U.S. Coast Guard Research and Development Center
1082 Shennecossett Road, Groton, CT 06340-6096

Report No. CG-D-11-99

FIRE SAFETY ANALYSIS OF THE USCGC DEPENDABLE

FINAL REPORT
January 1999

This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161

Prepared for:

U.S. Department of Transportation
United States Coast Guard
Atlantic Area (Aof)
Portsmouth, VA 23704

N O T I C E

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

The United States Government does not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

This report does not constitute a standard, specification, or regulation.

Marc B. Mandler, Ph.D.
Technical Director
United States Coast Guard
Research & Development Center
1082 Shennecossett Road
Groton, CT 06340-6096

Technical Report Documentation Page

1. Report No. CG-D-11-99	2. Government Accession Number	3. Recipient's Catalog No.
4. Title and Subtitle Fire Safety Analysis of the USCGC DEPENDABLE		5. Report Date January 1999 6. Performing Organization Code Project No. 9100 / UDI 57
7. Author(s) Chester M. Sprague, P.E., Derek White, and Brian Dolph		8. Performing Organization Report No. R&DC 04/99
9. Performing Organization Name and Address MicroSystems Integration, Inc. 158 South Broad Sreet Suite C Pawcatuck, CT 06379	U.S. Coast Guard Research and Development Center 1082 Shennecossett Road Groton, CT 06340-6096	10. Work Unit No. (TRAIS) SHRD Report No. 138 11. Contract or Grant No. Contract No. DTCG39-97-E-E00414
12. Sponsoring Organization Name and Address U.S. Department of Transportation United States Coast Guard Atlantic Area (Aof) Portsmouth, VA 23704		13. Type of Report & Period Covered Final Report, 8/97 – 1/99 14. Sponsoring Agency Code United States Coast Guard Atlantic Area (Aof) Portsmouth, VA 23704

15. Supplementary Notes
The R&D Center's technical point of contact is Brian Dolph, 860-441-2817, of the U.S. Coast Guard Research and Development Center. The Project Officer is LCDR Kevin Harkins, Coast Guard Atlantic Area (Aof).

16. Abstract (MAXIMUM 200 WORDS)
This report documents the results of a fire safety analysis of the USCGC DEPENDABLE prior to and after implementing changes associated with the Paragon project. The Paragon project reduces the normal crew by approximately 20% and implements a number of changes to supplant the loss of manual firefighting effectiveness. These changes include a new fire detection and monitoring system, installation of fixed surveillance cameras, and utilization of a rapid response team concept.

The Ship Fire Safety Engineering Methodology (SFSEM) and associated computer program, SAFE version 2.2, were utilized as an analytical tool to perform the analysis. The SFSEM is a probabilistic based fire risk analysis methodology. It is useful to conduct a structured and comprehensive analysis of the performance of all types of surface ships as a fire safety system. The SFSEM provides an integrated framework for analyzing fires on ships in comparison to established fire safety objectives. It accounts for all relevant aspects of fire safety including the growth and spread of fire, the effectiveness of passive design features such as barriers, and active fire protection features such as fixed and portable fire extinguishing systems, as well as manual fire suppression.

SAFE implements the SFSEM and evaluates the probability of spaces and barriers limiting a fire. The evaluation is conducted on a compartment-by-compartment basis. SAFE calculates the probable paths of fire spread for user-specified time duration. SFSEM/SAFE has been successfully used to analyze the fire safety design of existing as well as proposed ships.

SAFE input data included information collected during a ship visit to the CGC DEPENDABLE during the period 30 September – 3 October 1997. Baseline fire safety analysis results show that with just passive fire protection in effect (without considering automated or manual fire protection), all compartments in the DEPENDABLE exceed fire safety objectives, both in port and at sea. Automated and manual firefighting attributes increase the margin of safety provided by passive protection. The post Paragon fire safety analysis shows improvement in fire safety in all scenarios. Recommendations are provided to implement the rapid response team concept on all other cutters in the Coast Guard and modification of fire detection systems on other cutters.

17. Key Words fire protection, cutter, fire safety, ship fire, engineering methodology, Paragon project, reduced manning	18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161.

19. Security Class (This Report)	20. Security Class (This Page)	21. No of Pages	22. Price
UNCLASSIFIED	UNCLASSIFIED		

Form DOT F 1700.7 (8/72) Reproduction of form and completed page is authorized

[This page intentionally left blank.]

EXECUTIVE SUMMARY

The Coast Guard commenced the Paragon Project to more effectively and efficiently operate a 210' WMEC in all mission areas, with an eye cast toward opportunities for crew-size reduction. The USCGC DEPENDABLE (and crew) was selected as the test vessel to evaluate this new operational philosophy. The Coast Guard is evaluating all aspects of operating DEPENDABLE with a reduced crew, including effects on fire safety, watchstanding, maintenance, and mission performance. The objectives of this study are to perform fire safety analyses of fire protection levels of pre-Paragon and post-Paragon conditions on board DEPENDABLE to ensure that an acceptable level of fire safety is achieved in both configurations. The scope of this project includes a comparison of results of these analyses.

The Ship Fire Safety Engineering Methodology (SFSEM) and associated computer program, SAFE version 2.2, were utilized as an analytical tool to perform the analyses. The SFSEM is a probabilistic-based fire risk analysis methodology. It is useful to conduct a structured and comprehensive analysis of the performance of all types of surface ships as a fire safety system. The SFSEM provides an integrated framework for analyzing fires on ships in comparison to established Fire Safety Objectives (FSO). It accounts for all relevant aspects of fire safety, including the growth and spread of fire, the effectiveness of passive design features such as barriers, and active fire protection features such as fixed and portable fire extinguishing systems as well as manual fire suppression.

SAFE implements the SFSEM and evaluates the probability of spaces and barriers limiting a fire. The evaluation is conducted on a compartment-by-compartment basis. SAFE calculates the probable paths of fire spread for a user-specified time duration. SFSEM/SAFE has been successfully used in the past to analyze the fire safety design of existing as well as proposed ships.

SAFE input data for the pre-Paragon analysis included information collected during a ship visit to the DEPENDABLE during the period 30 September to 3 October 1997. The baseline (pre-Paragon) fire safety analysis results show that all compartments in the pre-Paragon DEPENDABLE exceed FSOs, in port and at sea. Moreover, all compartments exceed FSOs with just passive fire protection in effect. Automated fire protection systems and manual firefighting efforts serve to increase the margin of safety provided by passive fire protection. This means that no improvements are necessarily required to bring the pre-Paragon DEPENDABLE up to minimally acceptable fire safety levels.

The following changes associated with the Paragon project were implemented on DEPENDABLE:

- The original zoned fire detection system was changed to a fully addressable system.
- Sixteen fixed surveillance cameras were installed in strategic locations throughout the vessel. TV monitors located throughout the ship constantly display the view from one of the cameras.
- The fire detection and monitoring system is integrated with other alarms, including bilge high water level and magazine high temperature. The system is also integrated with the surveillance cameras, TV monitors mounted in strategic locations, and the general

announcing system. The system is designed to automatically make an announcement of the precise location of a fire as soon as it is detected. In addition, the nearest surveillance camera automatically locks in so that all TV monitors provide a continuous view of the scene near the fire.

- A four- to five-person Rapid Response Team (RRT), modeled after a concept developed by the Navy, is used to immediately respond to all fires in port and at sea.
- At sea and in port, away from homeport, one repair party is billeted to be manned (as compared with two repair parties in other 210' WMEC cutters).
- In homeport, the normal duty section is reduced to five persons. Reliance is placed on the assistance available from the city fire department as well as from other cutters that may be in port at the time.
- Most crew members have been issued personal portable wireless communication devices.

Some of the changes implemented on DEPENDABLE as a result of the Paragon Project increase the fire safety of the cutter, while other changes have an adverse effect on fire safety. The net effect on the fire safety of the DEPENDABLE as a result of the Paragon changes is significantly positive or beneficial for all scenarios. The average increase in fire safety of the post-Paragon cutter compared to the pre-Paragon cutter varies from 15.3% for the in homeport, XRAY, scenario to 30.5% for the at sea scenario. The post-Paragon fire safety analysis results show that all compartments exceed FSOs, in port and at sea. Furthermore, all compartments exceed FSOs with just passive fire protection in effect. Automated fire protection systems and manual firefighting efforts serve to increase the margin of safety provided by passive fire protection. This means that no improvements are necessarily required to bring the post-Paragon DEPENDABLE up to minimally acceptable fire safety levels.

As a result of performing the fire safety analysis of the post-Paragon DEPENDABLE, the following recommendations are offered for consideration by the Coast Guard:

- Besides the obvious benefits in damage control and firefighting, the personal communication devices issued to virtually all crew members has benefits in many other aspects of operating the cutter. All Coast Guard cutters could benefit from issuing these devices to their crew members.
- The Coast Guard should consider revising the firefighting procedures in all cutters to incorporate a rapid response team concept.
- All cutters with a fire detection system that can be similarly modified as on DEPENDABLE should be changed to a fully addressable system.
- The new fire detection and monitoring system has not been fully implemented in DEPENDABLE due to technical difficulties encountered during installation. It is recommended that this system be fully implemented to take full advantage of the increase in fire safety offered by the new system.

The appendices in this report include the AutoCAD drawings and comprehensive tables of input data used to populate the baseline data set in SAFE. The detailed spreadsheets for calculating the probabilities of flame termination are included as supporting data. The input and output data from the analysis of the post-Paragon DEPENDABLE are also included.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF ABBREVIATIONS AND TERMS

A Curve - The resulting curve when A values for increasing areas of a compartment are plotted on a graph with probability of flame limitation on the ordinate axis (logarithmic scale) with the origin at the top left and the deck area of the compartment on the abscissa axis (linear scale). See "A Value."

A Value (%) - The probability that an automated fixed fire protection system installed in a compartment will successfully extinguish the fire before FRI occurs given that the fire did not self-terminate and was not extinguished by manual firefighting efforts. Each compartment is assigned three A-values: the probability of flame limitation given EB in the room of origin, the probability of flame limitation given EB has occurred in the room as a result of a thermal (T-bar) failure of a barrier, and the probability of flame limitation given EB has occurred in the room as a result of a durability (D-bar) failure of a barrier. In SAFE, these values are abbreviated OA, TA, and DA, respectively

Active Fire Protection - Fire protection features designed to limit flame movement by automatic detection, automatic/automated fire extinguishing systems, and manual suppression systems or equipment. Examples of active fire protection features are automatic sprinkler systems, fire extinguishers, and trained firefighting teams. See "Passive Fire Protection."

AFFF - Aqueous Film Forming Foam. A firefighting agent particularly effective against class B fires.

Alpha (kilowatts per second squared) - The fire growth coefficient in the pre-FRI heat release rate algorithm. Values for alpha are established for each fire growth model as documented in the SAFE User Manual, Version 2.2. See "Fire Growth Model" and "Pre-FRI Heat Release Rate."

Alternative Data Set - Data sets identified as "Alternative" have had the SAFE baseline input values adjusted, as necessary, to reflect the impact of the proposed alterations or modifications that affect the ship's fire-safety system. See "Baseline Data Set."

ASTM E119 Test Rating (hours and minutes) - A rating in hours and minutes specifying time to failure of a material or assembly in the standard fire test that is conducted in accordance with the requirements of ASTM E-119 standardized test methodology.

AutoCAD - Commercially available Computer Aided Design (CAD) software used to display the plan views of a ship's compartmentation on each deck level.

Barrier - Any vertical or horizontal surface that tends to impede, slow, or stop the spread of heat, flames, and combustion products from one space to another. In a ship, barriers may be bulkheads (joiner, watertight, or structural), decks, or overheads. See "Zero-Strength Barrier."

Baseline Data Set - Data sets identified as "Baseline" utilize input values to the SAFE program based on the physical condition of the ship found during the ship visit and are not influenced by any modifications or alterations that may be proposed as a result of an analysis. See "Alternative Data Set."

Blackout - The cessation of visible flaming (not to be mistaken for extinguishment, which is the cessation of combustion).

Bulkhead - The equivalent in a ship to a wall in a building. Bulkheads can be structural or joiner (nonstructural), insulated or bare. They may be constructed of aluminum, steel, or a composite such as Marinite or Nomex. Together with overheads, they serve to segment the ship into various compartments.

CBO (minutes) - Compartment Burnout - The point in the fire growth curve where complete consumption of all fuel due to pyrolysis occurs.

Ceiling Point - The point in growth of a compartment fire when the flames first touch or involve the ceiling.

Cellulosics - One of two classifications of fuel on board ship. Cellulosics are characterized as ash producing; examples are wood, paper, and textile products. See "Fuel Load" and "Petrochemicals."

Class A Fire - A fire involving cellulosic-type products (wood, cotton, paper, etc.) that produce ash as a combustion product. Water is the primary firefighting agent and extinguishes the fire by cooling the fuel below the ignition point. See "Class B Fire" and "Class C Fire."

Class B Fire - A fire involving flammable liquids (fuel oil, lube oil, gasoline, etc.) that burn vigorously without producing ash. AFFF is the primary firefighting agent and extinguishes the fire by smothering (local oxygen depravation) the fire with a thick layer of foam that floats on the surface of the fuel. See "Class A Fire" and "Class C Fire."

Class C Fire - A fire involving energized electrical equipment. Class C fires frequently involve class A or B fires as well. Electrical fires are usually extinguished when the electrical power to the affected equipment is secured, however the associated class A or class B fire may continue to burn. CO_2 is the primary firefighting agent and extinguishes the fire by smothering (local oxygen depravation) the fire without damaging electrical or electronic components. See "Class A Fire" and "Class B Fire."

CO_2 - Carbon Dioxide. A firefighting agent particularly effective against class C fires.

Combustion - Rapid oxidation in which a fuel pyrolizes or turns into a vapor and mixes with oxygen at an extremely rapid rate accompanied by the release of intense heat and light, visible as flames. See "Fire" and "Pyrolysis."

Compartment - An enclosed space in a ship usually identified with a unique identifying number consisting of deck, forward frame, relation to centerline, and a letter designating the function or type of compartment. See "Plan ID."

Condition of Readiness - One of three material conditions of readiness set by the Commanding Officer of a military ship. All accesses such as doors, hatches and scuttles, and other fittings having damage control value are labeled X, Y, or Z. In condition "XRAY," all YOKE and ZEBRA accesses and fittings are open and those labeled XRAY are closed; in condition "YOKE," all ZEBRA accesses and fittings are open while those labeled XRAY and YOKE are closed; in condition "ZEBRA," all accesses and fittings are closed.

Configuration - The type of fire protection under consideration in a given fire scenario for a SAFE computer model run. Options include Passive only (I), Passive and Automatic

Detection/Fixed Fire extinguishing (I and A), Passive and Manual suppression (I and M), or all three (I, A, and M).

CUI - Compartment Use Indicator - An abbreviated designation for a compartment selected from a list provided in SAFE, which is used to define the type or function of the compartment and establish default values for various fire parameters.

Cum-L (%) - The accumulated probability that a fire will be limited (thus points on an "L-curve") in this or some previous compartment in a particular fire path. "1 - Cum L," therefore, is the probability that the fire will spread.

D-Adjust (%) - A user-specified parameter that can range from 0% to -99% to modify the D-bar values for a barrier. Usually used to account for deterioration of the barrier. An open door is not considered a derating of the barrier. See "D-bar."

Data Set - A data set describes those characteristics of a ship which affect its performance as a firesafety system. It includes information describing particular aspects of a compartment such as geometry, construction, fuel type and load, automatic detection and monitoring systems, ventilation, and fire protection systems. See "Alternative Data Set" and "Baseline Data Set."

D-bar (%) - The probability of a durability failure of a barrier, which would permit significant transfer of heat into the adjacent compartment.

Deck - The equivalent in a ship to a floor in a building. Decks can be continuous or stepped, insulated or bare. They can be constructed of aluminum, steel, or a composite such as Nomex. They can be covered with tile, carpet, or a poured floor covering such as terrazzo on one side and sheathing, insulation, or both on the other. Together with overheads and bulkheads they serve to segment the ship into various compartments.

Destroyed Barrier - When a barrier is "destroyed" in a model run, heat from the burning compartment is transferred to the adjacent compartment if that room is not at full room involvement. The amount of heat transferred is a function of the barrier material and is referred to as residual heat transfer. See "Residual Heat Transfer."

Door - An opening through a bulkhead providing access to a compartment. If a door is open it is equivalent to a durability failure of the associated bulkhead.

Dur IAM (%) - The probability of terminating a fire originating in a compartment due to a durability barrier failure. The probability is calculated from a combination of the I, A, and M curves for that room. If the room is a room of origin, Dur IAM is not applicable.

EB - Established Burning - The point in the fire growth curve between ignition and FRI when the fire starts to grow exponentially with respect to time. In SAFE, it is assumed that this exponential growth varies with the 2nd power of time. EB is usually considered equivalent to a flame 10 inches high. EB also signifies the demarcation between fire prevention and the beginning of the ship's response to the fire.

EEBD - Emergency Escape Breathing Device. This self-contained device provides 15 minutes of oxygen to an individual for the purpose of escaping from a fire.

Enclosure Point - The point in the fire growth curve where the fire starts to become influenced by a barrier.

Engineering Judgment - The assessment of risk in a probabilistic model utilizing subjective probabilities. In the SFSEM, engineering judgment is synonymous with an analyst's degree of belief. In this context an analyst is a domain knowledgeable individual whose judgment is augmented by all available data including results of deterministic computer models.

Extinguishment - The cessation of combustion (not to be confused with blackout, which is the cessation of visible flaming).

Failed Barrier - When a barrier has "failed" in a SAFE computer model run, EB is assumed in the adjacent compartment if that room is not already burning. The failure mode is thermal (T-bar) if the barrier's T-bar > D-bar; conversely if D-bar is >= T-bar, the failure mode is D-bar.

FAL - Frequency of Acceptable Loss. The frequency with which a compartment can sustain a given Magnitude of Acceptable Loss (MAL). The FAL and MAL together establish the fire safety objectives (FSOs) for a given compartment. See "MAL" and "FSO."

FFS - Fire Free State. The status of a compartment relative to fire before ignition has occurred.

Fire - Combustion. Usually destructive and undesirable in a ship. See "Combustion" and "Pyrolysis."

Fire Growth Model - One of 16 models of fire growth defined in SAFE that may be selected by the user to describe the characteristics of the fuel load in a compartment. The fire growth model determines the fire growth coefficient, alpha, and the maximum heat release rate, Qmax. See "Alpha" and "Qmax."

Fire Path - The sequential spread of fire from the compartment of origin through a failed barrier into an adjacent compartment, then through another barrier into another space and so on until the fire is limited. Multiple fire paths occur when failure of more than one barrier in a compartment permits the fire to spread into multiple compartments.

Fire Safety System - A term used to address the overall performance of a ship as it relates to fire safety. It considers the ship as a whole and accounts for such things as compartment geometry, construction, fuel type and load, automatic detection and monitoring systems, ventilation, and fire protection systems.

Flashover - A phenomenon characteristic of compartment fires denoted by the rapid and sudden propagation of flame through the unburned gases and vapors collected at the top of the enclosure. Flashover is invariably accompanied by full room involvement (FRI). FRI conditions are untenable for humans.

FLLR - Flammable Liquid Line Rupture. A scenario used in SAFE to model a class B spray fire. The key user defined variables include the amount of fuel due to the rupture that is added to the compartment's fuel load, the room of origin, and its associated FRI time and I value.

Frequency of EB (losses per compartment year) - A frequency based on historic fire casualty data compiled from data provided by the U.S. Naval Safety Center and the Coast Guard's MISREP mishap reporting system.

FRI - Full Room Involvement - The point in the fire growth curve when the temperature in a compartment has increased 500° C above ambient. FRI conditions include surface burning of all combustibles and survival for unprotected personnel is not possible.

FRI Time (minutes) - The elapsed time from EB to FRI calculated in SAFE using the Peatross/Beyler algorithm. See "FRI."

