sessions  
SESSION 1  
FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER  
SESSION CHAIRMAN: R. G. Boh  
Bethlehem Steel Corp.  
THE NEW INTERACTIVE GRAPHICS SYSTEM AT CALI AND ASSOCIATES  
L. Lowery, Cali and Associates, Inc.  
SESSION 2  
FRANCIS SCOTT KEY BALLROOM, SOUTH  
SESSION CHAIRMAN: H. M. Bunch  
University of Michigan  
AN APPROACH TO SUCCESSFUL SHIPYARD PLANNING AND SCHEDULING  
S. Knapp, SPAR Associates, Inc.  
PLANNING AND SCHEDULING SHIP CONSTRUCTION SUBJECT TO LIMITED RESOURCES  
L. C. Deschamps, SPAR Associates, Inc.  
IMPLEMENTATION OF A PRACTICAL PLANNING AND PRODUCTION CONTROL SYSTEM IN SMALL AND MEDIUM SIZED SHIPYARDS  
J. N. Spillane, Shipbuilding Consultants, Inc.  
10:00 INFORMAL DISCUSSION ON PERI OD  
10:30 GENERAL SESSION FRANCIS SCOTT KEY BALLROOM, NORTH & CENTER  
SESSION CHAIRMAN: B. Loydahl  
Todd Pacific Shipyards
INTERACTIVE STEEL STRUCTURE DEFINITION AND GENERATION: EFFECTS ON MANPOWER AND LEADING TIME
R. Di Luca, Italcantieri S.P.A.

A PRACTICAL APPROACH TO USING STANDARD SOFTWARE PACKAGES IN SMALL SHIPYARDS
G. Hoffman, St. Louis Ship

AN INTRODUCTION TO ENGINEERING MODELS (WITH A CASE STUDY IN THE SHIPBUILDING INDUSTRY) - A CHALLENGE
J.W. Rohrer, U.S.A. Models
G.L. Kraine, Sun Shipbuilding and Dry Dock Company

12:00 LUNCH

1:30 GENERAL SESSION BALLROOM NORTH & CENTER
SESSION CHAIRMAN: D.J. Martin National Steel & Shipbuilding

PRODUCTIBILITY FROM CONCEPTUAL DESIGN TO SHIP CONSTRUCTION
I.S. MacDougall A & P Appledore, Ltd.

COMPUTER ASSISTED PROCESS MANUFACTURING AND ASSEMBLY - A FIRST STEP TOWARDS INTEGRATION
A. Houtzeel, Organization for Industrial Research, Inc.

3:00 INFORMAL DISCUSSION PERIOD

3:30 GENERAL SESSION BALLROOM NORTH & CENTER
SESSION CHAIRMAN: L.M. Thorell Todd Pacific Shipyards

PRODUCTIVITY - MANAGEMENT'S BONUS (??) OR FAILURE (???)
F.H. Rack, Shipbuilding Consultants, Inc.

THE U.S. SHIPBUILDING STANDARDS PROGRAM - LONG RANGE PLAN
Y. Ichinose, IHI Maxime Technology, Inc.

4:30 ADJOURNMENT
APPENDIX B: IREAPS TECHNICAL SYMPOSIUM ATTENDANCE LIST

Baltimore, Maryland
SEPTEMBER 15-17, 1981

A&P APPLEDORE LIMITED
Northumbrian Way, Killingworth
Newcastle Upon Tyne, ENGLAND

Malcolm Bell
Ship Production Engineer
I. S. MacDougall
Director

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1725 Jefferson Davis Hwy - Suite 1300
Arlington, VA 22202

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System Analyst
Eric Byler
Systems Analyst
Dave Helgerson
Chief Hull Scientific Sect.
Ricky W Lee
Sr. Designer
Otto P. Jons
V. P. Engineering

ADVANCED TECHNOLOGY, INC.
1725 Jefferson Davis Hwy - Suite 300
Arlington, VA 22202

Stephen T. Fisher
Senior Program Engineer

THE AMERICAN SHIPBUILDING COMPANY
AMSHIP Div.
400 Colorado
Lorain, OH 44052

Gordon Calvin
VP Planning & Production Control
Ray Francis
Manager-Engineering
Ed Wingenroth
Welding Engineer
ANDERSON ENGINEERS INC.
200 Thelma Drive
Carnegie, PA 15106
Gary L. Schnorrenberg
National Sales Manager

D. APPLETON CO., INC. (DACOM)
P.O. Box 838
Manhattan Beach, CA 90266
A. Wayne Snodgrass
Project Manager

AUTO-TROL TECHNOLOGY
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Denver, CO 80233
Walt Simpson
Manager of Applications Dev.