FSAC - Fire Safety Analysis of Cutters. Project sponsored by the U.S. Coast Guard to analyze fire safety on cutters 180' and greater in length.

FSOs - Fire Safety Objectives - Performance standard, ideally established by cognizant authorities, for a compartment accounting for mission protection, property protection, and life safety. The SFSEM is designed to analyze, quantify, and compare the ship's performance as a fire safety system to achieve the established FSOs on a compartment basis. The FAL and MAL together establish the FSOs for a given compartment. See "FAL" and "MAL."

Fuel-Controlled Burning - When sufficient ventilation is available, fuel controlled burning will occur. The fire is limited by the fuel surface and fuel quantity available for combustion. See "Ventilation-Controlled Burning."

Fuel Load (BTUs/sq ft) - The total heat energy available for release from combustible materials in a compartment. In SAFE, fuel loads are expressed as fuel load density, where the total fuel load in a compartment is divided by the compartment area. Fuel loads are entered in SAFE for cellulosics, plastics, and petroleum-based flammable liquids. Cellulosics and plastics are entered in lbs/sq ft, while flammable liquids are entered as gallons. The heat energy content of cellulosics is approximately 8,000 BTUs/lb; plastics and flammable liquids are approximately 16,000 BTUs/lb (flammable liquids are assumed to weigh 8 lbs/gallon).

FY - Fiscal Year - (For example, FY96 is Oct. 1, 1995, to Sept. 30, 1996).

Halon - Halogenated Hydrocarbon. A firefighting agent particularly effective against all classes of fires. Halon is presently banned from further production in accordance with the Montreal Protocol due to its atmospheric ozone-depleting characteristics.

Hatch - An opening through a deck providing access to a compartment. If a hatch greater than or equal to 400 square inches is open, it is equivalent to a durability failure of the associated barrier.

Heat Energy Impact (HEI) (kBTUs/sq ft) - The thermal heat flux to which the barrier is subjected during a fire. See "Pre-FRI Heat Release Rate" and "Post-FRI Heat Release Rate."

I-Curve - The resulting curve when I values for a compartment fire reaching the enclosure point, the ceiling point, and the room point are plotted on a graph with probability of flame limitation on the ordinate axis (logarithmic scale), with the origin at the top left, and the area of fire involvement on the abscissa axis (linear scale). See "I-Value."

Ignition - Point in the fire growth curve that denotes the beginning of pyrolysis of combustible fuel.

Ign Mode - Ignition Mode. In SAFE, one of three ways a compartment can reach EB: orig (as room of origin), therm (due to a thermal [T-bar] failure), or dur (due to a durability [D-bar] failure).

Intermediate Barrier Value (IBV) - The probability that the barrier will be successful in limiting the spread of fire. In SAFE, IBV is calculated as IBV = P(FPC)*P(BF), where P(FPC) is the probability of failure in limiting the fire in the previous compartment (1-Cum L in the previous compartment) and P(BF) is the probability of this barrier failing to limit the fire (1- [T-bar + D-bar]).

I-Value (%) - The probability that the fire will self-extinguish at some point between EB and FRI, given that the fire was not extinguished by automated systems or by manual firefighting efforts. Each compartment is assigned three I-values: the probability of flame limitation given EB in the room of origin, the probability of flame limitation given EB has occurred in the room as a result of a thermal (T-bar) failure of a barrier, and the probability of flame limitation given EB has occurred in the room as a result of a durability (D-bar) failure of a barrier. In SAFE, these values are abbreviated OI, TI, and DI, respectively.

L-Curve - A graph that plots the cumulative probability of limiting the flame on the Y axis against time or some other suitable parameter on the X axis, such as the number of rooms in a fire path or the deck area of a particular compartment. Convention calls for plotting 0 as the probability of limiting the flame at the top of the Y axis and 100% as the probability of limiting the flame on the X axis. See "cum-L."

L-Value (%) - The probability that a fire will be limited in a given compartment calculated from the I, A, and M values for that compartment.

MAL - Magnitude of Acceptable Loss - The severity of damage that can be tolerated in a compartment. FAL and MAL together establish the FSOs for a given compartment. See "FAL" and "FSOs."

Material ID - A three-character identifier to describe one of a compartment's barriers selected from the catalog of available barrier materials.

M-Curve - The resulting curve when M-values for increasing areas of a compartment are plotted on a graph with probability of flame limitation on the ordinate axis (logarithmic scale) with the origin at the top left and the deck area of the compartment on the abscissa axis (linear scale). See "M-Value."

M Value (%) - The probability that manual firefighting efforts will successfully extinguish the fire before FRI occurs given that the fire did not self-terminate and was not extinguished by automated fire protection systems. Each compartment is assigned three M-values: the probability of flame limitation given EB in the room of origin, the probability of flame limitation given EB has occurred in the room as a result of a thermal (T-bar) failure of a barrier, and the probability of flame limitation given EB has occurred in the room as a result of a durability (D-bar) failure of a barrier. In SAFE, these values are abbreviated OM, TM, and DM, respectively.

NFTI - Naval Firefighting Thermal Imager. A hand-held device used to locate the source of flames in a compartment by sensing the infrared thermal emissions in the space.

Nonstandard Scenario - Similar in all respects to a Standard Scenario except that it considers reduced levels of available fire protection systems.

NSTM - Naval Ship's Technical Manual. A set of regulations and guidelines issued by the U.S. Navy and frequently cited in U.S. Coast Guard regulations.

OBA - Oxygen Breathing Apparatus. A self-contained device that supplies oxygen to facilitate firefighting in untenable atmospheres.

One-Shot Halon System - A total flooding system with the capability to completely flood the protected space one time with the required concentration level of Halon 1301.

Overhead - The equivalent in a ship to a ceiling in a building. Overheads can be continuous or stepped, insulated or bare. They can be constructed from steel, aluminum, or a composite material such as Nomex or Celotex. They can be covered with sheathing, insulation, or both on one side and covered with carpet, tile, or a poured floor such as terrazzo on the other. Together with bulkheads, they serve to segment the ship into various compartments.

P-250 - A portable gasoline-powered pump used for firefighting and dewatering.

Passive Fire Protection - Fire protection features designed to limit flame movement by their presence alone. Barriers are the best example of passive fire protection; intumescent coatings, fire doors, fire insulation, fuel load distribution, and insulation of hot surfaces are other examples. See "Active Fire Protection."

Peatross/Beyler Algorithm - The algorithm used in SAFE, version 2.2, to calculate FRI-time for compartment fires. Primary variables include heat release rate, heat loss through the boundaries, and the incoming air. See "FRI-Time."

Percent Monitored At Sea (%) - An estimate of the percentage of time around the clock while a ship is underway that a compartment is monitored to detect the presence of smoke and flames. Both personnel and fire/smoke/heat detectors can monitor a compartment.

Percent Monitored In Port (%) - An estimate of the percentage of time around the clock while a ship is in port that a compartment is monitored to detect the presence of smoke and flames. Both personnel and fire/smoke/heat detectors can monitor a compartment.

Petrochemicals - One of two classifications of fuel on ships. Petroleum-based chemical products are characterized by having twice the heat energy per pound than cellulosics type of fuel. Examples of petrochemicals include flammable liquids and polymeric materials. See "Fuel Load and Cellulosics."

PKP - Potassium Bicarbonate. A dry chemical firefighting agent frequently used in portable fire extinguishers. The only authorized dry chemical portable fire extinguisher permitted on board Coast Guard Cutters.

Plan ID - A unique identifier for compartments as used in the Booklet of General Plans and other ship's drawings. The four fields that make up the identifier are deck number, forward frame number, relationship to the centerline (1 for starboard, 2 for port, 0 for centerline), and compartment use indicator. Examples are 3-66-0-E and 01-40-2-L.

Post-FRI Heat Release Rate (kW) - The rate that heat is released from the burning fuel in a compartment during the fully developed fire realm and calculated in accordance with the following expression: $Q = 1500 *A*H^{0.5}$. In SAFE, the ventilation factor, $A*H^{0.5}$, takes into account the height and area of all ventilation openings. Open doors, hatches, windows, etc., are assumed to be ventilation openings. The numerical coefficient, 1500, assumes stoichiometric burning conditions.

Pre-FRI Heat Release Rate (kW) - The rate that heat is released from the burning fuel in a compartment during the fire growth realm and calculated according to: $Q = \text{Alpha} * t^2$. The heat energy produced is used as a key variable in the Peatross/Beyler algorithm for calculating compartment fire temperatures; when the temperature exceeds ambient by 500° C, full room involvement (FRI) is assumed to exist in the compartment.

Pyrolysis - The conversion of solid fuel into flammable vapor through the application of heat.

Qmax - The maximum heat release rate value applied on a compartment-by-compartment basis. Qmax is the upper limit for Q in the Peatross/Beyler algorithm and is a function of the fire growth model. See "Fire Growth Model."

Radiation Point - The transition point between smoldering combustion and the point where a fire grows proportionally to the square of time. This point (beginning of exponential fire growth) is also referred to as Established Burning (EB), since this is the point where radiational feedback to the fuel bed becomes the predominant mode of heat transfer.

Relative Frequency of Acceptable Loss/Fire Free State - Relative Frequency of Acceptable Loss of a compartment given Fire Free State, calculated in SAFE by summing the probabilities of a target compartment or set failing to meet its FSOs over all fire paths, from all possible rooms of origin, multiplied by the frequency of EB in each room of origin.

Residual Heat Transfer (%) - The percentage of remaining thermal energy transferred from a burning compartment to an adjacent compartment due to a D-bar failure of a barrier. This transfer does not occur if the adjacent compartment is at full room involvement. This parameter is a function of the barrier material and can be found in the catalog of available barrier materials.

RLF - Relative Loss Factor - RLFs are calculated in SAFE as a means of assessing whether a target compartment or set meets FSOs. A Relative Loss Factor > 1 indicates that a target compartment has failed to meet its FSOs. This factor is determined by multiplying the target's Relative Frequency of Acceptable Loss given Fire Free State of the target in failures/year (calculated during a given run of SAFE) by the assigned frequency of acceptable loss in years. A target is considered lost if its level of fire involvement in a given path exceeds the level specified by its MAL rating.

Room of Origin - The compartment in a fire path where EB first occurs.

Room Point - The point in the growth of a compartment fire where flames fully involve the compartment. See "Full Room Involvement."

SAFE - Ship Applied Fire Engineering - The computerized implementation of the SFSEM. SAFE is actually an integrated series of computer programs utilizing AutoCAD and the INFORMIX relational data base management system

Scenario - A situation defined by the user before executing a SAFE probabilistic model run. Such parameters as run time, ship location, material condition of readiness, and firefighting configuration are specified.

SCFP - Small Cutter Fire Protection. Project sponsored by the U.S. Coast Guard to analyze fire safety on cutters less than 180' in length.

SFSEM - The Ship Fire Safety Engineering Methodology. A probabilistic-based risk analysis methodology used to analyze all aspects of the ship's performance in response to a fire compared to preestablished FSOs.

Shell Plating - The ship's hull consisting of the underwater body and the freeboard Main Deck and below. The ship's superstructure is above the Main Deck. Shell plating can be steel or aluminum.

SHIPALT - Ship Alteration. A document that describes an authorized change to the configuration, compartmentation, or other major alteration to a ship. The purpose of SHIPALTS is to standardize the configuration of all ships in a class.

Ship Location - A ship is either "at sea" or "in port" for the purpose of setting up a model run in SAFE.

SOLAS - Safety of Life at Sea. An international convention, prompted by the TITANIC disaster (amended several times since), that establishes international regulations for building ships to ensure passenger safety.

Standard Scenario - Scenarios that describe a ship's location and material condition of readiness with passive automated and manual fire protection capabilities in effect. Since this describes a ship under normal operating conditions, these scenarios are referred to as standard scenarios. See "Nonstandard Scenario."

Stepped Deck - That portion of a deck that is not in the same horizontal plane as the majority of the deck.

Stoichiometric - A term that describes ideal burning, which assumes there is sufficient oxygen to ensure 100% combustion of available fuel. Stoichiometric burning produces the hottest fire temperatures; therefore, sufficient ventilation to produce stoichiometric conditions is assumed in the SFSEM where fire protection systems should be designed for worst case conditions.

Superstructure - The ship's structure above the Main Deck. The superstructure can be steel or aluminum.

T-Adjust (%) - A value that can range from 0% to -99% that is applied to the T-bar value of a specified barrier to account for cracks or other flaws that would reduce its ability to resist a thermal or hot spot failure. An open door or window is not considered a derating of the barrier.

Target - A compartment or set of compartments that are analyzed in a probabilistic model run for the frequency and magnitude of fire loss due to fires started in every possible room of origin. A target set of compartments may be selected because they contain components necessary to perform a ship's mission. In this manner the likelihood of mission failure can be ascertained.

T-bar (%) - The probability of a thermal failure of a barrier which would permit a small, hot spot ignition in the adjacent compartment.

Therm IAM (%) - The probability of terminating a fire originating in a compartment due to a thermal barrier failure. The probability is calculated from a combination of the I, A, and M curves for that room. If the room is a room of origin, Therm IAM is not applicable.

Two-Shot Halon System - A total flooding system with the capability to completely flood the protected space two times with the required concentration level of Halon 1301. This system is designed such that each shot of Halon is released from a different location in the vessel.

USCGC - United States Coast Guard Cutter.

Vent Area (sq in) - The sum of all the ventilation openings in a compartment, excluding doors and hatches but including ventilation grates in a door. Used to calculate the post-FRI heat release rate. See "Post-FRI Heat Release Rate."

Vent Height (in) - The average of the vertical height of all vent openings in a compartment. The height of the compartment itself is used for horizontal vents.

Ventilation Controlled Burning - When insufficient ventilation is available, ventilation controlled burning occurs. The fire is limited by the air supply available for combustion. See "Fuel Controlled Burning."

Ventilation Factor - A factor, $A*H^{0.5}$, that describes the primary variables in the post-FRI heat release rate calculation in SAFE. These variables are the area and height of the ventilation opening(s) in a compartment. In compartments with multiple vents, areas are summed and heights are averaged.

WMEC - U.S. Coast Guard Medium Endurance Cutter.

XRAY, YOKE, and ZEBRA - Material Conditions of Readiness. Successively increasing levels of watertight integrity for controlling damage. At each level, additional access closures, valves, and fittings are required to be closed to limit fire and flooding.

Zero-Strength Barrier - An imaginary boundary used to model extremely long passageways and multiple-deck compartments. The barrier is presumed to have no thermal resistance.

1. INTRODUCTION

1.1 BACKGROUND

The U.S. Coast Guard operates a large fleet of Medium Endurance Cutters to conduct various Coast Guard missions including Search and Rescue, Maritime Law Enforcement, and Defense Operations. The fleet includes 33 cutters primarily in the 210' and 270' WMEC Medium Endurance Cutter classes. These cutters are equipped with flight decks, JP-5 refueling machinery, and other equipment to support helicopter operations. Typical patrols may extend up to three weeks underway, although two-week patrols are more common. The normal crew size on a 210' WMEC is 75 persons; this class of cutter is not considered to be minimally manned.

The Coast Guard commenced the Paragon Project to more effectively and efficiently operate a 210' WMEC in all mission areas, with an eye cast toward opportunities for crew-size reduction. The USCGC DEPENDABLE (and crew) was selected as the test vessel to evaluate this new operational philosophy. The Coast Guard is evaluating all aspects of operating DEPENDABLE with a reduced crew including effects on fire safety, watchstanding, maintenance, and mission performance. It is desired to evaluate the difference in fire protection levels on board pre-Paragon and post-Paragon operating cutters to ensure that an acceptable level of fire safety is achieved in both configurations.

The Coast Guard previously initiated the Small Cutter Fire Protection (SCFP) project to thoroughly analyze the fire safety of 10 classes of small cutters (less than 180' in length) and produce a tailored fire protection doctrine for each. The scope of the SCFP project included the 82' Point Class Patrol Boat, 110' Surface Effect Ship, 110' Island Class Patrol Boat, 65' Harbor Tugboat, and several classes of buoy tenders (including the 175' WLM [R] class) in the Coast Guard fleet. The Fire Safety Analysis of Cutters (FSAC) project was initiated by the Coast Guard to thoroughly analyze the fire safety of large cutters. The scope of the FSAC project included cutters 180' and greater, such as the 180' Seagoing Buoy Tender, 210' and 270' Medium Endurance Cutters.

The technical approach in the SCFP and FSAC projects specified the use of the Ship Fire Safety Engineering Method (SFSEM) as the analytical tool to evaluate shipboard fire safety. The SFSEM is a probabilistic-based risk analysis methodology that provides an integrated framework to account for all relevant aspects of shipboard fire protection. The Theoretical Basis of the Ship Fire Safety Engineering Method [1] provides a comprehensive discussion of the SFSEM. The SFSEM is designed to evaluate the ship's performance compared to preestablished fire safety objectives (FSO). The methodology quantifies the contribution of passive and active fire protection systems, thus it provides a means for analyzing and comparing hypothetical design alternatives to improve the overall fire protection on the cutter as necessary. SAFE, version 2.2, is a series of integrated computer programs that automate the numerous calculations required. In addition, various output options are available in SAFE that permit a detailed analysis of compartment and barrier performance. Appropriate documentation is available in the SAFE User Manual, version 2.2. [2]

As noted in the final report for the SCFP project, the following features of the SFSEM have been clearly demonstrated: [3]

- Utility to analyze existing ships, as well as proposed designs

- Ability to identify problem compartments that fail to meet fire safety objectives
- Capability to analyze the effectiveness of hypothetical design alternatives

Therefore, the SFSEM was specified as the analytical tool to evaluate the fire safety of the USCGC DEPENDABLE prior to the Paragon project and subsequent to reducing the crew and other changes associated with the Paragon project. The SFSEM/SAFE is an ideal tool for this analysis, because if any adverse changes to the fire safety levels are noted, SAFE could be used to evaluate potential methods to restore fire safety to pre-Paragon levels.

1.2 SCOPE

The scope of this project involves analyzing the fire safety of the CGC DEPENDABLE. The analysis compares the fire safety levels before and after the changes associated with the Paragon project were implemented on the cutter. The changes associated with Paragon project include:

- An improved fire detection system that is fully addressable
- Installation of fixed surveillance cameras
- An improved internal communications system
- A reduced in-port duty section when the cutter is in homeport
- Utilization of a rapid response team concept

Complete details concerning changes associated with the Paragon Project are discussed in section 4.1 of this report.

The primary objective established for this project is to evaluate and compare the fire safety of the CGC DEPENDABLE before and after changes associated with the Paragon Project were implemented. The fire safety analysis of the DEPENDABLE prior to Paragon changes is referred to in this report as the baseline analysis. These results are discussed in Section 3 of this report and should be comparable to the fire safety analysis results of other 210' WMEC class cutters. The fire safety analysis of post-Paragon conditions for DEPENDABLE are discussed in Section 4 of this report. Due to different operating conditions, there are two baseline conditions discussed in Section 3 and three post-Paragon conditions discussed in Section 4 as follows:

- <u>Baseline at sea.</u> Fire scenarios assume that the full crew complement of 75 persons are on board, awake, and alert. Two repair parties are fully manned when the Bridge announces "general emergency" or "fire." The fire detection system is not capable of distinguishing among compartments comprising a zone. Wireless communications devices are not available; crew members must use existing internal communications systems.
- <u>Baseline in port.</u> Fire scenarios are assumed to occur at night when the normal duty section is on board. In addition, a minimum number of other personnel may also be on board at night in port. Since this cutter is not minimally manned, the normal in-port duty section is assumed capable of manning a single repair party with the same number of crew members as at-sea conditions. Wireless communications devices are not available; crew members must use existing internal communications systems.

- Post-Paragon at sea. Fire scenarios assume that the reduced crew complement of 65 persons are on board, awake, and alert. One repair party is fully manned when the Bridge announces "general emergency" or "fire." A four-person rapid response team is deployed immediately to the scene of the fire. They do not dress out in firefighting ensembles, and they pick up portable extinguishers while proceeding to the scene. The new fully addressable fire detection system and surveillance cameras are operable, but the laptop computer and interface to the system are not operable. The wireless communications devices are used by all crew members.
- Post-Paragon in homeport. Fire scenarios are assumed to occur at night with a reduced duty section on board. The reduced duty section consists of five persons. The vessel must be in a cold-iron status with minimal operating machinery. It is also assumed that assistance is available from other vessels in the cutter's homeport as well as from the local city fire department. A four-person rapid response team is deployed immediately to the scene of the fire. They do not dress out in firefighting ensembles, and they pick up a portable extinguisher while proceeding to the scene. The new fully addressable fire detection system and surveillance cameras are operable, but the laptop computer and interface to the system are not operable. All crew members use the wireless communications devices.
- Post-Paragon in port away from homeport. Fire scenarios are assumed to occur at night when the normal duty section is on board. In addition, a minimum number of other personnel may also be on board at night in port. The normal in-port duty section is assumed capable of manning a single repair party with the same number of crew members as at-sea conditions. A four-person rapid response team is deployed immediately to the scene of the fire. They do not dress out in firefighting ensembles and they pick up portable extinguishers while proceeding to the scene. The new fully addressable fire detection system and surveillance cameras are operable, but the laptop computer and interface to the system are not operable. All crew members use the wireless communications devices.

Even though only some of the features of the new fire detection and monitoring system were operable and thus analyzed, the remaining features will further improve the fire safety of the cutter. Therefore, the results of this analysis are considered conservative.

1.3 TECHNICAL APPROACH

This project was organized into five sequential phases:

1. Conduct a ship visit of the CGC DEPENDABLE, Portsmouth, VA.
2. Collect factual input data and develop subjective input data needed to run SAFE.
3. Analyze fire safety of DEPENDABLE based on pre-Paragon (baseline) conditions using the SFSEM/SAFE.
4. Analyze fire safety of DEPENDABLE based on post-Paragon conditions using the SFSEM/SAFE.
5. Document results in this final report.

The first phase involved a ship visit from 30 September to 3 October 1997. During this visit, factual and subjective information was collected concerning the characteristics of the cutter that affect fire safety. This phase also included modeling the compartmentation in AutoCAD as a necessary prerequisite for using the SFSEM/SAFE. The second phase involved developing subjective input data, such as fire safety objectives and probabilities of flame termination, and documenting the factual input data, such as fuel loads and ventilation details. After all input data was entered into SAFE, a thorough review of the baseline fire safety levels of the DEPENDABLE (pre-Paragon) using the SFSEM/SAFE was performed in phase three. The individual target option provided relative loss factors that are a relative comparison of compartment loss compared to the fire safety objectives established for each compartment. Phase four involved analyzing post-Paragon conditions on DEPENDABLE. A one-day ship visit on 22 October 1998 was conducted to collect data about the changes implemented as a result of the Paragon project. Results of this analysis were compared with the baseline results to determine the effect of operating the vessel with a reduced crew and other changes implemented in the Paragon project. Finally, the results of the entire study were documented in the final technical report compiled in phase five.

1.4 FIRE SAFETY ANALYSIS PROCEDURE

The fire safety analysis of Coast Guard cutters typically compares the predicted loss potential for each compartment with the fire safety objectives established for each compartment in the cutter under evaluation. In this project, the comparison was made for the CGC DEPENDABLE under pre-Paragon and post-Paragon conditions/configurations. The SFSEM/SAFE analysis of the pre-Paragon conditions (considered the "baseline") is described in Section 3 of this report. The SFSEM/SAFE analysis of the post-Paragon conditions is described in Section 4 of this report

The following nine-step procedure, discussed briefly in the following sections, used to conduct the fire safety analysis of the CGC DEPENDABLE was adapted from the detailed fire safety analysis procedure used in the SCFP and FSAC projects:

1. Model the cutter in AutoCAD.
2. Load data base with ship's geometry.
3. Conduct ship visit.
4. Load input values into SAFE.
5. Calculate FRI times and post-FRI heat release rates.
6. Run SAFE on baseline (pre-Paragon) conditions.
7. Run SAFE on post-Paragon conditions.
8. Compare fire safety analysis results.
9. Document results.

1.4.1 MODEL THE CUTTER IN AUTOCAD

The general arrangement drawings provided by the Coast Guard are converted to AutoCAD before the ship visit is conducted. Zero-strength barriers are used to divide long compartments, such as passageways or compartments that span multiple deck levels. Other modeling techniques are described in the SAFE User Manual. [2]

1.4.2 LOAD DATA BASE WITH SHIP'S GEOMETRY

The simplified, yet accurate, representation of the ship's geometry created in AutoCAD is utilized by the connectivity generator in SAFE to produce a listing of all compartments on the cutter. Also produced is a listing of each compartment's barriers and individual connections to other compartments or to the weather. Once these lists have been verified for accuracy, they are loaded into SAFE's data base and ship visit forms are produced.

1.4.3 CONDUCT SHIP VISIT

The SFSEM/SAFE requires an extensive amount of data to facilitate an analysis of the cutter's fire safety. Preprinted ship visit forms ensure that the information concerning fuel loads, compartmentation, ventilation, fire safety objectives (FSOs), and other required data is collected in an efficient manner. This information is also used by the engineer/analyst to temper the engineering judgment required to develop the probabilistic values entered into SAFE. The accuracy of the fire safety analysis is directly proportional to the quality and completeness of the information collected during the ship visit and from written documentation, drawings, and other information sources.

1.4.4 LOAD INPUT VALUES INTO SAFE

This step includes refining the ship's geometry with any new information gathered during the ship visit, determining all required fire parameters, performing the data entry of the information on the ship visit forms, and verifying the accuracy of the entered data. The values now in the data base comprise the "baseline data set" for the ship. This baseline data set permits discrimination between the pre-Paragon data sets and the post-Paragon data sets (which are created in a subsequent project phase).

1.4.5 CALCULATE FRI TIMES AND POST-FRI HEAT RELEASE RATES

Flashover is the sudden propagation of flames through the unburned gases and vapors collected at the top of the compartment. Flashover invariably leads to full room involvement (FRI) conditions where the majority of combustible surfaces are burning and conditions for life are untenable. FRI time, or the elapsed time from EB to Full Room Involvement (FRI), is a very important parameter in fire growth. After all input values have been assigned, FRI times and post-FRI heat release rates are calculated for each compartment. FRI times may be reviewed and adjusted, or input values used to calculate FRI time may be adjusted and FRI time recalculated. FRI times are calculated in SAFE in accordance with the Peatross/Beyler algorithm. [4] Basically, this algorithm calculates the time in minutes for the temperature in a compartment to rise 500° C above ambient.

The variables in the post-FRI heat release rate calculation are included in the ventilation factor: $A*H^{0.5}$. This factor takes into account the height and area of a single vertical ventilation opening, which is providing natural (unforced) ventilation. The coefficient for this variable is based on the worst-case assumption of stoichiometric combustion. Some ship compartments are served by multiple vents and frequently use forced ventilation through horizontal vents; thus, determining vent opening height becomes problematic. The Theoretical Basis of the SFSEM provides an explanation how SAFE deals with multiple and horizontal vent openings. [1]

1.4.6 RUN SAFE ON BASELINE (PRE-PARAGON) CONDITIONS

Once the data base has been loaded with all required input, the probabilistic model is run on the baseline data set to establish the baseline fire safety levels of the cutter. Several parameters have to be specified in order to run the model. These parameters are specified in "scenarios" and include material condition of readiness (XRAY or YOKE), ship location (in port or at sea), firefighting configuration (passive [I], automated [A], and/or manual [M]), simulation run time (in minutes), and barrier failure criteria (best case or worst case). The Theoretical Basis of the SFSEM and the SAFE User Manual, Version 2.2, provide detailed explanations for these parameters and scenarios. [1, 2]

The objective of the baseline fire safety analysis is to quantify the level of fire safety prior to implementing changes associated with the Paragon project. This is accomplished by comparing the results with fire safety objectives established for the cutter. The baseline analysis is designed to identify compartments that fail to meet FSOs (or significantly exceed their FSOs) so that attention can be focused on these compartments.

The results of using the individual target option with the standard scenarios on the baseline data set are carefully examined to determine how well the ship performs as a fire safety system in response to a fire. This is accomplished by examining relative loss factors (RLF) for "target" compartments. RLFs greater than 1.0 indicate that the target compartment failed to meet the FSOs established for that compartment and an improvement in fire protection is needed. A target compartment with a RLF equal to 1.0 indicates that the compartment exactly meets its FSOs. A target with a RLF less than 1.0 indicates that the compartment exceeds its FSOs and a reduction in fire protection may be warranted.

The results from the individual target option focus on the target compartments, which do not meet their FSOs. These results do not provide any insight as to the primary sources of the fires that ultimately caused the loss of the targets. Determining the source or cause of each failed compartment may involve running the probabilistic model with different output options, such as the barrier or path options. For example, the detailed reports from the target option, barrier option, and path option may yield information that many of the fire paths that ultimately involve the target compartment actually originate in another compartment. Thus, improving the fire protection in the appropriate room of origin may improve the results in the target compartment as well as the room of origin. If all compartments exceed FSOs, insights gained by running the barrier option and path option are not required.

1.4.7 RUN SAFE ON POST-PARAGON CONDITIONS

The baseline data set is adjusted as needed to account for any changes implemented in conjunction with the Paragon project. For example, the new detection and monitoring system should improve the performance of the cutter as a fire safety system. Since the rapid response team (RRT) deploying to the scene of the fire arrives quickly and has the benefit of knowing a more localized estimate of the room of origin, the RRT should be able to attack the fire when it is smaller in size and thus easier to extinguish. Moreover, in compartments with installed automated fire protection systems, the RRT should be able to activate the system earlier in the fire growth period, thus improving the probability of flame termination by automated means. A reduced in-port duty section in homeport does not permit manning a full repair party, which reduces the onboard, initial firefighting capability. The manual firefighting effectiveness of the post-Paragon DEPENDABLE is affected by all the changes associated with this program. Since some of these changes increase fire safety and others decrease fire safety, the SFSEM/SAFE provides a way to analyze the combined effect of all changes. In general, the baseline data set is only changed to directly account for changes implemented by the Paragon project. To ensure the ability to compare results accurately, it is particularly important that the fire safety objectives used in the baseline or pre-Paragon data set are those used in the post-Paragon data set.

1.4.8 COMPARE FIRE SAFETY ANALYSIS RESULTS

This step involves comparing the results of running SAFE with the target option on both baseline and post-Paragon data sets to the established FSOs. A comparison of results will indicate whether the overall fire safety levels have either increased or decreased as a consequence of the Paragon project. In addition, the goal of this comparison is to identify compartments that fail to meet FSOs. If any compartments fail to meet FSOs, the SFSEM/SAFE may be used to study hypothetical changes that could improve the fire safety of those compartments to acceptable levels. This may involve running other options available in SAFE, such as the barrier and path option.

It is feasible to compare the fire safety levels of the DEPENDABLE with other classes of Coast Guard cutters that have been analyzed using the SFSEM/SAFE. However, comparison of DEPENDABLE with other cutter classes is outside the scope of this project.

1.4.9 DOCUMENT RESULTS

The final report documents the results of this study. Reports from SAFE that were generated are included in the appendices as supporting data. Graphic reports from SAFE (including color graphics) are available outputs from SAFE. For example, SAFE can generate deck plans that portray compartments that fail to meet FSOs in red, while compartments colored yellow, green or blue are progressively "safer."

1.5 ORGANIZATION OF REPORT

Section 2 of this report discusses historical fire records that pertain to U.S. Coast Guard cutters, as well as the process used to establish the frequency of EB in various types of compartments. The results of the baseline fire safety analysis of the DEPENDABLE are discussed in Section 3. Section 4 presents the results of the analysis of post-Paragon conditions as a result of the changes implemented in the Paragon project. Section 5 summarizes the conclusions and recommendations that were developed as a result of the fire safety analyses accomplished in this project. Appendix A presents plan views of all decks in the USCGC DEPENDABLE. Appendix B includes the documentation of all input data that comprises the baseline data set. Appendix C contains the detailed baseline fire safety analysis results generated by running the individual target option. Appendix D documents the SAFE input data and the target option output results from the analysis of post-Paragon conditions. Appendix E contains the methodology used to establish probabilities of flame termination in a consistent manner.

[This page intentionally left blank.]

2. HISTORICAL RECORDS OF FIRE

2.1 FREQUENCY OF ESTABLISHED BURNING

Fire safety analyses of Coast Guard Cutters to date have utilized historical records to establish the frequency of established burning (EB), since adequate data from the U.S. Naval Safety Center and U.S. Coast Guard Headquarters is available for each type of compartment aboard a cutter. Military ships, including Coast Guard Cutters, are required to report all fires that result in damage or personal injury. This provides the opportunity to utilize historical records to determine the frequency of EB.

Historical reports of fires on all classes of Coast Guard Cutters were obtained from the Commandant (G-KSE-4), U.S. Coast Guard, for the period FY87 to FY91. This data was combined with data received from the U.S. Naval Safety Center on 21 classes of large naval vessels during the period 1975 through 1986 to refine the reported fire frequencies. For the purposes of the SFSEM, similar compartments were grouped by compartment use indicator (CUI). CUI categories were adapted from the standard nomenclature used by the Coast Guard and Navy to identify compartment usage. Some CUIs were further subdivided in order to permit a more accurate assignment of reported fire frequency. Based on experience, it is estimated that approximately half of all fires that reach EB do little or no damage to the vessel and result in no injuries to personnel; thus they may go unreported. As a result, the "reported frequency of EB" based on historical data is doubled and called "adjusted fire frequency" to account for unreported fires. The number of fires reported and adjusted fire frequency values from the combined Navy and Coast Guard data are shown in Table 2.1, grouped according to CUI.

The adjusted fire frequencies for Main Propulsion Mechanical (EM) and Emergency Auxiliary Generator Rooms (QE) compartments are much greater than for other compartments. This fact has a substantial impact on the results of a fire safety analysis using the SFSEM.

Table 2.1 Fire Frequency Data

Type of Compartment	Compartment Use Indicator (CUI)	Number of Fires Reported	Adjusted Fire Frequency (1) (Fires per Compt Year)
Cargo Hold	AA	0 (2)	0.0001 (3)
Gear Locker	AG	19	0.0010
Refrigerated Storage	AR	3	0.0009
Storeroom	AS	34	0.0009
Ship Control Area	C	4	0.0012
Main Propulsion Electrical (4)	EE	7	0.0031
Main Propulsion Mechanical	EM	148	0.0272
Fuel Oil, Lube Oil Tank	F	0 (2)	0.0001 (3)
JP-5 Fuel Tank	J	0 (2)	0.0001 (3)
Hazardous Material Storage	K	4	0.0013
Berthing Space	L1, L2, L5	20	0.0008
Wardroom, Mess, Lounge Space	LL	7	0.0008
Medical, Dental Space (4)	LM	0	0.0001
Passageway, Staircase, Vestibule	LP	3	0.0001
Sanitary Space	LW	4	0.0002
Explosives Storage	M	1	0.0001
Auxiliary Machine Space (4)	QA	89	0.0029
Emergency Aux. Generator Room (4)	QE	23	0.0204
Fan Room	QF	7	0.0004
Galley Pantry, Scullery	QG	13	0.0026
Helicopter Hangar	QH	3	0.0036
Laundry	QL	5	0.0031
Office Space (4)	QO	5	0.0004
Shops, Labs	QS	15	0.0018
Trunk, Hoist, Dumbwaiter	TH	0 (2)	0.0001
Stack, Uptake	TU	5	0.0013
Void, Cofferdam	V	1	0.0001 (3)
Water, Peak, Ballast Tank	W	1 (2)	0.0004

NOTES:

1. Taken as twice the reported fire frequency
2. Based on 1986 - 1991 USCG data only. (All other numbers of fires based on both USN and USCG data.)
3. Default value used in cases where no fires have been reported or when calculated adjusted frequency is below 0.00005
4. New compartment types added since analysis of first three small cutters in the SCFP project

2.2 HISTORICAL RECORDS OF FIRES ON COAST GUARD CUTTERS

The Coast Guard MISREP data base was researched for historical records of reported fires by all Coast Guard Cutters during the period FY87 through FY91. Commandant (G-KSE-4) data included reports of 29 fires and 2 explosions over the 5-year period on cutters that represent 95% of the Coast Guard fleet. Three of the 31 fires/explosions (10%) occurred in 378' High Endurance Cutters; 13 fires/explosions (42%) occurred in 210' and 270' Medium Endurance Cutters, 180' Medium Endurance Cutters, and 140' Icebreaking Tugboats; the remaining 15 (48%) occurred in small cutters ranging from 65' Harbor Tugboats to 110' Island Class Patrol Boats and Construction Tenders.

The data provided by the Commandant (G-KSE-4) were also analyzed to obtain such information as the frequency that arson is a problem, the frequency of fires that spread to other compartments from the room of origin, the class of fires that most frequently occur, and the type of compartment where high-dollar-loss fires occur. This analysis revealed the following:

- The breakdown of the 29 fires shows that 18 were class A, 4 were class B, 5 were class C, and there were 2 unknown class fires.
- Most reported fires were relatively minor. Only 7 fires resulted in damage exceeding $1,000. There were no deaths, 6 minor injuries, and 25 fires with no injuries.
- Arson was not considered a factor in any reported fire.
- Most reported fires were quickly extinguished by the crew (90% within 5 minutes). Only three reported fires took longer than 5 minutes to extinguish. Ninety-three percent of all reported fires were contained within the room of origin.
- Additional mishap data provided by Commandant (G-KSE-4) shows that the majority of high dollar loss fires originate in Engine Rooms.
- Forty-two percent of the fires occurred in port, 29% underway, 23% during a Yard period, and 6% unknown. Note that the period of time a vessel was undergoing FRAM, SLEP, or MMA was excluded.

[This page intentionally left blank.]

3. BASELINE FIRE SAFETY ANALYSIS

This section of the report will address the baseline fire safety analysis results organized as follows:

- SAFE Input Data. The sources for the factual and subjective input data needed to run SAFE are documented in this section.
- Baseline Fire Safety Analysis. The SFSEM/SAFE is used to perform the fire safety analysis of CGC DEPENDABLE based on the baseline data set. The baseline data set was populated with data determined from the ship visit, ship's drawings, compartment check-off lists, the cutter's Damage Control Book, and the cutter's Machinery Space Firefighting Doctrine.

3.1 SAFE INPUT DATA

The baseline analysis is founded on information collected and observed during the ship visit. There are two general types of input data required to run SAFE, factual and subjective. Factual data includes physical characteristics of the cutter, design information, and operational information such as:

- Type, location, and condition of bulkhead and deck materials
- Compartment deck area and height
- Type, location, and quantity of automated and manual fire protection equipment
- Type, location, and quantity of smoke, flame, and heat detectors
- Size and orientation of ventilation duct openings (exhaust and supply) and other ventilation openings
- Estimates of cellulosics, plastics, and flammable liquid fuel loads

Subjective data is more esoteric in nature and is established based on engineering judgment, default values, and comparisons to similar parameters on other ships. This data includes:

- Probabilities of flame termination
- Fire safety objectives
- Percent time monitored for each compartment
- Applicable fire growth models

The following sections provide additional information concerning input data collected or determined for the DEPENDABLE baseline fire safety analysis categorized into factual and subjective input data.

3.1.1 FACTUAL INPUT DATA

Data or information relative to the DEPENDABLE's physical characteristics, design, and operational configuration is considered to be factual data. Factual data is observed during the ship visit, determined from drawings and official documentation, or it is based on default values, rules of thumb, and certain assumptions. Factual data also includes estimated data. For example, it would be possible to exactly determine a compartment's fuel load by weighing each combustible. Since this is impractical, fuel loads are estimated based on engineering judgment and experience gained through numerous ship visits. The following sections describe input data relative to the ship's physical characteristics. Subjective input data, which is based on engineering judgment, is then discussed.