AVONDALE SHIPYARDS INC.
P.O. Box 50280
New Orleans, LA 70150
John Peart
Richard Price

AVONDALE SHIPYARDS INC.
76 Dunlcith Ct.
Marrero, LA 70072
Vincent H. Nuzzo
Supt. Mold Loft

BALTIMORE MARINE SERVICES
22 W. Padonia - Suite C252
Timonium, MD 21093
Robert Dennison
Gordon Kincaid
President
Tom Kneeshaw
VP

BAND, LAVIS & ASSOCIATES INC.
670 Ritchie Highway
Severna Pk, MD 21146
Paul R. Van Mater, Jr
Senior Naval Architect
BATH IRON WORKS
700 Washington Street
Bath, Maine 04530

David Blais
J. R. Erikson
FFG Design Mgr.
J. R. Fortin
J. C. Mason
Richard B. Siek
NC Project Coordinator
D. H. Thompson
Producibility Project Engineer
James R. Vander Schaaf
Supvr. of Planning Systems Development
S. Wolkow

BAY SHIPBUILDING CORP.
605 N. Third Ave.
Sturgeon Bay, WI 54235

Robert H. Miller
VP, Director of Engineering

BETHLEHEM STEEL CORP.
CTD-Sparrows Point Shipyard
Sparrows Point, MD 21219

V. G. Adams
Hull Drafting Dept.
Bruce Bohl
Lead/Programmer/Analyst
Karl E. Briers
System Engineer
Martin Castle
Sr. Designer
Kevin D. Dyer
Sr. Engr.
Edwin Faus
Industrial Engineer
Isaac Gemmell
Chief Electrical Draftsman
Sudarshan K. Gupta
Senior Engineer
Joseph Haslbeck
Chief Machinery Draftsman
Nicholas V. Haynes
supt., Production Engineering

605
Art Huge  
Shipyard Controller-Accounting Dept.

Henry Jones  
Plant Engineer

James P. Kozo  
Project Manager

Ed Marcavage  
Computer Applications Sect.

William P. McCloskey  
General Foreman-Electrical & Sheet Metal

Peter McNair  
Planning

Alex Miller  
Chief Planner

Mike Miller  
Planning

T. L. Mullin  
Chief Draftsman

Tahanh Mnh Ngo  
Computer Applications Sect.

Dan Romanchuk  
General Supt.

Gerald Simmons  
Pipe Foreman

Frank J. Slyker  
Chief, Basic Ship Design

Norm Smith  
Supt. Outfitting

John Spies  
Computer Applications Sect.

David T. Vermette  
Exempt. Supervisor

Dave Watson

Henry A. Baierlein  
Supt. Maint. Practices

John C. Estes  
Assistant VP, Shipbuilding

Eugene Schorsch  
Manager
CDI MARINE COMPANY
1725 Jefferson Davis Hwy - Suite 613
Arlington, VA 22202

Donald Atkins
William H. Hunley
Robert Van Buiten

COLLINGWOOD SHipyARDS
Canadian Shipbuilding & Engineering Ltd.
Collingwood, ONT., Canada

Laurie Moore
Systems Analyst

CORPORATE-TECH PLANNING INC.
John Hart Mansion-The Hill
Portsmouth, NH 03801

Rodney A. Robinson
Executive Staff Member

DAVIE SHIPBUILDING LTD
P.O. 130 Lauzon Levis
Quebec, Canada

M. Donnison
Manager of Engineering
Marc-Guy Letourneau
Designer and Scientific Analysis
Charles Methot
Steel Work Planning Manager

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Arlington, VA 22202

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Computer Specialist
Steve Klomparens
Head, Computer Aided Ship Design

FMC
Marine & Rail Equipment
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Manager Marine Operations
L. W. Sandor

Bruce D. Johnson
Chief Engineer

Kenneth D. Brown
Operations Engineering Manager

Thomas F. McCarthy
Principal Engineer

Doug Palmer

David V. Pearson
Chief Engineer

Victor Sibilla
Chief Central Trade Planning

John M. Wallent
Chief of Automated Processes

Paul M. Cofoni
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George Panciera
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New York, NY 10006

Malcolm Dick

GRUMMAN AEROSPACE
Advanced Marine Systems
Bethpage, NY 11714

Gordon Sammis
Naval Architect

Bob Skirkanich
Sr. Science Systems Analyst

HEMPEL'S MARINE
Ship Bldg. Div.
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Wellington, NJ

J. H. Shubrook
Nat'l. Sales Manager
J. J. HENRY CO., INC.
West Park Drive
Mt. Laurel Industrial Park
Moorestown, NJ 08057

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John H. Klose
Assistant VP
Gordon Plancich, Jr.

HYDRONAUTICS, INC.
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Laurel, MD

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Research Scientist

Thomas M. Sauer
Research Scientist

IHI MARINE TECHNOLOGY INC.
100 Church Street - Suite 1830
New York, New York 10007

Yoshinon Ichinose
VP

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Edmund R. Bangs
IREAPS Manager

Lind M. Bender
General Chairman, IREAPS Technical Symposium

Victor Fischer
Staff

Margarita Hernandez
IREAPS Librarian

INDUSTRIAL CONSULTANTS, INC.
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Rockville, MD 20852

M. B. Miller
President

S. J. Miller
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Washington, DC 20041

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Director
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Seattle, WA 98134

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Production Manager - Yard 1

Gerald A. Flynn
Craft Superintendent - Lofting

L. W (Bill) Frank
Director of New Construction

Thomas Kuhlmeier
Design Engineer

David E. Todd
Sr. Systems Engineer

LOCKHEED MISSILES & SPACE CO.
P.O. Box 504
Sunnyvale, CA 94088

William Saunders
Staff Engineer

LONG BEACH NAVAL SHIPYARD
Long Beach, CA 90822

Jeffrey D. Arthursd
Naval Architect

Code 250.11 LBNS

Kenneth E. Knollenberg
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