3.1.1.1 Ship's Geometry

The ship's drawings were converted into a three-dimensional rendition using AutoCAD, Release 12. Each compartment in the cutter was assigned a Compartment Use Indicator (CUI). Most of the default values established in SAFE are based on CUIs. Since some of the input data for the DEPENDABLE relies on default values, CUI assignments are particularly important. Type and location of bulkhead and deck materials are based on observations made during the ship visit and are documented in Appendix B, Table B.2. Compartment height and deck area are determined from the AutoCAD drawings and shown in Appendix B, Table B.1.1.

3.1.1.2 Automated and Manual Fire Protection Systems

The following descriptions of fire protection systems installed in DEPENDABLE were obtained from information collected during the ship visit, the cutter's Damage Control Book and Machinery Space Firefighting Doctrine:

- The firemain system is supplied by two electric fire pumps rated at 250 gpm each; one is located in the Engine Room (4-108-0-E) and the other in the Auxiliary Machinery Space (4-156-0-E). The firemain and fire stations are designed such that any location in the DEPENDABLE can be reached from at least two fire stations with a single 50-foot length of fire hose. The 3-inch firemain supplies salt water at 125 psi to firemain stations (hoselines), the AFFF firefighting system, the washdown system, and the magazine sprinkling system.
- Three P-250 portable fire pumps are available for firefighting and dewatering operations.
- A fixed CO_2 total flooding system is installed in the Flammable Liquids Storeroom.
- An aqueous potassium carbonate firefighting system is installed to extinguish grease fires in the Galley.
- Three AFFF foam stations are installed for fighting class B flammable liquid fires. Two of the stations are located at frame 66 on the port and starboard sides of the 01 weather deck for the purpose of combating fires on the flight deck. The third station is located in Passageway (2-156-01-L). Each station is equipped with an in-line foam proportioner, a foam liquid pickup tube, a 50-foot length of fire hose with varinozzle, and a 5-gallon container of foam liquid concentrate.
- An AFFF system consisting of a 100-gallon AFFF concentrate tank, pump, valves, and proportioner in Passageway (2-156-01-L) provides 6% AFFF to the following locations:

  a. Flight Deck Hose Stations located at frame 87 on the port side and frame 95 on the starboard side of the 01 Deck.

  b. Auxiliary Machinery Space (3-96-0-E)

  c. Auxiliary Machinery Space (4-156-0-E)

d. Engine Room Bilge and the AFFF Hose Reel in the Engine Room (4-108-0-E)

e. Steering Gear Room (4-188-0-E)

- The following magazines are protected by a seawater sprinkling system:

  a. Handling Room Passage (4-52-01-L)

  b. Small Arms Magazine (4-52-1-M)

  c. 25MM Magazine (4-62-1-M)

  d. 50MM Magazine (4-62-2-M)

  Saltwater sprinklers are installed to thoroughly wash down all weather decks and the exterior portions of the superstructure. This system is primarily designed to eliminate chemicals or radioactive contamination and is not intended for firefighting purposes.

- Portable CO_2 and PKP fire extinguishers are installed throughout the cutter.

The above list indicates that this cutter is well equipped with adequate quantities and appropriate types of automated and manual fire extinguishment equipment in order to respond to fire emergencies on this vessel. The location, type, and quantity of installed and portable fire protection equipment in DEPENDABLE is documented in Table B.5, Appendix B.

3.1.1.3 Fire Detection System

Based on observations and discussions with the crew, it appears that the original detection system prior to the Paragon project was unreliable and maintaining the system in a high state of readiness may have been given low priority. The input values for the percent time monitored for each compartment are based on the estimated time a compartment is monitored by persons in the crew or by an automatic detector. The methodology for assigning percent time monitored values is contained in Appendix E. The percent time monitored values for compartments in DEPENDABLE protected by automatic detectors reflects the fact that the original detection system was unreliable and not fully addressable. Crew notification of the fire is one of several factors considered in the calculation of the probabilities of automated and manual flame termination. The presence of automatic detectors increases the probability that the crew will be notified of a fire while it is still small. Table B.4, Appendix B, lists the location, quantity, and type of detectors installed in each compartment; in addition, the percent time monitored established for each compartment is shown as well as the estimated minutes to detection. This estimate is actually a calculated output from SAFE as described in Chapter V, Sections H.1 and H.2, of the SAFE User Manual [2].

The location, type, and quantity of installed fire detectors were observed during the ship visit. The type and quantity of all installed fire and smoke detectors are shown in Appendix B, Table B.4, including the calculated time to detection.

3.1.1.4 Ventilation

The size and orientation of both ventilation duct and other openings in each compartment were observed during the ship visit. The ventilation input data including area and average height of all ventilation openings in each compartment for the baseline analysis of the DEPENDABLE are documented in Appendix B, Table B.1.2.

3.1.1.5 Fuel Loads

Estimates of cellulosics, plastics, and flammable liquid fuel loads, documented in Appendix B, Table B.7, are based on fuel loads observed in each compartment during the ship visit.

3.1.2 SUBJECTIVE INPUT DATA

The SAFE analysis of USCGCs requires input data that is either an estimate of relative effectiveness or a qualitative assessment, both of which rely on engineering judgment. Engineering judgment expresses an experienced and knowledgeable person's degree of belief. The SFSEM is a probabilistic-based fire risk analysis methodology. Engineering judgment is therefore appropriate for determining the following:

- Probabilities of Flame Termination. There are three ways that flame movement can be terminated:
  - ➢ The fire can extinguish itself due to a lack of fuel, lack of oxygen, lack of heat to pyrolize the fuel, or a break in the chain reaction necessary for a fire to continue to burn. This is referred to as passive extinguishment because it occurs without automated or manual intervention.
  - ➢ The fire can be extinguished by application of a fire extinguishing agent from an automated fire protection system. This is referred to as automated extinguishment.
  - ➢ The fire can be extinguished by the manual application of a fire extinguishing agent. This is referred to as manual extinguishment.

  A probability for each of the above three methods of fire termination, given the fact that established burning has occurred in the compartment, is assigned for each compartment in the cutter. In addition, the probability that flame termination will occur, given the fact that fire enters a compartment as a result of a thermal or massive failure of a barrier, is assigned for each compartment in the cutter. Therefore a total of nine probabilities of flame termination are determined for each compartment in the cutter as described in Section 3.1.2.1 of this report.
- Fire Safety Objectives. A detailed explanation of the methodology for establishing FSOs is provided in Section 3.1.2.2 of this report.
- Percent Time Monitored. A detailed explanation of the methodology for estimating the percent of time each compartment is monitored is provided in Section 3.1.2.3 of this report.
- Fire Growth Models. A detailed explanation of the methodology for assigning fire growth models to each compartment is provided in Section 3.1.2.4 of this report.

3.1.2.1 Probabilities of Flame Termination

Probabilities of flame termination are documented in Appendix B, Tables B.6.1, B.6.2, and B.6.3, for in-port and at-sea scenarios. SAFE default values were used extensively, especially for the probabilities of flame termination in compartments entered as a result of a thermal (T-bar) or massive (D-bar) failure of a barrier. Probabilities of passive, automated, and manual means of flame termination for each compartment given EB in that compartment may be determined in accordance with the methodology documented in Appendix E of the final report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender [5]. This methodology was modified for use in this project to account for the changes implemented in DEPENDABLE as a result of the Paragon project. The revised methodology is documented in Appendix E of this report.

The probabilities of flame termination were calculated using network diagrams as described in Appendix F of the final report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender. [5] Probabilities were assigned to each of the subfactors at the lowest level of detail for I, A, and M values as described in Appendix G of the report and in the Theoretical Basis of the SFSEM. [5, 1] For example, the following illustrates how the "A-Value" of 0.24 was determined as the probability of flame termination by automated means in the Flammable Liquids Storeroom that is protected by an installed CO_2 flooding system:

Probability of Notification (An)

An = dan * nan* san = 0.70 * 0.70 * 0.95 = 0.47 where:

dan = probability of detection

nan = notification of Pilot House

san = sound the alarm

Probability of Preparation (Ap)

Ap = fap * vap * pap = 1.00 * 0.80 * 0.90 = 0.72 where:

fap = securing the fuel supply to internal combustion engines in the space

vap = securing the ventilation fans in the space

pap = securing the electrical power in the space

Probability of Agent Application (Aa)

Aa = saa * aaa * daa = 0.95 * 1.00 * 1.00 = 0.95 where

saa = automated system is properly aligned for operation

aaa = agent discharges from the nozzle(s)

daa = agent discharges on the fire

Probability of Fire Extinguishment (Ae)

Ae = qae * cae * bae = 1.00 * 0.90 * 0.85 = 0.77 where

qae = quantity of agent is adequate

cae = concentration of agent is adequate

bae = blackout occurs

Probability of Flame Termination by Automated Means (A)

A = An * Ap * Aa * Ae = 0.47 * 0.72 * 0.95 * 0.77 = 0.24

3.1.2.2 Fire Safety Objectives

In order to analyze the performance of a ship as a fire safety system, there must be acceptable performance standards or criteria established by cognizant authorities. These criteria are referred to as Fire Safety Objectives (FSOs). The development of FSOs should take into consideration life safety, property protection, and mission impairment. Ideally, FSOs are established by owners or cognizant authorities who have been delegated responsibility for the management of ship operations and who are knowledgeable of fire protection engineering principles. In the Coast Guard, cognizant authorities are the appropriate program and support managers in Coast Guard Headquarters. In the absence of such input, FSOs were established by the engineer/analyst using the process described in this section. As the purpose of this project was to establish the relative impact of changes implemented by the Paragon Implementation Team on shipboard fire safety levels, the actual FSOs are similarly relative.

FSOs are designed to establish the performance standard for a fire safety system taking into account all aspects of fire including flame movement, smoke movement, people movement (egress for the occupants), and the ability of the structure to withstand the fire's assault. In the SFSEM, smoke movement, people movement, and structural analysis modules are not yet fully developed; therefore the FSOs are presently established considering flame movement only.

FSOs were established for the DEPENDABLE for each compartment utilizing the traditional approach used over the past 10 years in the fire safety analysis of 16 classes of Coast Guard cutters. A number of limitations and drawbacks have been identified with the traditional approach, and there has been some discussion concerning the practicality and validity of establishing FSOs on a compartment basis. [6, 7] Even with these minor concerns, the traditional approach has merit and is considered a valid approach. The following paragraphs describe the traditional approach in more detail.

FSOs are established for each compartment in the cutter that may be analyzed by SAFE. Currently, magazines, flammable liquid tanks, and helicopter hangars are not analyzed due to the inability of SAFE to deal with explosion hazards. All other compartments are rated for both Magnitude of Acceptable Loss (MAL) and Frequency of Acceptable Loss (FAL). The MAL is established by assigning a rating to each of the following four factors for each compartment and then weighting these factors to determine an overall rating for the compartment:

- Life Safety (LS)
- Property Protection (PP)
- Primary Mission (PM)
- Secondary Mission (SM)

The weighting factors are different for each module in the SFSEM. For example, in the flame movement module, damage from flames affects the primary mission of the ship more than it causes life safety concerns. Whereas considering the effects of smoke, life safety will be the primary concern compared to property damage. Thus the weighting factors for the four factors are adjusted for each module in the SFSEM. The weighting factors used to assign a MAL rating to each compartment in the DEPENDABLE considering flame movement only are shown in the following expression:

$$MAL = 0.1*LS + 0.3*PP + 0.4*PM + 0.2*SM$$

The MAL rating for each factor (LS, PP, PM, & SM) is permitted to be one of the following four integer values:

Established Burning (EB) is not acceptable........................1

EB is acceptable but Full Room Involvement (FRI) is not........2

FRI is acceptable but Compartment Burnout (CBO) is not.......3

CBO is acceptable..4

A MAL rating is assigned to each factor for each compartment, then the overall MAL rating is calculated according to the algebraic expression shown above and the truncated MAL rating is assigned to the compartment. For example, if the result of the calculation is 3.37, a MAL of 3 is assigned.

The ratings are assigned for each factor using engineering judgment and considering the effect flame movement has on each factor. Compartments whose total loss (CBO) would not significantly affect the ship's primary or secondary mission are typically assigned a rating of 4 for factors PM and SM. For example, if totally lost, most sanitary spaces, gear lockers, passageways, voids, water tanks, ladders, cofferdams, and certain storerooms would not prevent the ship from performing its primary or secondary mission. Note that a compartment may contain a significant fuel load and contribute materially to the spread of a fire, but if its loss does not significantly affect the ship's mission, it receives a rating of 4. At the other extreme, flammable materials storage lockers, paint lockers, and other compartments containing extremely flammable materials representing a significant fire hazard are normally assigned a rating of 1 for the factors PM and SM.

The balance of the compartments are normally assigned a rating of 2 or 3 for the factors PM and SM. In general, if the compartment contains equipment vital to the ship's primary or secondary mission, and if its loss would likely result in the ship is aborting its patrol and returning to homeport for repairs, it would be assigned a 2. On the other hand, if the compartment's loss would degrade but not prevent the ship's ability to perform its mission, it would receive a 3 rating. Examples of compartments typically rated 2 for the factors PM or SM are the Engine Room, Bridge, and Galley. Berthing Areas, Ship's Offices, and Labs/Workshops are typically assigned a 3 rating for the factors PM and SM. Note: If a compartment would normally be assigned a MAL of 4 for PM and SM factors, but it contains wiring that serves vital systems or equipment in other spaces, the MAL ratings for the PM and SM factors are assigned to match the rating assigned to those spaces that contain the vital systems or equipment.

The cost to replace a compartment's contents (machinery and outfit) is the primary consideration for assigning a rating to the property protection (PP) factor. Obviously, Engineering Spaces such as the Engine Room, Emergency Generator Room, and Auxiliary Machinery Rooms contain very expensive machinery not only from an acquisition point of view but also in respect to the costs for the labor to install and align the equipment. Thus these spaces are typically assigned a rating of 2 for the PP factor. A rating of 1 is assigned to spaces such as paint lockers and flammable materials storage lockers for the property protection factor due to the additional property damage that would undoubtedly occur in other adjacent spaces. A rating of 4 is assigned for the PP factor to those spaces whose total loss would be considered minimal (compared with other spaces). Finally, a rating of 3 is assigned for the PP factor to those compartments whose cost is not minimal but is considered far less than major engineering spaces. Examples of spaces assigned a 3 rating for the PP factor include the Galley, the Scullery, and spaces with some minor machinery such as sewage machinery spaces and potable water equipment rooms.

Ratings for the life safety (LS) factor take into account the likelihood that personnel will be injured by the fire (not by the smoke or toxic gases). This probability is affected by the likelihood that the space will be occupied, the accessibility of the space, the quantity of personnel likely to be in the space, and the likelihood that the occupants will be sleeping. Thus spaces such as the Paint Locker, where personnel would be in danger even if EB occurs, are assigned a rating of 1 for the LS factor. Spaces in which EB can occur, but personnel are not likely to be in serious danger unless FRI occurs, receive a rating of 2 for the LS factor. If FRI can be tolerated but the entire compartment would have to be lost before personnel are in danger of being injured, a rating of 3 would be appropriate for the LS factor. Finally, if a compartment can be totally lost and still not endanger personnel, a rating of 4 can be assigned to the LS factor. After a rating has been assigned to all four factors, the overall MAL rating for the compartment is calculated. This value is then used in the calculation for the Frequency of Acceptable Loss (FAL) as described in the next paragraph.

The FAL is related to the MAL. For example, it may be considered acceptable to lose a compartment with a MAL = 4 once a year, but compartments with a MAL = 1 may be lost only once in a ship's lifetime (30 years). Based on MAL and FAL ratings established by engineering judgment for similar compartments in several classes of cutters, a correlation between MAL and FAL was determined by fitting a curve to the data points. The following algebraic relationship expresses this correlation and is used to establish the FAL based on the nontruncated MAL rating for each compartment:

$$\mathbf{FAL = 32.25 - (1.766*MAL) - (0.214*MAL^2) - (0.222*MAL^3)}$$

The FSOs established for the DEPENDABLE using the traditional approach described above are tabulated in Appendix B, Table B.3.

3.1.2.3 Percent Time Monitored

The time to detect a fire is a function of the percent of time a compartment is monitored. There are two possible ways a compartment can be monitored: by the ship's crew or by an installed smoke, heat, or flame detector. In compartments monitored by installed detectors that are wired to a fully addressable central alarm panel, 95% is normally assigned (99% in the event of multiple detectors in a compartment) as the percent of time the compartment is monitored both in port and at sea. This value reflects the reliability expected with this type of detection system. As discussed earlier, since the detection system in DEPENDABLE prior to the Paragon project is not fully addressable or reliable, the percent time monitored in compartments with installed detectors was significantly reduced as shown in Appendix B, Table B.4. In other compartments not protected by detectors engineering judgment was utilized to estimate the percentage of time per 24-hour day that a particular compartment is expected to be monitored (visited) by a crew member.

Percent time monitored values are used as the probability of detection subfactor in the assignment of flame termination by automated means (A-values) and by manual means (M-values). To ensure that these values are assigned in a consistent manner, a methodology for assigning M-values was developed and documented in the final report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender. [5] This methodology was modified to account for the changes implemented in the Paragon project in DEPENDABLE and documented in Appendix E of this report.

3.1.2.4 Fire Growth Models

There are 16 fire growth models in SAFE that describe the nature and distribution of fuel packages. The particular model that is selected predetermines two extremely important fire growth parameters: alpha and Qmax. Alpha is the fire growth coefficient in the heat release rate formula in the pre-FRI fire growth regime. Qmax describes the maximum heat release rate that is permitted regardless of the fuel load. These parameters in the fire growth models were based on empirical data collected in full-scale tests. These tests were conducted in warehouses, basements, and other nonshipboard scenarios. Consequently, many of the available fire growth models are a poor match to shipboard conditions; however, their application in SAFE is considered to give conservative results. Fire growth models were assigned based on observations during the ship visit of the fuel loads in each compartment. Fire growth models selected for the DEPENDABLE are documented in Appendix B, Table B.8.

3.2 BASELINE FIRE SAFETY ANALYSIS RESULTS

3.2.1 FRI TIMES AND POST-FRI HEAT RELEASE RATES

The Post-FRI heat release rates (Q) and FRI times are calculated in SAFE. These fire parameters are tabulated for each compartment in Appendix B, Table B.8. The algorithms for these calculations are described in the Theoretical Basis of the SFSEM. [1]

FRI time is a critically important fire parameter because it determines the length of time between EB and the development of sufficiently high compartment temperatures that full room involvement conditions are expected. When FRI is achieved, conditions in the compartment are assumed to be incapable of supporting life, and the heat energy of the burning fuel is assumed to begin impacting the barriers. Therefore, if FRI time is infinite (or greater than 60 minutes for practical purposes) the fire will be limited to the compartment. On the other hand, if FRI time is very short (for example, 2 or 3 minutes), there may be little chance that the fire party can respond quickly enough to extinguish the fire in the compartment unless there is a very small fuel load. If the fuel load is small, the available fuel may be consumed quickly and the fire may be easily extinguished by the fire party. The ability to achieve FRI is largely dependent on ventilation. Stoichiometric burning conditions are assumed to exist in each compartment. In an actual ship, many compartments may be rendered relatively airtight, thus this is a conservative assumption. A review of the calculated FRI times tabulated in Appendix B, Table B.8, shows expected results for all compartments.

3.2.2 ANALYZE BASELINE RESULTS

The following summarizes some of the basic assumptions made in SAFE and by the analyst that affect the results of the fire safety analysis:

- FRI times are based on a rise of ambient temperatures in the compartment of 500°C.
- Rate of heat release in the pre-FRI fire growth regime is based on an "alpha-T-squared" fire growth curve.
- Rate of heat release in the post-FRI fire growth regime is calculated according to the following formula: $1500*A*H^{0.5}$ (stoichiometric combustion conditions).
- The Ingberg conversion is used for the determination of heat energy impact on the barriers. Moreover this heat energy is assumed to impact the barriers only after FRI is achieved.
- Fire paths are assumed to be *independent* in the individual target option. Since actual fire paths are *dependent,* the results predict that target compartments are not as safe as they actually are.
- In a fire, ventilation fans are usually secured. Significantly less air can flow through the ductwork than the natural vent opening assumed in the calculations.
- An unimpaired, fully trained 75-person crew is assumed to be on board underway. A fully manned and trained in port duty section is on board in port with all persons in the repair party fully qualified for their roles.

The net effect of these assumptions on the results is considered conservative. In other words it is believed that the fire safety of this ship is actually better (safer) than the results indicate.

3.2.2.1 Individual Target Option Results

The individual target option was specified as the output option for running the probabilistic model in the fire safety analyses of previous cutters as well as the DEPENDABLE. This option permits a rapid comparison of each compartment as a target compartment compared with preestablished fire safety objectives for fires that may originate in any compartment. In other words, it provides a means to identify "victims" of fires that may start in any compartment (including the target) and ultimately involve the target compartment. Results of the baseline fire safety analysis with the individual target option run on the baseline data set are documented in Appendix C, Individual Target Option - Summary Level Reports.

Excerpts from the individual target option results are shown in Tables 3.1, 3.2, and 3.3 and list all compartments with RLFs greater than or equal to 0.03 and a MAL of 1, 2, or 3 in scenario 1 (XRAY, In Port, I, A, & M in effect). These three tables summarize the most interesting results of the baseline analysis. The RLFs shown in Table 3.1 for the two in-port scenarios (XRAY and YOKE) are very similar. This indicates that there are relatively few doors, scuttles, and hatches labeled YOKE. A review of the access classifications in Appendix B, Table B.2, reveals that there are only seven watertight doors and four hatches classified YOKE. The most significant difference between the XRAY and YOKE in-port scenarios is the Engine Room. The YOKE door in the Engine Room leading to Passageway, 2-140-0-L, accounts for why the XRAY scenario is significantly less safe.

The small differences in the two YOKE scenarios, in port and at sea (scenarios 2 and 3), shown in Table 3.1 are primarily attributed to the difference in the percent (time) monitored for each compartment in port and at sea as documented in Appendix B, Table B.4. In general, it is more likely that a crew member will discover a fire earlier at sea than in port due to the higher manning levels at sea. Therefore, lower RLFs (safer ship) are expected for at-sea scenarios than for in-port scenarios. Another reason that accounts in part for the small difference between the two YOKE scenarios shown in Table 3.1 is the fact that the relative contribution of automated (A) and manual (M) suppression is small; therefore the results are largely attributable to passive (I) protection only. Since there is virtually no difference in passive protection at sea and in port, very little difference is expected in results between the two YOKE scenarios.

A review of the baseline fire safety analysis results show that with passive (I), automated (A), and manual (M) fire protection in effect, all compartments in the pre-Paragon DEPENDABLE exceed FSOs, in port and at sea. This means that no improvements are necessarily required to bring the pre-Paragon DEPENDABLE up to minimally acceptable fire safety levels.

Table 3.2 compares varying levels of fire protection for the in-port, XRAY scenario. As expected, the RLFs increase with decreasing levels of fire protection. The results also show that the rank ordering of compartments from most dangerous (highest RLF) to safest (lowest RLF) is approximately the same among the four scenarios. As shown in Table 3.2, all compartments exceed FSOs with all combinations of fire protection in effect (I only; I & A; I & M; and I, A, & M). Therefore passive fire protection alone (I only) is adequate to meet FSOs. Automated and manual fire extinguishment increase the margin of safety. A comparison of results between I only and I & M shows the minimal contribution of manual firefighting efforts to the overall fire safety of the ship. Similarly, there is no significant improvement between I only and I & A in RLFs for most target compartments. This result is attributed to the fact that only six compartments (other than magazines, which are not analyzed) are protected by an automated system. The very slight increase between I & A and I, A, &M results is due to the slight improvement added by manual firefighting efforts. In summary, the pre-Paragon DEPENDABLE exceeds fire safety objectives in port in all compartments, with and without the contribution of either automated or manual firefighting.

Table 3.3 compares varying levels of fire protection for the at-sea YOKE scenario. As expected, the RLFs increase with decreasing levels of fire protection. The results also show that the rank ordering of compartments from most dangerous (highest RLF) to safest (lowest RLF) is approximately the same among the four scenarios. As shown in Table 3.3, all compartments exceed FSOs with all combinations of fire protection in effect (I only; I & A; I & M; and I, A, & M). Therefore passive fire protection alone (I only) is adequate to meet FSOs. Automated and manual fire extinguishment increases the margin of safety. A comparison of results between I only and I & M shows the minimal contribution of manual firefighting efforts to the overall fire safety of the ship. Similarly, there is no significant improvement between I only and I & A in RLFs for most target compartments. This result is attributed to the fact that only six compartments (other than magazines, which are not analyzed) are protected by an automated system. The very slight increase between I & A and I, A, &M results is due to the slight improvement added by manual firefighting efforts. In summary, the pre-Paragon DEPENDABLE exceeds fire safety objectives at sea in all compartments, with and without the contribution of either automated or manual firefighting.

Table 3.1
Relative Loss Factors, Scenarios 1, 2, 3

Plan ID	Compartment Name	CUI	MAL	FAL	Run 10-37	Run 10-41	Run 6-17
					Scenario 1	Scenario 2	Scenario 3
					Xray, In Port	Yoke, In Port	Yoke, At Sea
4-108-0-E	Engine Room	EM	2	26	0.338	0.019	0.019
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.105	0.105	0.102
03-62-0-C	Pilot House	C	2	26	0.104	0.104	0.099
02-56-1-C	Radio Room	C	2	26	0.062	0.062	0.060
02-90-0-Q	Plenum Room	QF	3	18	0.044	0.044	0.042
02-56-2-C	CIC Room	C	2	26	0.042	0.042	0.041
1-108-0-Q	Uptake	TU	2	23	0.041	0.041	0.040
01-92-0-Q	Helo Service Room	QA	2	22	0.040	0.040	0.039
1-114-2-Q	Scullery	QG	2	20	0.038	0.038	0.038
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.038	0.023	0.022
1-20-0-Q	Laundry	QL	3	19	0.036	0.000	0.000
1-93-0-L	CPO Mess	LL	2	24	0.034	0.034	0.033
1-121-0-L	Crews Mess	LL	2	24	0.033	0.033	0.032
4-188-0-E	Steering Gear Room	QA	2	26	0.032	0.009	0.008

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios include I, A, and M

Table 3.2
Relative Loss Factors, Scenarios 1, 4, 7, 10

Plan ID	Compartment Name	CUI	MAL	FAL	Run 10-37	Run 10-38	Run 10-39	Run 10-40
					Scenario 1	Scenario 4	Scenario 7	Scenario 10
					I, A, & M	I & A	I & M	I Only
4-108-0-E	Engine Room	EM	2	26	0.338	0.366	0.398	0.432
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.105	0.124	0.108	0.128
03-62-0-C	Pilot House	C	2	26	0.104	0.199	0.104	0.199
02-56-1-C	Radio Room	C	2	26	0.062	0.086	0.062	0.086
02-90-0-Q	Plenum Room	QF	3	18	0.044	0.050	0.045	0.052
02-56-2-C	CIC Room	C	2	26	0.042	0.062	0.042	0.062
1-108-0-Q	Uptake	TU	2	23	0.041	0.045	0.042	0.048
01-92-0-Q	Helo Service Room	QA	2	22	0.040	0.044	0.040	0.045
1-114-2-Q	Scullery	QG	2	20	0.038	0.045	0.041	0.048
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.038	0.047	0.040	0.051
1-20-0-Q	Laundry	QL	3	19	0.036	0.040	0.036	0.040
1-93-0-L	CPO Mess	LL	2	24	0.034	0.048	0.036	0.051
1-121-0-L	Crews Mess	LL	2	24	0.033	0.048	0.036	0.053
4-188-0-E	Steering Gear Room	QA	2	26	0.032	0.037	0.037	0.043

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are XRAY In Port

Table 3.3
Relative Loss Factors, Scenarios 3, 6, 9, 12

Plan ID	Compartment Name	CUI	MAL	FAL	Run 6-17	Run 6-18	Run 6-19	Run 6-20
					Scenario 3	Scenario 6	Scenario 9	Scenario 12
					I, A, & M	I & A	I & M	I Only
4-108-0-E	Engine Room	EM	2	26	0.019	0.023	0.023	0.029
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.102	0.124	0.104	0.128
03-62-0-C	Pilot House	C	2	26	0.099	0.193	0.099	0.193
02-56-1-C	Radio Room	C	2	26	0.060	0.084	0.060	0.084
02-90-0-Q	Plenum Room	QF	3	18	0.042	0.050	0.043	0.052
02-56-2-C	CIC Room	C	2	26	0.041	0.058	0.041	0.058
1-108-0-Q	Uptake	TU	2	23	0.040	0.045	0.042	0.048
01-92-0-Q	Helo Service Room	QA	2	22	0.039	0.044	0.040	0.045
1-114-2-Q	Scullery	QG	2	20	0.038	0.045	0.041	0.048
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.022	0.029	0.023	0.030
1-20-0-Q	Laundry	QL	3	19	0.000	0.000	0.000	0.000
1-93-0-L	CPO Mess	LL	2	24	0.033	0.048	0.035	0.051
1-121-0-L	Crews Mess	LL	2	24	0.032	0.048	0.036	0.053
4-188-0-E	Steering Gear Room	QA	2	26	0.008	0.011	0.010	0.014

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are YOKE At Sea

4. ANALYSIS OF POST-PARAGON CONDITIONS

As noted in Section 3 of this report, all compartments in the DEPENDABLE exceed their fire safety objectives. Therefore no changes to the existing fire safety systems are required to bring the ship up to minimally acceptable fire safety standards. However, as a consequence of the Paragon Project, a significant reduction in crew size was implemented. The in-port duty section size was significantly reduced to five persons while the cutter is in homeport. When the DEPENDABLE is in a port other than its homeport, there is no change in the in-port duty section size. The original fire detection system was changed to a more reliable and fully addressable system. A reduction in crew size and an improved fire detection system have offsetting effects on fire safety. The Coast Guard initiated this study to evaluate the impact of the Paragon project changes on the ship's fire safety. It is important to recognize that since the Paragon project changes impact only A and M values, the DEPENDABLE will still meet the FSOs as the I values (passive fire protection) remain unchanged.

To accomplish the objectives of this study, a fire safety analysis using the SFSEM/SAFE was performed on the DEPENDABLE under pre-Paragon and post-Paragon conditions, and the results were compared to quantify the net effect on fire safety of the changes implemented in the Paragon project. This section of the report is organized into three subsections:

- Changes Implemented in the Paragon Project. The changes that affect fire safety that were implemented in DEPENDABLE as a result of the Paragon Project are described in Section 4.1 of this report.
- Post-Paragon Fire Safety Analysis. The results of running SAFE and the individual target option on the Post-Paragon DEPENDABLE are discussed in Section 4.2 of this report
- Comparison of Pre-Paragon and Post-Paragon Results. The results of running SAFE on the Post-Paragon conditions are compared to the baseline (pre-Paragon) results and the net effect on fire safety is discussed in Section 4.3 of this report.

4.1 CHANGES IMPLEMENTED IN THE PARAGON PROJECT

The following changes associated with the Paragon project were implemented on DEPENDABLE:

- The existing fire detection system was changed to a fully addressable system. However, only compartments that initially contained detector heads are covered. The original system was divided into 16 zones, most of which included multiple compartments. Under this system, a detection alarm required an investigator to search the compartments comprising the zone to determine the exact location of the fire. This information would then be transmitted to the Bridge by messenger or by some internal communications system where an announcement of the fire location would be made. The new detection system is fully addressable; that is, the compartment where the detector is located is automatically and immediately displayed on the master alarm panel. The existing detector heads were changed to support the new addressable alarm panel, but the original wiring was reused. As stated previously, locations of detectors were not modified.
- Sixteen fixed surveillance cameras were installed in strategic locations throughout the vessel. TV monitors located throughout the ship constantly display the view from one of the cameras. The crew can control the sequence and length of display from each camera. In addition, a portable laptop computer that can be plugged into the system in multiple locations

throughout the ship, is used to control the system. The laptop computer can command a constant display from a selected camera during a fire incident.

- The fire detection and monitoring system was combined with other alarms including the bilge high water level alarm and the magazine high temperature alarm. The system is also integrated with the surveillance cameras, TV monitors mounted in strategic locations, and the general announcing system. The system is designed to automatically make an announcement of the compartment location of a fire as soon as it is detected. In addition, the nearest surveillance camera automatically locks in so that all TV monitors provide a continuous view of the scene near the fire.
- A four- to five-person rapid response team (RRT), modeled after a concept developed by the Navy, is used to immediately respond to all fires in port and at sea. The RRT does not take the time to dress out in firefighting ensembles. They immediately respond to the scene of the fire with portable extinguishers. If they are unsuccessful in extinguishing the fire, they back out of the space and contain the fire by closing all doors and hatches in the vicinity of the fire. The repair party will then relieve the RRT of firefighting duties.
- At sea and in port away from homeport, one repair party is fully manned (opposed to two in other 210' WMEC cutters) and responds to all fires after firefighters don firefighting ensembles. The repair party responds to the scene after breaking out appropriate firefighting equipment such as hoses, and AFFF.
- In homeport, the normal duty section is reduced to five persons. Because the normal duty section is reduced, DEPENDABLE will augment the firefighting capabilities with assistance from city fire department personnel as well as potential assistance from other cutters in port. It is important to recognize that the in-port duty section is reduced only under "cold iron" conditions. "Cold iron" conditions preclude the operation of the main engines or the ship's service generators.
- Most crew members have been given personal wireless portable communication devices. These devices are capable of tying into the general announcing system. Presently, these devices cannot be used with an oxygen breathing apparatus. There are plans to alter the OBA helmets to permit hands-free use of the portable phone.

Some of the features of the new fire detection and monitoring system have not been implemented due to technical difficulties encountered during installation. For example, currently the laptop computer will not interface with the detection system; therefore the surveillance cameras can only be controlled or locked on to a constant display from the IC Gyro Room. This analysis is based on the features of the new system that were operable during the ship visit in October 1998. Features of the new system that have not been accounted for should only improve fire safety on DEPENDABLE.

4.2 POST-PARAGON FIRE SAFETY ANALYSIS

The changes that were implemented in DEPENDABLE as a result of the Paragon project do not affect the probabilities of passive flame termination. No changes were made to installed or fixed fire protection equipment with the exception of the fire detection system. Fire safety objectives, fuel loads, ventilation values, and all other important parameters that affect fire safety were not affected by the Paragon project. Therefore, all the changes described above affect the assignment of probabilities of automated and manual flame termination. A-values and M-values were assigned in accordance with the revised methodology described in Appendix E of this report. The inputs to the post-Paragon fire safety analysis in the form of detailed A-value and M-value spreadsheets and a complete set of outputs in the form of individual target summary level reports are included in Appendix D of this report.

Excerpts from the individual target option results are shown in Tables 4.1, 4.2, and 4.3 and list all compartments with RLFs greater than or equal to 0.03 and a MAL of 1, 2, or 3 in scenario 1 (XRAY, In Port, I, A, & M in effect). These three tables summarize the most interesting results of the post-Paragon analysis.

Tables 4.1, 4.2, and 4.3 compare varying levels of fire protection for the following scenarios:

- Table 4.1: At sea, YOKE.
- Table 4.2: In port, in homeport, XRAY
- Table 4.3: In port, away from homeport, XRAY

As expected, the RLFs increase with decreasing levels of fire protection. The results also show that the rank ordering of compartments from most dangerous (highest RLF) to safest (lowest RLF) is approximately the same among the four scenarios. As shown in Tables 4.1, 4.2, and 4.3, all compartments exceed FSOs with all combinations of fire protection in effect (I only; I & A; I & M; and I, A, & M). Therefore, passive fire protection alone (I only) is adequate to meet FSOs. Automated and manual fire extinguishment increase the margin of safety. A comparison of results between I only and I & M shows the minimal contribution of manual firefighting efforts to the overall fire safety of the ship. Similarly there is no significant improvement between I only and I & A in RLFs for most target compartments. This result is attributed to the fact that only six compartments (other than magazines, which are not analyzed) are protected by an automated system. The very slight increase between I & A and I, A, &M results is due to the slight improvement added by manual firefighting efforts. **In summary, the post-Paragon DEPENDABLE exceeds fire safety objectives at sea in all compartments, at sea and in port, with and without the contribution of either automated or manual firefighting**. This means that no improvements are necessarily required to bring the post-Paragon DEPENDABLE up to minimally acceptable fire safety levels.

Table 4.1
Relative Loss Factors, Scenarios 3, 6, 9, 12

Plan ID	Compartment Name	CUI	MAL	FAL	Run 14-63	Run 14-64	Run 14-65	Run 14-66
					Scenario 3	Scenario 6	Scenario 9	Scenario 12
					I, A, & M	I & A	I & M	I Only
4-108-0-E	Engine Room	EM	2	26	0.011	0.020	0.016	0.029
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.081	0.121	0.084	0.128
03-62-0-C	Pilot House	C	2	26	0.073	0.193	0.073	0.193
02-56-1-C	Radio Room	C	2	26	0.046	0.084	0.046	0.084
02-90-0-Q	Plenum Room	QF	3	18	0.035	0.049	0.036	0.052
02-56-2-C	CIC Room	C	2	26	0.031	0.058	0.031	0.058
1-108-0-Q	Uptake	TU	2	23	0.032	0.043	0.034	0.048
01-92-0-Q	Helo Service Room	QA	2	22	0.030	0.044	0.031	0.045
1-114-2-Q	Scullery	QG	2	20	0.026	0.042	0.028	0.048
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.013	0.029	0.013	0.030
1-20-0-Q	Laundry	QL	3	19	0.000	0.000	0.000	0.000
1-93-0-L	CPO Mess	LL	2	24	0.021	0.046	0.022	0.051
1-121-0-L	Crews Mess	LL	2	24	0.018	0.044	0.023	0.053
4-188-0-E	Steering Gear Room	QA	2	26	0.005	0.010	0.006	0.014

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are YOKE At Sea

Table 4.2
Relative Loss Factors, Scenarios 1, 4, 7, 10

Plan ID	Compartment Name	CUI	MAL	FAL	Run 15-67	Run 15-68	Run 15-69	Run 15-70
					Scenario 1	Scenario 4	Scenario 7	Scenario 10
					I, A, & M	I & A	I & M	I Only
4-108-0-E	Engine Room	EM	2	26	0.306	0.330	0.399	0.432
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.094	0.121	0.097	0.128
03-62-0-C	Pilot House	C	2	26	0.107	0.199	0.107	0.199
02-56-1-C	Radio Room	C	2	26	0.059	0.086	0.059	0.086
02-90-0-Q	Plenum Room	QF	3	18	0.039	0.049	0.040	0.052
02-56-2-C	CIC Room	C	2	26	0.039	0.062	0.039	0.062
1-108-0-Q	Uptake	TU	2	23	0.034	0.043	0.036	0.048
01-92-0-Q	Helo Service Room	QA	2	22	0.035	0.044	0.036	0.045
1-114-2-Q	Scullery	QG	2	20	0.027	0.042	0.031	0.048
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.027	0.044	0.031	0.051
1-20-0-Q	Laundry	QL	3	19	0.031	0.040	0.031	0.040
1-93-0-L	CPO Mess	LL	2	24	0.027	0.046	0.028	0.051
1-121-0-L	Crews Mess	LL	2	24	0.024	0.044	0.031	0.053
4-188-0-E	Steering Gear Room	QA	2	26	0.025	0.032	0.033	0.043

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are XRAY In Port

Table 4.3
Relative Loss Factors, Scenarios 1, 4, 7, 10

Plan ID	Compartment Name	CUI	MAL	FAL	Run 16-75	Run 16-76	Run 16-77	Run 16-78
					Scenario 1	Scenario 4	Scenario 7	Scenario 10
					I, A, & M	I & A	I & M	I Only
4-108-0-E	Engine Room	EM	2	26	0.272	0.330	0.355	0.432
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.083	0.121	0.086	0.128
03-62-0-C	Pilot House	C	2	26	0.077	0.199	0.077	0.199
02-56-1-C	Radio Room	C	2	26	0.047	0.086	0.047	0.086
02-90-0-Q	Plenum Room	QF	3	18	0.036	0.049	0.037	0.052
02-56-2-C	CIC Room	C	2	26	0.031	0.062	0.031	0.062
1-108-0-Q	Uptake	TU	2	23	0.033	0.043	0.034	0.048
01-92-0-Q	Helo Service Room	QA	2	22	0.031	0.044	0.031	0.045
1-114-2-Q	Scullery	QG	2	20	0.026	0.042	0.028	0.048
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.019	0.044	0.022	0.051
1-20-0-Q	Laundry	QL	3	19	0.025	0.040	0.025	0.040
1-93-0-L	CPO Mess	LL	2	24	0.022	0.046	0.023	0.051
1-121-0-L	Crews Mess	LL	2	24	0.018	0.044	0.024	0.053
4-188-0-E	Steering Gear Room	QA	2	26	0.022	0.032	0.029	0.043

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are XRAY In Port

4.3 COMPARISON OF BASELINE AND POST-PARAGON RESULTS

A comparison of the pre-Paragon fire safety analysis results with the post-Paragon results provides the net effect of all changes associated with the Paragon project that affect fire safety. The pre-Paragon results are discussed in Section 3.2.2.1 of this report and summarized in Tables 3.1, 3.2, and 3.3. The post-Paragon results are discussed in Section 4.2 and summarized in tables 4.1, 4.2, and 4.3. These tables summarize results from running SAFE with the individual target option that are included in Appendix D. The results of the in-port, YOKE SAFE runs are, as expected, safer than the XRAY scenarios. The SAFE runs for in-port, YOKE scenarios are included in Appendix D for the sake of completeness. Table 4.4 lists the SAFE runs and Tables that summarize these results.

Table 4.4: Comparable Pre- and Post-Paragon Results

Scenario	Pre-Paragon		Post-Paragon	
	Table in Text of Report	SAFE Run Numbers in Appendix D	Table in Text of Report	SAFE Run Numbers in Appendix D
In Port XRAY, Scenarios 1, 4, 7, & 10	Table 3.2	10-37 through 10-40	Table 4.2, & Table 4.3	15-67 through 15-70 16-75 through 16-78
In Port, YOKE, Scenarios 2, 5, 8, & 11		10-41 through 10-44		15-71 through 15-74 16-79 through 16-82
At Sea, YOKE, Scenarios 3, 6, 9, & 12	Table 3.3	6-17 through 6-20	Table 4.1	14-63 through 14-66

As expected, the results for I only scenarios are identical for pre- and post-Paragon conditions. Since A-values and M-values were changed, I&A, I & M, and I, A, & M results should differ.

The following describes expected changes in fire safety as a result of changes implemented in the Paragon project:

- The reduction in the homeport duty section size should cause fire safety to decrease because of a reduction in manual firefighting effectiveness caused by a delay in firefighters responding to the scene since they are coming from the local fire department or another cutter in port at the time.
- The utilization of the rapid response team concept should cause fire safety to increase because firefighting will commence sooner in the fire growth period.
- The new fire detection and monitoring system should increase fire safety due to increased probability of detection. Probability of detection is improved with a fully addressable system, since time is not wasted in determining the exact location of the fire. In addition, automatic notification of the Bridge is improved, since the system reports the location of the fire instead of relying on an accurate relay of information from an investigator.
- Manning one repair party instead of two repair parties should decrease fire safety due to a loss in manual firefighting effectiveness.

The net effect of these changes is shown in Tables 4.5, 4.6, and 4.7. In these tables the pre- and post-Paragon results are shown for comparable scenarios and the net improvement in fire safety is calculated. For the 14 compartments shown in Tables 4.5, 4.6, and 4.7, there is an average net improvement in the margin of safety (increased fire safety) of 30.5% in the YOKE at-sea scenario, an 15.3% increase in the margin of safety in the in-port in-homeport XRAY scenario, and a 28.9% increase in the margin of safety in the in-port away-from-homeport XRAY scenario. The 14 compartments listed in these tables have a MAL of 1, 2, or 3 and a RLF greater than 0.03 in Scenario 1. Therefore it should not be concluded that these increases in the margin of safety apply to all compartments in the cutter.

Table 4.5
Relative Loss Factors, Scenario 3

Plan ID	Compartment Name	CUI	MAL	FAL	Run 6-17 Scenario 3 I, A, & M Baseline	Run 14-63 Scenario 3 I, A, & M Post Paragon	Percent Improvement
4-108-0-E	Engine Room	EM	2	26	0.019	0.011	40.2%
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.102	0.081	20.6%
03-62-0-C	Pilot House	C	2	26	0.099	0.073	26.0%
02-56-1-C	Radio Room	C	2	26	0.060	0.046	24.0%
02-90-0-Q	Plenum Room	QF	3	18	0.042	0.035	17.7%
02-56-2-C	CIC Room	C	2	26	0.041	0.031	23.8%
1-108-0-Q	Uptake	TU	2	23	0.040	0.032	20.3%
01-92-0-Q	Helo Service Room	QA	2	22	0.039	0.030	23.0%
1-114-2-Q	Scullery	QG	2	20	0.038	0.026	33.2%
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.022	0.013	42.3%
1-20-0-Q	Laundry	QL	3	19	0.000	0.000	N/A
1-93-0-L	CPO Mess	LL	2	24	0.033	0.021	36.3%
1-121-0-L	Crews Mess	LL	2	24	0.032	0.018	43.3%
4-188-0-E	Steering Gear Room	QA	2	26	0.008	0.005	45.1%
						Average	30.5%

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are YOKE At Sea

Table 4.6
Relative Loss Factors, Scenario 1

Comparison Post-Paragon and Baseline Results
In Port In Homeport

Plan ID	Compartment Name	CUI	MAL	FAL	Run 10-37 Scenario 1 I, A, & M Baseline	Run 15-67 Scenario 1 I, A, & M Post Paragon	Percent Improvement
4-108-0-E	Engine Room	EM	2	26	0.338	0.306	9.3%
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.105	0.094	11.3%
03-62-0-C	Pilot House	C	2	26	0.104	0.107	-3.1%
02-56-1-C	Radio Room	C	2	26	0.062	0.059	4.9%
02-90-0-Q	Plenum Room	QF	3	18	0.044	0.039	12.0%
02-56-2-C	CIC Room	C	2	26	0.042	0.039	7.4%
1-108-0-Q	Uptake	TU	2	23	0.041	0.034	17.0%
01-92-0-Q	Helo Service Room	QA	2	22	0.040	0.035	11.6%
1-114-2-Q	Scullery	QG	2	20	0.038	0.027	28.9%
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.038	0.027	28.0%
1-20-0-Q	Laundry	QL	3	19	0.036	0.031	15.4%
1-93-0-L	CPO Mess	LL	2	24	0.034	0.027	20.9%
1-121-0-L	Crews Mess	LL	2	24	0.033	0.024	27.0%
4-188-0-E	Steering Gear Room	QA	2	26	0.032	0.025	23.2%
						Average	15.3%

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are XRAY In Port

Table 4.7
Relative Loss Factors, Scenario 1

Plan ID	Compartment Name	CUI	MAL	FAL	Run 10-37 Scenario 1 I, A, & M Baseline	Run 16-75 Scenario 1 I, A, & M Post Paragon	Percent Improvement
4-108-0-E	Engine Room	EM	2	26	0.338	0.272	19.4%
01-99-0-Q	Uptake & Fan Room	TU	2	23	0.105	0.083	21.5%
03-62-0-C	Pilot House	C	2	26	0.104	0.077	25.3%
02-56-1-C	Radio Room	C	2	26	0.062	0.047	24.2%
02-90-0-Q	Plenum Room	QF	3	18	0.044	0.036	18.4%
02-56-2-C	CIC Room	C	2	26	0.042	0.031	26.9%
1-108-0-Q	Uptake	TU	2	23	0.041	0.033	20.1%
01-92-0-Q	Helo Service Room	QA	2	22	0.040	0.031	23.0%
1-114-2-Q	Scullery	QG	2	20	0.038	0.026	33.3%
2-172-1-A	Hawser & Rescue Equipment	AS	2	22	0.038	0.019	49.6%
1-20-0-Q	Laundry	QL	3	19	0.036	0.025	30.8%
1-93-0-L	CPO Mess	LL	2	24	0.034	0.022	36.8%
1-121-0-L	Crews Mess	LL	2	24	0.033	0.018	43.6%
4-188-0-E	Steering Gear Room	QA	2	26	0.032	0.022	32.3%
						Average	28.9%

Compartments listed have
MAL of 1-3 and RLF>.03 in Scenario 1

All Scenarios are XRAY In Port

[This page intentionally left blank.]

5. CONCLUSIONS AND RECOMMENDATIONS

The primary objectives of this project are to analyze the fire safety of the CGC DEPENDABLE before and after the changes associated with the Paragon project were implemented on the cutter and to quantify the net effect of these changes. The analysis was performed using the SFSEM/SAFE with the individual target option specified for the output data. The input data was collected during ship visits and is documented in the Appendices of this report.

The conclusions and recommendations from this study are discussed in the following sections of this report.

5.1 CONCLUSIONS

The following conclusions are supported by the baseline fire safety analysis, the analysis of the post-Paragon conditions, and a comparison of the results from these analyses discussed in Sections 3 and 4 of this report:

- Some of the changes implemented on DEPENDABLE as a result of the Paragon Project increase the fire safety of the cutter, while other changes have an adverse effect on fire safety. The net effect on the fire safety of the DEPENDABLE as a result of changes implemented in conjunction with the Paragon project is significantly positive or beneficial for all scenarios. For the 14 compartments shown in Tables 4.5, 4.6, and 4.7, the average increase in fire safety varies from 15.3% for the in homeport, XRAY, scenario to 30.5% for the at sea, YOKE, scenario.
- The baseline (pre-Paragon) fire safety analysis results show that all compartments in the pre-Paragon DEPENDABLE exceed FSOs, in port and at sea. Moreover, all compartments exceed FSOs with just passive fire protection in effect. Automated fire protection systems and manual firefighting efforts serve to increase the margin of safety provided by passive fire protection. This means that no improvements are necessarily required to bring the pre-Paragon DEPENDABLE up to minimally acceptable fire safety levels.
- The post-Paragon fire safety analysis results show that all compartments in the post-Paragon DEPENDABLE exceed FSOs, in port and at sea. Furthermore, all compartments exceed FSOs with just passive fire protection in effect. Automated fire protection systems and manual firefighting efforts serve to increase the margin of safety provided by passive fire protection. This means that no improvements are necessarily required to bring the post-Paragon DEPENDABLE up to minimally acceptable fire safety levels.
- The original fire detection system was not addressable and was generally considered to be unreliable. The new fire detection system is fully addressable and is integrated with other alarms such as the magazine high temperature alarm and the high bilge level alarm. It is also designed to interface with the general announcing system and the 16 surveillance cameras installed throughout the ship. The wireless internal communications devices have benefits besides their obvious use in damage control and firefighting operations. Some of these changes have not been fully implemented. The effect of fully implementing these changes should further increase the fire safety of the cutter.

5.2 RECOMMENDATIONS

The following recommendations are based on the results of the baseline fire safety analysis, the analysis of the post-Paragon conditions, and a comparison of the results from these analyses discussed in Sections 3 and 4 of this report:

- The fire safety of the post-Paragon DEPENDABLE is greater than the pre-Paragon DEPENDABLE. The increase in fire safety is primarily attributable to the new fire detection and monitoring system and implementation of the rapid response team concept. It is recommended that these changes be implemented on all other cutters in the 210' WMEC class, regardless if other Paragon changes are implemented.
- The benefits of a fully addressable fire detection system and the rapid response team concept would benefit all cutters in the Coast Guard. The Coast Guard should consider revising the firefighting procedures in all cutters to incorporate a rapid response team concept. The new fire detection and monitoring system was installed using the original wiring and replacing the existing detectors with new, addressable detectors. It is recommended that all cutters with a fire detection system that can be similarly modified should be changed to a fully addressable system.
- The new fire detection and monitoring system has not been fully implemented in DEPENDABLE due to technical difficulties encountered during installation. It is recommended that this system be fully implemented to take full advantage of the increase in fire safety offered by the new system.
- The portable personal communication devices discussed in this report have benefits beyond damage control and firefighting that result in efficient day to day operations. These devices should be considered for use on all cutters in the Coast Guard.

REFERENCES

1. Sprague, Chester M. & Dolph, Brian. Theoretical Basis of the Ship Fire Safety Engineering Methodology (Report No. CG-D-30-96, Final Report, September 1996).

2. Clouthier, Elizabeth, Rich, Doris & Romberg, Betty. Ship Applied Fire Engineering (SAFE) User Manual, Version 2.2, A Computer Model for the Implementation of The Ship Fire Safety Engineering Methodology (SFSEM) (Report No. CG-D-10-96, Final Report, March 1996).

3. Sprague, Chester M., Romberg, Betty & Dolph, Brian. Small Cutter Fire Protection Project (Report No. CG-D-26-96, Final Report, June 1996).

4. Peatross, Michelle, Beyler, Craig & Back, Gerry. Validation of Full Room Involvement Time Correlation Applicable to Steel Ship Compartments (Hughes Associates, Inc.: Report No. 1117-001-1993, 1993).

5. Sprague, Chester M., White, Derek & Dolph, Brian. Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender (Final Report, Pending Approval for Publication in the NTIS, July 1997).

6. Bahadori, Hamid. A Quantitative Procedure for Fire Risk Assessment of U.S. Coast Guard Vessels (Master's Thesis, submitted to Worcester Polytechnic Institute, October 1987).

7. Bahadori, Hamid, Beyler, Craig, Richards, Robert & Romberg, Betty. Using the Ship Fire Safety Engineering Methodology with Mission Oriented Objectives (Draft Paper, Center for Firesafety Studies, Worcester Polytechnic Institute, June 1991).

[This page intentionally left blank.]

Appendix A
Compartmentation of the CGC DEPENDABLE

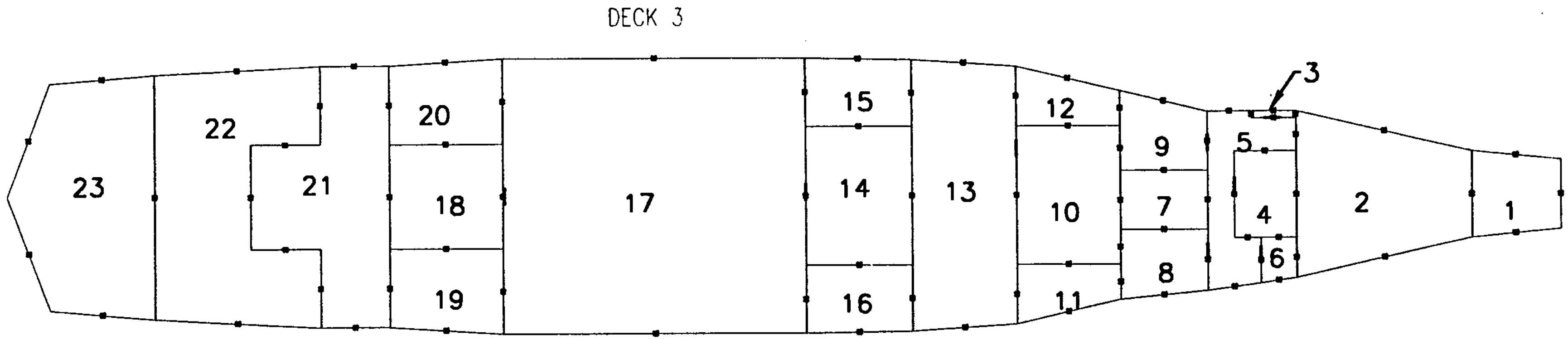
This appendix includes the plan views of all decks in the CGC DEPENDABLE, which is a 210' Medium Endurance Cutter (WMEC). The plan views include the access fittings for each compartment such as doors, scuttles, hatches, and operable windows. The compartmentation shown represents how the ship was modeled in AutoCAD for the fire safety analysis.

Key	Plan ID	Compartment Name	CUI
1	4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	K
2	4-32-0-A	STOREROOM	AS
3	3-52-2-M	AMMO HOIST	TH
4	4-52-0-Q	*ARMORY AND WORKSHOP	M
5	4-52-01-L	HANDLING PASSAGE	
6	4-52-1-M	*SMALL ARMS MAG	M
7	4-62-0-F	*DIESEL OIL TANK	F
8	4-62-1-M	*MAGAZINE (25MM) CAL	M
9	4-62-2-M	*MAGAZINE (50MM) CAL	M
10	3-72-0-C	IC AND GYRO ROOM	C
11	4-72-3-F	*DIESEL OIL TANK	F
12	4-72-4-F	*DIESEL OIL TANK	F
13	4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	QA
14	3-96-0-E	AUX MACHINERY ROOM	QA
15	4-96-4-F	*DIESEL OIL STORAGE	F
16	4-96-5-F	*DIESEL OIL STORAGE	F
17	4-108-0-E	ENGINE ROOM	EM
18	4-143-0-A	ENGINEERS STOREROOM	AS
19	4-143-1-F	*DIESEL OIL	F
20	4-143-2-F	*DIESEL OIL	F
21	4-156-0-E	AUX MACHINERY SPACE	QA
22	4-164-0-F	*LIQUID STORAGE TANKS	F
23	4-188-0-E	STEERING GEAR ROOM	QA
24	3-12-0-Q	CHAIN LKR	AG
25	2-16-0-A	BOSUN'S STORES	AS
26	2-32-0-L	CREW WR, WC, SH	LW
27	2-32-01-L	CREW BERTHING	L5
28	2-52-0-L	CREW WR, WC, SH	LW
29	2-52-01-L	CREW BERTHING	L5
30	2-52-02-A	CLEANING GEAR LKR	AG
32	2-72-0-L	OFFICER WR, WC, SH	LW
33	2-72-1-L	ENGINEERING OFFICER SR	L1
34	2-72-2-L	OFFICER WR, WC, SH	LW
35	2-72-4-L	OFFICER SR	L2
36	2-75-1-A	WARDROBE	AG
37	2-76-0A-L	PASSAGE	LP
38	2-76-0B-L	PASSAGE	LP
39	2-78-0-A	HS STORES	AG
40	2-78-2-A	REC LKR	AG
41	2-84-1-L	OFFICER SR	L2
42	2-84-2-L	OFFICER SR	L2
43	2-88-1-L	OFFICER WR, WC, SH	LW
44	2-88-2-L	OFFICER WR, WC, SH	LW
45	2-96-0-L	PASSAGE	LP
46	2-96-1-L	CPO STATEROOM	L2
47	2-96-2-L	CPO STATEROOM	L2
48	2-99-0-L	CPO WR, WC, SH	LW
50	2-136-0-C	CONTROL BOOTH	C
51	2-140-1-Q	ENGINEERS WORKSHOP	QS
52	2-143-0A-L	PASSAGE	LP
53	2-143-0B-L	PASSAGE	LP
54	2-143-2-L	STAIRWAY	LP

Key	Plan ID	Compartment Name	CUI
55	2-143-2-Q	ENGINEERING OFFICE	QO
56	2-156-0-A	THAW BOX	AR
57	2-156-01A-L	PASSAGE	LP
58	2-156-01B-L	PASSAGE	LP
59	2-156-01C-L	PASSAGE	LP
60	2-156-02-A	DRY PROVISIONS STOREROOM	AS
61	2-156-1-A	FREEZER BOX	AR
62	2-164-2-A	CHILL BOX	AR
63	2-172-0-L	PASSAGE	LP
64	2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	AS
65	2-172-2-Q	ELECTRIC WORKSHOP	QS
66	2-180-2-A	REPAIR PARTY LKR	AG
68	1-1-0-A	GENERAL STORES	AS
69	1-12-0-A	BOSUN'S STORES	AS
70	1-20-0-Q	LAUNDRY	QL
71	1-20-2-A	GENERAL STORES	AG
72	1-20-4-Q	DECON SHWR	LW
73	1-32-0-L	CREW BERTHING	L5
74	1-52-0-L	CREW BERTHING	L5
75	1-52-01A-L	PASSAGE	LP
76	1-52-01B-L	PASSAGE	LP
77	1-52-01C-L	PASSAGE	LP
78	1-52-1-A	SHIPS SERVICE STORE	AG
79	1-52-2-L	CREW WR, WC, SH	LW
81	1-57-1-A	FWD REPAIR LKR	AG
82	1-63-1-Q	FAN ROOM	QF
83	1-63-2-Q	FAN ROOM	QF
84	1-72-0-A	REPAIR ANNEX	AG
85	1-72-2-Q	SUPPLY OFFICE	QO
86	1-80-0-L	WARDROOM	LL
87	1-93-0-L	CPO MESS	LL
88	1-99-1-Q	SHIPS OFFICE	QO
89	1-108-0-Q	UPTAKE	TU
90	1-108-1-L	PASSAGE	LP
91	1-114-0-L	DISPENSARY	LM
92	1-114-2-Q	SCULLERY	QG
93	1-121-0-L	CREWS MESS	LL
94	1-143-2-L	STAIRWAY	LP
95	1-148-0-Q	GALLEY	QG
96	1-159-1-A	DRY STORES	AS
97	1-159-2-A	DRY PROVISIONS STORE	AS
98	01-44-0-L	CO SR	L1
99	01-44-1-L	CO CABIN	L1
100	01-44-2-L	CO WR, WC, SH	LW
102	01-56-2-L	OFFICER WR, WC, SH	LW
103	01-59-0-L	OFFICER SR	L2
104	01-69-0-L	PASSAGE	LP
105	01-72-0-L	XO SR	L1
106	01-72-01-L	OPS OFFICER SR	L1
107	01-85-2-A	EQPT LKR	AG
108	01-87-0-L	XO WR, WC, SH	LW
109	01-87-1-L	OPS OFFICER WR, WC, SH	LW
110	01-92-0-Q	HELO SERVICE	QA

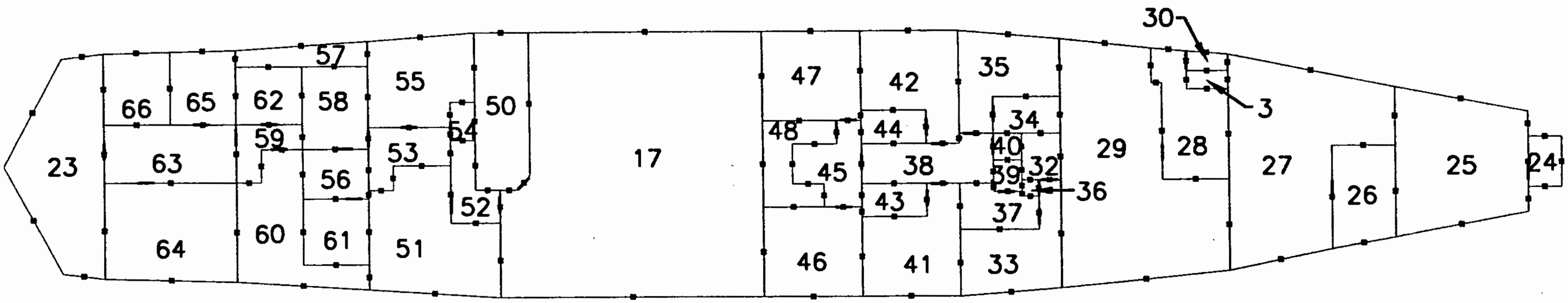
Key	Plan ID	Compartment Name	CUI
111	01-99-0-Q	UPTAKE AND FAN ROOM	TU
112	02-56-1-C	RADIO ROOM	C
113	02-56-2-C	CIC ROOM	C
114	02-69-2-L	PASSAGE	LP
115	02-69-4-L	VESTIBULE	LP
116	02-78-1-Q	ELEC LAB AND STORAGE	QS
117	02-81-2-Q	FAN ROOM	QF
118	02-90-0-Q	PLENUM ROOM	QF
120	03-62-0-C	PILOT HOUSE	C

Note: Numbers 31, 49, 67, 80, 101, and 119 were not used

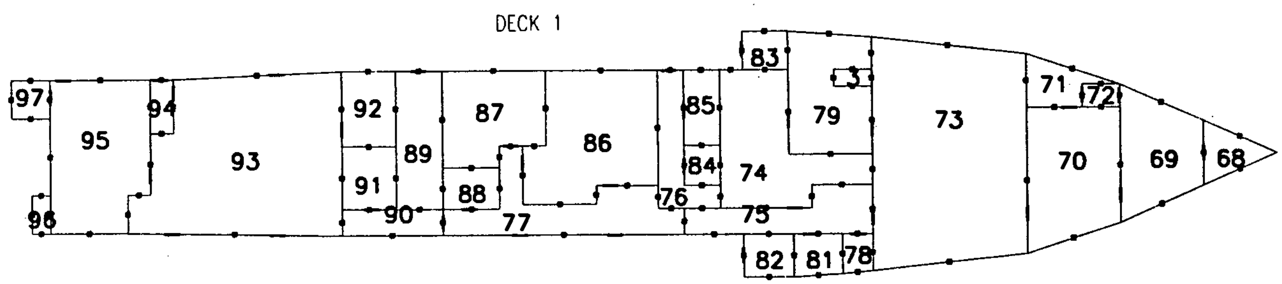


DECK 3

DECK 2

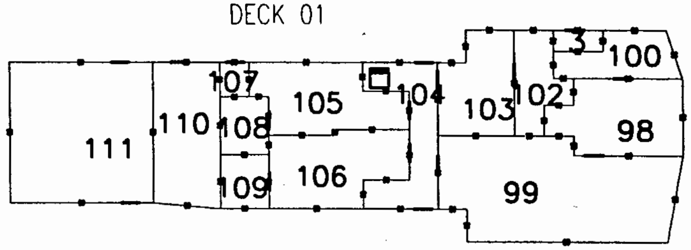

23
66
65
62
57
58
55
50
17
47
42
35
30
3
63
59
56
53
54
48
44
34
40
38
32
39
36
29
28
27
25
24
26
45
43
37
52
64
60
61
51
46
41
33

DECK 2

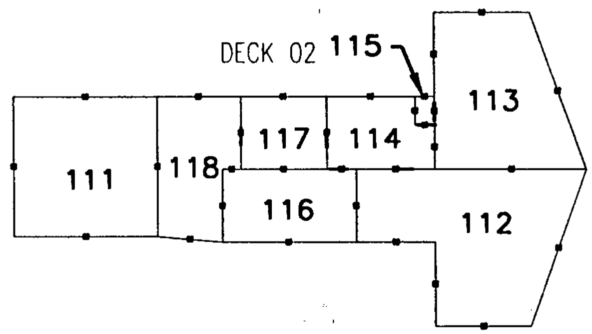

DECK 1
97
94
95
93
92
91
90
89
88
87
86
85
84
83
82
81
79
78
77
76
75
74
73
72
71
70
69
68
96
3

DECK 1

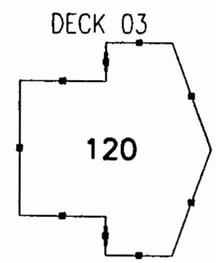
DECK 01



DECK 01



DECK 02



DECK 03

Appendix B
SAFE Input Data for the Baseline Fire Safety Analysis

The various input data required to perform the baseline fire safety analysis on the CGC DEPENDABLE using SAFE, version 2.2, are documented in this appendix. The following is an index of the tables and attachments contained in this appendix:

Table B.1.1. Compartment Height and Deck Area

Plan ID	Compartment Name	Height (Ft)	Area (Ft^2)
CUI=AG	(Gear Locker)		
3-12-0-Q	CHAIN LKR	8	24
2-52-02-A	CLEANING GEAR LKR	8	11
2-75-1-A	WARDROBE	8	4
2-78-0-A	HS STORES	8	12.9
2-78-2-A	REC LKR	8	10.9
2-180-2-A	REPAIR PARTY LKR	8	69.6
1-20-2-A	GENERAL STORES	9	45.6
1-52-1-A	SHIPS SERVICE STORE	9	20
1-57-1-A	FWD REPAIR LKR	9	34.6
1-72-0-A	REPAIR ANNEX	9	23.9
01-89-2-A	EQPT LKR	7.5	10.8
CUI=AR	(Refrigerated Storage)		
2-156-0-A	THAW BOX	8	48
2-156-1-A	FREEZER BOX	8	64
2-164-2-A	CHILL BOX	8	56
CUI=AS	(Storeroom)		
4-32-0-A	STOREROOM	7.5	292
4-143-0-A	ENGINEERS STOREROOM	7.5	156
2-16-0-A	BOSUN'S STORES	8	240
2-156-02-A	DRY PROVISIONS STOREROOM	8	140
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	8	188.8
1-1-0-A	GENERAL STORES	9	39.5
1-12-0-A	BOSUN'S STORES	9	139.9
1-159-1-A	DRY STORES	9	12
1-159-2-A	DRY PROVISIONS STORE	9	25
CUI=C	(Ship Control/Communications)		
3-72-0-C	IC AND GYRO ROOM	7.5	192
2-136-0-C	CONTROL BOOTH	8	124.1
02-56-1-C	RADIO ROOM	8	274
02-56-2-C	CIC ROOM	8	213.2
03-62-0-C	PILOT HOUSE	8	324
CUI=EM	(Main Propulsion – Mechanical)		
4-108-0-E	ENGINE ROOM	15.5	1106
CUI=K	(Hazardous Material Storage)		
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	7.5	90
CUI=L1	(Senior Officer's Cabin)		
2-72-1-L	ENGINEERING OFFICER SR	8	105.6
01-44-0-L	CO SR	7.5	97.6
01-44-1-L	CO CABIN	7.5	235.6
01-72-0-L	XO SR	7.5	101.4
01-72-01-L	OPS OFFICER SR	7.5	103.8

Table B.1.1. Compartment Height and Deck Area

Plan ID	Compartment Name	Height (Ft)	Area (Ft^2)
CUI=L2	(Officer/CPO Quarters)		
2-72-4-L	OFFICER SR	8	107.6
2-84-1-L	OFFICER SR	8	131.2
2-84-2-L	OFFICER SR	8	131.2
2-96-1-L	CPO STATEROOM	8	129.6
2-96-2-L	CPO STATEROOM	8	129.6
01-59-0-L	OFFICER SR	7.5	77.8
CUI=L5	(Crews Berthing)		
2-32-01-L	CREW BERTHING	8	349.9
2-52-01-L	CREW BERTHING	8	431
1-32-0-L	CREW BERTHING	9	564
1-52-0-L	CREW BERTHING	9	215
CUI=LL	(Wardroom/Mess/Lounge Areas)		
1-80-0-L	WARDROOM	9	257.6
1-93-0-L	CPO MESS	9	152
1-121-0-L	CREWS MESS	9	510.6
CUI=LM	(Medical/Dental Spaces)		
1-114-0-L	DISPENSARY	9	57.4
CUI=LP	(Passageway/Staircase/Vestibule)		
4-52-01-L	HANDLING PASSAGE	7.5	105.6
2-76-0A-L	PASSAGE	8	46
2-76-0B-L	PASSAGE	8	81.6
2-96-0-L	PASSAGE	8	472
2-140-0A-L	PASSAGE	8	42
2-140-0B-L	PASSAGE	8	55
2-143-2-L	STAIRWAY	8	13.8
2-156-01A-L	PASSAGE	8	40
2-156-01B-L	PASSAGE	8	80
2-156-01C-L	PASSAGE	8	36
2-172-0-L	PASSAGE	8	112
1-52-01A-L	PASSAGE	9	107.6
1-52-01B-L	PASSAGE	9	75
1-52-01C-L	PASSAGE	9	161.1
1-108-1-L	PASSAGE	9	44.2
1-143-2-L	STAIRWAY	9	21
01-69-0-L	PASSAGE	7.5	75.6
02-69-2-L	PASSAGE	8	77.6
02-69-4-L	VESTIBULE	8	6
CUI=LW	(Sanitary Spaces)		
2-32-0-L	CREW WR, WC, SH	8	88.9
2-52-0-L	CREW WR, WC, SH	8	105.6
2-72-0-L	OFFICER WR, WC, SH	8	25.8

Table B.1.1. Compartment Height and Deck Area

Plan ID	Compartment Name	Height (Ft)	Area (Ft^2)
2-72-2-L	OFFICER WR, WC, SH	8	35.2
2-88-1-L	OFFICER WR, WC, SH	8	32
2-88-2-L	OFFICER WR, WC, SH	8	32
2-99-0-L	CPO WR, WC, SH	8	63.2
1-20-4-Q	DECON SHWR	9	14.4
1-52-2-L	CREW WR, WC, SH	9	160.6
01-44-2-L	CO WR, WC, SH	7.5	50
01-56-2-L	OFFICER WR, WC, SH	7.5	46.4
01-87-0-L	XO WR, WC, SH	7.5	30
01-87-1-L	OPS OFFICER WR, WC, SH	7.5	28
CUI=QA	(Aux Machinery Spaces)		
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	7.5	364.8
3-96-0-E	AUX MACHINERY ROOM	7.5	192
4-156-0-E	AUX MACHINERY SPACE	7.5	336
4-188-0-E	STEERING GEAR ROOM	15.5	389
01-92-0-Q	HELO SERVICE	7.5	104.3
CUI=QF	(Fan Room)		
1-63-1-Q	FAN ROOM	9	37
1-63-2-Q	FAN ROOM	9	30
02-81-2-Q	FAN ROOM	8	68.4
02-90-0-Q	PLENUM ROOM	8	119.5
CUI=QG	(Galley/Pantry/Scullery)		
1-114-2-Q	SCULLERY	9	68.6
1-148-0-Q	GALLEY	9	245
CUI=QL	(Laundry)		
1-20-0-Q	LAUNDRY	9	204
CUI=QO	(Office Spaces)		
2-143-2-Q	ENGINEERING OFFICE	8	132.7
1-72-2-Q	SUPPLY OFFICE	9	45.1
1-99-1-Q	SHIPS OFFICE	9	40
CUI=QS	(Shops)		
2-140-1-Q	ENGINEERS WORKSHOP	8	197
2-172-2-Q	ELECTRIC WORKSHOP	8	71.2
02-78-1-Q	ELEC LAB AND STORAGE	8	106.4
CUI=TH	(Trunks/Hoists/Dumbwaiters)		
3-52-2-M	AMMO HOIST	32	11
CUI=TU	(Stacks/Engine Uptakes)		
1-108-0-Q	UPTAKE	9	108
01-99-0-Q	UPTAKE AND FAN ROOM	15.5	219

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
CUI=AG	(Gear Locker)						
3-12-0-Q	CHAIN LKR					0	0
2-52-02-A	CLEANING GEAR LKR					0	0
2-75-1-A	WARDROBE					0	0
2-78-0-A	HS STORES					144	12
		2	V	72	12		
2-78-2-A	REC LKR					144	12
		2	V	72	12		
2-180-2-A	REPAIR PARTY LKR					10359	53
		1	V	10296	99		
		1	V	63	7		
1-20-2-A	GENERAL STORES					75	2
		1	V	24	3		
		1	V	15	3		
		1	V	36	1		
1-52-1-A	SHIPS SERVICE STORE					72	3
		1	V	36	6		
		1	V	36	1		
1-57-1-A	FWD REPAIR LKR					36	1
		1	V	36	1		
1-72-0-A	REPAIR ANNEX					32346	50
		1	V	21978	99		
		1	V	10296	99		
		2	V	36	1		
01-89-2-A	EQPT LKR					0	0
CUI=AR	(Refrigerated Storage)						
2-156-0-A	THAW BOX					0	0
2-156-1-A	FREEZER BOX					0	0
2-164-2-A	CHILL BOX					0	0
CUI=AS	(Storeroom)						
4-32-0-A	STOREROOM					32	3
		1	V	8	2		
		2	V	12	4		
4-143-0-A	ENGINEERS STOREROOM					90	90
		1	H	90	90		
2-16-0-A	BOSUN'S STORES					2592	96
		1	H	2592	96		
2-156-02-A	DRY PROVISIONS STOREROOM					1659	79
		1	V	1659	79		
2-172-1-A	HAWSER & RESCUE					22221	67

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
	EQUIPMENT STORAGE						
		1	V	21978	99		
		1	V	147	7		
		1	H	96	96		
1-1-0-A	GENERAL STORES					0	0
1-12-0-A	BOSUN'S STORES					2592	108
		1	H	2592	108		
1-159-1-A	DRY STORES					0	0
1-159-2-A	DRY PROVISIONS STORE					0	0
CUI=C (Ship Control/Communications)							
3-72-0-C	IC AND GYRO ROOM					0	0
2-136-0-C	CONTROL BOOTH					0	0
02-56-1-C	RADIO ROOM					1000	41
		1	H	480	96		
		1	H	96	96		
		2	V	161	7		
		1	V	102	1		
02-56-2-C	CIC ROOM					387	27
		1	H	192	96		
		1	V	24	8		
		1	V	135	5		
		1	V	36	1		
03-62-0-C	PILOT HOUSE					1728	96
		1	H	1728	96		
CUI=EM (Main Propulsion - Mechanical)							
4-108-0-E	ENGINE ROOM					716	50
		2	V	88	8		
		1	H	396	186		
		2	V	72	24		
CUI=K (Hazardous Material Storage)							
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM					55	5
		1	V	55	5		
CUI=L1	(Senior Officer's Cabin)						
2-72-1-L	ENGINEERING OFFICER SR					317	9
		2	V	136	17		
		1	V	9	3		
		1	V	36	1		
01-44-0-L	CO SR					308	11
		2	V	136	17		
		1	V	36	1		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
01-44-1-L	CO CABIN					308	11
		2	V	136	17		
		1	V	36	1		
01-72-0-L	XO SR					308	11
		2	V	136	17		
		1	V	36	1		
01-72-01-L	OPS OFFICER SR					308	11
		2	V	136	17		
		1	V	36	1		
CUI=L2 (Officer/CPO Quarters)							
2-72-4-L	OFFICER SR					317	9
		2	V	136	17		
		1	V	9	3		
		1	V	36	1		
2-84-1-L	OFFICER SR					317	9
		2	V	136	17		
		1	V	9	3		
		1	V	36	1		
2-84-2-L	OFFICER SR					317	9
		2	V	136	17		
		1	V	9	3		
		1	V	36	1		
2-96-1-L	CPO STATEROOM					184	7
		1	V	136	17		
		1	V	12	3		
		1	V	36	1		
2-96-2-L	CPO STATEROOM					178	6
		1	V	136	17		
		1	V	6	2		
		1	V	36	1		
01-59-0-L	OFFICER SR					308	11
		2	V	136	17		
		1	V	36	1		
CUI=L5 (Crews Berthing)							
2-32-01-L	CREW BERTHING					274	6
		1	V	184	23		
		1	V	24	4		
		2	V	15	3		
		1	V	36	1		
2-52-01-L	CREW BERTHING					192	5
		1	V	88	11		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
		2	V	25	5		
		1	V	18	6		
		1	V	36	1		
1-32-0-L	CREW BERTHING					105	2
		2	V	12	3		
		1	V	24	4		
		1	V	15	3		
		1	V	42	1		
1-52-0-L	CREW BERTHING					349	12
		1	V	184	23		
		1	V	144	18		
		1	V	9	3		
		1	V	12	4		
CUI=LL	(Wardroom/Mess/Lounge Areas)						
1-80-0-L	WARDROOM					641	28
		2	V	136	17		
		1	H	297	108		
		2	V	36	1		
1-93-0-L	CPO MESS					52	1
		2	V	8	2		
		1	V	36	1		
1-121-0-L	CREWS MESS					300	18
		1	V	50	5		
		1	V	78	78		
		1	V	136	17		
		3	V	12	3		
CUI=LM (Medical/Dental Spaces)							
1-114-0-L	DISPENSARY					175	39
		1	V	40	8		
		1	H	99	108		
		1	V	36	1		
CUI=LP	(Passageway/Staircase/Vestibule)						
4-52-01-L	HANDLING PASSAGE					15	5
		1	V	15	5		
2-76-0A-L	PASSAGE					1078	8
		2	V	15	3		
		4	V	136	17		
		4	V	72	12		
		6	V	36	1		
2-76-0B-L	PASSAGE					1078	8
		2	V	15	3		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
		4	V	136	17		
		4	V	72	12		
		6	V	36	1		
2-96-0-L	PASSAGE					624	8
		1	V	184	23		
		2	V	136	17		
		1	V	24	3		
		4	V	36	1		
2-140-0A-L	PASSAGE					310	9
		1	V	102	17		
		1	V	136	17		
		2	V	36	1		
2-140-0B-L	PASSAGE					310	9
		1	V	102	17		
		1	V	136	17		
		2	V	36	1		
2-143-2-L	STAIRWAY					0	0
2-156-01A-L	PASSAGE					1680	41
		1	V	21	3		
		1	V	1659	79		
2-156-01B-L	PASSAGE					1680	41
		1	V	21	3		
		1	V	1659	79		
2-156-01C-L	PASSAGE					1680	41
		1	V	21	3		
		1	V	1659	79		
2-172-0-L	PASSAGE					32346	50
		1	V	21978	99		
		1	V	10296	99		
		2	V	36	1		
1-52-01A-L	PASSAGE					2855	11
		1	H	1881	108		
		4	V	136	17		
		1	V	34	2		
		11	V	36	1		
1-52-01B-L	PASSAGE					2855	11
		1	H	1881	108		
		4	V	136	17		
		1	V	34	2		
		11	V	36	1		
1-52-01C-L	PASSAGE					2855	11

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
		1	H	1881	108		
		4	V	136	17		
		1	V	34	2		
		11	V	36	1		
1-108-1-L	PASSAGE					208	6
		1	V	136	17		
		2	V	36	1		
1-143-2-L	STAIRWAY					0	0
01-69-0-L	PASSAGE					2494	27
		1	H	1890	90		
		4	V	136	17		
		1	V	60	5		
02-69-2-L	PASSAGE					2336	19
		2	V	136	17		
		1	H	1920	96		
		4	V	36	1		
02-69-4-L	VESTIBULE					1936	28
		1	H	1728	96		
		1	V	136	17		
		2	V	36	1		
CUI=LW (Sanitary Spaces)							
2-32-0-L	CREW WR, WC, SH					268	7
		1	V	184	23		
		2	V	24	3		
		1	V	36	1		
2-52-0-L	CREW WR, WC, SH					320	6
		1	V	192	24		
		1	V	32	4		
		1	V	24	4		
		2	V	36	1		
2-72-0-L	OFFICER WR, WC, SH					180	6
		1	V	136	17		
		1	V	8	2		
		1	V	36	1		
2-72-2-L	OFFICER WR, WC, SH					178	6
		1	V	136	17		
		1	V	6	2		
		1	V	36	1		
2-88-1-L	OFFICER WR, WC, SH					181	7
		1	V	136	17		
		1	V	9	3		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
		1	V	36	1		
2-88-2-L	OFFICER WR, WC, SH					181	7
		1	V	136	17		
		1	V	9	3		
		1	V	36	1		
2-99-0-L	CPO WR, WC, SH					181	7
		1	V	136	17		
		1	V	9	3		
		1	V	36	1		
1-20-4-Q	DECON SHWR					36	1
		1	V	36	1		
1-52-2-L	CREW WR, WC, SH					240	7
		1	V	184	23		
		1	V	12	3		
		1	V	8	2		
		1	V	36	1		
01-44-2-L	CO WR, WC, SH					262	36
		1	V	136	17		
		1	H	90	90		
		1	V	36	1		
01-56-2-L	OFFICER WR, WC, SH					188	7
		1	V	136	17		
		1	V	16	4		
		1	V	36	1		
01-87-0-L	XO WR, WC, SH					262	36
		1	V	136	17		
		1	H	90	90		
		1	V	36	1		
01-87-1-L	OPS OFFICER WR, WC, SH					180	6
		1	V	136	17		
		1	V	8	2		
		1	V	36	1		
CUI=QA (Aux Machinery Spaces)							
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM					177	6
		2	V	18	6		
		1	V	36	6		
		1	V	105	7		
3-96-0-E	AUX MACHINERY ROOM					148	6
		2	V	18	6		
		1	V	112	8		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
4-156-0-E	AUX MACHINERY SPACE					167	8
		1	V	63	9		
		1	V	104	8		
4-188-0-E	STEERING GEAR ROOM					144	67
		1	H	99	186		
		1	V	33	11		
		1	V	12	4		
01-92-0-Q	HELO SERVICE					130	47
		1	H	90	90		
		1	V	40	5		
CUI=QF (Fan Room)							
1-63-1-Q	FAN ROOM					279	31
		1	V	279	31		
1-63-2-Q	FAN ROOM					0	0
02-81-2-Q	FAN ROOM					120	5
		1	V	48	8		
		1	V	36	6		
		1	V	36	1		
02-90-0-Q	PLENUM ROOM					4923	48
		2	V	1704	71		
		1	V	375	25		
		2	V	570	38		
CUI=QG (Galley/Pantry/Scullery)							
1-114-2-Q	SCULLERY					271	42
		1	H	99	108		
		1	V	136	17		
		1	V	36	1		
1-148-0-Q	GALLEY					1755	84
		4	H	198	108		
		3	H	297	108		
		2	V	36	1		
CUI=QL (Laundry)							
1-20-0-Q	LAUNDRY					760	7
		2	V	72	8		
		2	V	242	11		
		1	V	96	8		
		1	V	36	1		
CUI=QO (Office Spaces)							
2-143-2-Q	ENGINEERING OFFICE					228	38
		1	V	102	17		
		1	H	90	96		

Table B.1.2 Ventilation Openings: Area and Average Height

Plan ID	Compartment Name	# Vents	H/V	Area (In^2)	Height (In)	Total Area (In^2)	Avg. Height (In)
		1	V	36	1		
1-72-2-Q	SUPPLY OFFICE					52	2
		1	V	16	4		
		1	V	36	1		
1-99-1-Q	SHIPS OFFICE					180	6
		1	V	136	17		
		1	V	8	2		
		1	V	36	1		
CUI=QS (Shops)							
2-140-1-Q	ENGINEERS WORKSHOP					166	6
		1	V	136	17		
		2	V	12	3		
		1	V	6	2		
2-172-2-Q	ELECTRIC WORKSHOP					49	7
		1	V	49	7		
02-78-1-Q	ELEC LAB AND STORAGE					268	38
		1	V	136	17		
		1	H	96	96		
		1	V	36	1		
CUI=TH (Trunks/Hoists/Dumbwaiters)							
3-52-2-M	AMMO HOIST					0	0
CUI=TU (Stacks/Engine Uptakes)							
1-108-0-Q	UPTAKE					8514	108
		2	H	4257	108		
01-99-0-Q	UPTAKE AND FAN ROOM					2574	94
		3	H	90	186		
		6	V	384	48		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft²	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
			4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	(CUI	= K)			
S3U	S3U	S3U	4-32-0-A	STOREROOM	75	0	0		
S3I	S3U		(none)	(weather bulkhead)	75.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	75.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	60	0	0		
D04			2-16-0-A	BOSUN'S STORES	90	0	0	HL	X
			4-32-0-A	STOREROOM	(CUI	= AS)			
S3U	S3U	S3U	4-16-0-K	FLAMMABLE LIQUIDS ST	75	0	0		
S3U	S3U	S3I	3-52-2-M	AMMO HOIST	6	0	0		
S3U	S3U	S3I	4-52-0-Q	ARMORY AND WORKSHOP	75	0	0		
S3U	S3U	S3U	4-52-01-L	HANDLING PASSAGE	28.5	0	0		
S3U	S3U	S3I	4-52-1-M	SMALL ARMS MAG	34.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	153.9	0	0		
S3I	S3U		(none)	(weather bulkhead)	153.9	0	0		
D06			2-32-0-L	CREW WR, WC, SH	59.8	0	0		
D06			2-32-01-L	CREW BERTHING	232.2	0	0	HS	X
			3-52-2-M	AMMO HOIST	(CUI	= TH)			
S3I	S3U	S3U	4-32-0-A	STOREROOM	6	0	0		
S3U		S3I	4-52-01-L	HANDLING PASSAGE	6	0	0		
S3U		S3I	4-52-01-L	HANDLING PASSAGE	37.5	0	0	DWT	X
S3U	S3U	S3I	2-32-01-L	CREW BERTHING	17.6	0	0		
S3U		S3I	2-52-0-L	CREW WR, WC, SH	40	0	0		
S3U		S3I	2-52-0-L	CREW WR, WC, SH	17.6	0	0		
S3U		S3I	2-52-02-A	CLEANING GEAR LKR	40	0	0		
S2U		S2I	1-32-0-L	CREW BERTHING	19.8	0	0		
S2U		S2I	1-52-2-L	CREW WR, WC, SH	45	0	0		
S2U		S2I	1-52-2-L	CREW WR, WC, SH	45	0	0		
S2U		S2I	1-52-2-L	CREW WR, WC, SH	19.8	0	0		
A2U		NSU	01-44-2-L	CO WR, WC, SH	16.5	0	0		
A2U		NSU	01-44-2-L	CO WR, WC, SH	37.5	0	0		
A2U		NSU	01-56-2-L	OFFICER WR, WC, SH	16.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	37.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	37.5	0	0	DJ	NO
D04			(none)	(weather overhead)	11	0	0		
			4-52-01-L	HANDLING PASSAGE	(CUI	= LP)			
S3U	S3U	S3U	4-32-0-A	STOREROOM	28.5	0	0		
S3I		S3U	3-52-2-M	AMMO HOIST	6	0	0		
S3I		S3U	3-52-2-M	AMMO HOIST	37.5	0	0	DWT	X
S3U		S3I	4-52-0-Q	ARMORY AND WORKSHOP	52.5	0	0		
S3U		S3I	4-52-0-Q	ARMORY AND WORKSHOP	75	0	0	DJ	NC
S3U		S3I	4-52-0-Q	ARMORY AND WORKSHOP	22.5	0	0		
S3U		S3I	4-52-1-M	SMALL ARMS MAG	39	0	0	DWT	X
S3I		S3U	4-62-0-F	DIESEL OIL TANK	51	0	0		
S3U		S3I	4-62-1-M	MAGAZINE (25MM) CAL	52.5	0	0	DWT	X
S3U		S3I	4-62-2-M	MAGAZINE (50MM) CAL	51	0	0	DWT	X
S3I	S3U		(none)	(weather bulkhead)	45.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	37.5	0	0		
D06			2-52-0-L	CREW WR, WC, SH	39.8	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft²	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D06			2-52-01-L	CREW BERTHING	65.8	0	0		
			3-72-0-C	IC AND GYRO ROOM	(CUI	= C)			
S3I	S3U	S3U	4-62-0-F	DIESEL OIL TANK	51	0	0		
S3I	S3U	S3U	4-62-1-M	MAGAZINE (25MM) CAL	30	0	0		
S3I	S3U	S3U	4-62-2-M	MAGAZINE (50MM) CAL	39	0	0		
S3I		S3U	4-72-3-F	DIESEL OIL TANK	90	0	0		
S3I		S3U	4-72-4-F	DIESEL OIL TANK	90	0	0		
S3I	S3U	S3U	4-84-0-Q	A/C MACHINERY AND SE	120	0	0	DWT	X
D06			2-72-0-L	OFFICER WR, WC, SH	25.8	0	0		
D06			2-72-1-L	ENGINEERING OFFICER	15.6	0	0		
D06			2-72-2-L	OFFICER WR, WC, SH	35.2	0	0		
D06			2-72-4-L	OFFICER SR	17.6	0	0		
D06			2-75-1-A	WARDROBE	4	0	0		
D06			2-76-0A-L	PASSAGE	46	0	0	HS	X
D06			2-76-0B-L	PASSAGE	24	0	0		
D06			2-78-0-A	HS STORES	12.9	0	0		
D06			2-78-2-A	REC LKR	10.9	0	0		
			4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	(CUI	= QA)			
S3U	S3U	S3I	3-72-0-C	IC AND GYRO ROOM	120	0	0	DWT	X
S3I	S3U	S3U	4-72-3-F	DIESEL OIL TANK	51	0	0		
S3I	S3U	S3U	4-72-4-F	DIESEL OIL TANK	51	0	0		
S3U	S3U	S3I	3-96-0-E	AUX MACHINERY ROOM	120	0	0		
S3I	S3U	S3U	4-96-4-F	DIESEL OIL STORAGE	57	0	0		
S3U	S3U	S3I	4-96-5-F	DIESEL OIL STORAGE	57	0	0		
S3I	S3U		(none)	(weather bulkhead)	90.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	90.2	0	0		
D06			2-76-0B-L	PASSAGE	57.6	0	0		
D06			2-84-1-L	OFFICER SR	121.6	0	0		
D06			2-84-2-L	OFFICER SR	121.6	0	0		
D06			2-88-1-L	OFFICER WR, WC, SH	32	0	0		
D06			2-88-2-L	OFFICER WR, WC, SH	32	0	0		
			3-96-0-E	AUX MACHINERY ROOM	(CUI	= QA)			
S3I	S3U	S3U	4-84-0-Q	A/C MACHINERY AND SE	120	0	0		
S3I		S3U	4-96-4-F	DIESEL OIL STORAGE	90	0	0		
S3I		S3U	4-96-5-F	DIESEL OIL STORAGE	90	0	0		
S3U	S3U	S3I	4-108-0-E	ENGINE ROOM	120	0	0	DWT	X
D06			2-96-0-L	PASSAGE	112.8	0	0	HS	X
D06			2-96-1-L	CPO STATEROOM	33.6	0	0		
D06			2-96-2-L	CPO STATEROOM	33.6	0	0		
D06			2-99-0-L	CPO WR, WC, SH	63.2	0	0		
			4-108-0-E	ENGINE ROOM	(CUI	= EM)			
S3I	S3U	S3U	3-96-0-E	AUX MACHINERY ROOM	120	0	0	DWT	X
S3I	S3U	S3U	4-96-4-F	DIESEL OIL STORAGE	58.5	0	0		
S3I	S3U	S3U	4-96-5-F	DIESEL OIL STORAGE	58.5	0	0		
S3I	S3U	S3U	4-143-0-A	ENGINEERS STOREROOM	90	0	0	DWT	X
S3I	S3U	S3U	4-143-1-F	DIESEL OIL	73.5	0	0		
S3I	S3U	S3U	4-143-2-F	DIESEL OIL	73.5	0	0		
S3I	S3U	S3I	2-96-1-L	CPO STATEROOM	86.4	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S3I	S3U	S3I	2-96-2-L	CPO STATEROOM	86.4	0	0		
S3I	S3U	S3U	2-99-0-L	CPO WR, WC, SH	83.2	0	0		
S2I		S2U	2-136-0-C	CONTROL BOOTH	17.6	0	0		
S2I		S2U	2-136-0-C	CONTROL BOOTH	18.2	0	0	DJ	NC
S2I		S2U	2-136-0-C	CONTROL BOOTH	137.6	0	0		
S3I	S3U	S3U	2-140-1-Q	ENGINEERS WORKSHOP	72	0	0		
S3I	S3U	S3U	2-140-0A-L	PASSAGE	32	0	0	DWT	Y
S3I	S3U		(none)	(weather bulkhead)	262.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	262.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	256	0	0		
S3I	S3U		(none)	(weather bulkhead)	227.2	0	0		
D06			2-136-0-C	CONTROL BOOTH	122.8	0	0		
D06			2-140-1-Q	ENGINEERS WORKSHOP	13.2	0	0		
D06			2-140-0A-L	PASSAGE	12	0	0		
D06			1-108-0-Q	UPTAKE	108	0	0		
D06			1-108-1-L	PASSAGE	44.2	0	0		
D06			1-114-0-L	DISPENSARY	57.4	0	0		
D06			1-114-2-Q	SCULLERY	68.6	0	0		
D06			1-121-0-L	CREWS MESS	349.5	0	0		
D04			(none)	(weather overhead)	329.2	0	0		
			4-143-0-A	ENGINEERS STOREROOM	(CUI	= AS)			
S3U	S3U	S3I	4-108-0-E	ENGINE ROOM	90	0	0	DWT	X
S3I		S3U	4-143-1-F	DIESEL OIL	97.5	0	0		
S3I		S3U	4-143-2-F	DIESEL OIL	97.5	0	0		
S3U	S3U	S3U	4-156-0-E	AUX MACHINERY SPACE	90	0	0		
D04			2-140-1-Q	ENGINEERS WORKSHOP	51	0	0		
D04			2-140-0A-L	PASSAGE	27	0	0		
D04			2-140-0B-L	PASSAGE	55	0	0	HS	X
D04			2-143-2-L	STAIRWAY	9	0	0		
D04			2-143-2-Q	ENGINEERING OFFICE	14	0	0		
			4-156-0-E	AUX MACHINERY SPACE	(CUI	= QA)			
S3U	S3U	S3U	4-143-0-A	ENGINEERS STOREROOM	90	0	0		
S3U	S3U	S3U	4-143-1-F	DIESEL OIL	67.5	0	0		
S3U	S3U	S3U	4-143-2-F	DIESEL OIL	67.5	0	0		
S3I	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	67.5	0	0		
S3I	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	60	0	0		
S3I	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	90	0	0		
S3I	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	60	0	0		
S3I	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	67.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	60	0	0		
S3I	S3U		(none)	(weather bulkhead)	60	0	0		
D04			2-156-0-A	THAW BOX	48	0	0		
D04			2-156-01A-L	PASSAGE	22	0	0	HS	X
D04			2-156-01B-L	PASSAGE	80	0	0		
D04			2-156-01C-L	PASSAGE	36	0	0	HS	X
D04			2-156-02-A	DRY PROVISIONS STORE	74	0	0		
D04			2-156-1-A	FREEZER BOX	64	0	0		
D04			2-164-2-A	CHILL BOX	8	0	0		
			4-188-0-E	STEERING GEAR ROOM	(CUI	= QA)			

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S3U	S3U	S3U	4-164-0-F	LIQUID STORAGE TANKS	210	0	0		
S3U	S3U	S3U	2-172-0-L	PASSAGE	56	0	0	DWT	Y
S3U	S3U	S3U	2-172-1-A	HAWSER & RESCUE EQUI	92.8	0	0		
S3U	S3U	S3U	2-180-2-A	REPAIR PARTY LKR	68.8	0	0		
S3U	S3U		(none)	(weather bulkhead)	104.5	0	0		
S3U	S3U		(none)	(weather bulkhead)	90.3	0	0		
S3U	S3U		(none)	(weather bulkhead)	90.3	0	0		
S3U	S3U		(none)	(weather bulkhead)	104.5	0	0		
S3I	S3U		(none)	(weather bulkhead)	40.3	0	0		
S3I	S3U		(none)	(weather bulkhead)	40.3	0	0		
S3I	S3U		(none)	(weather bulkhead)	118.1	0	0		
S3I	S3U		(none)	(weather bulkhead)	118.1	0	0		
D04			2-172-0-L	PASSAGE	35	0	0		
D04			2-172-1-A	HAWSER & RESCUE EQUI	58.3	0	0		
D04			2-180-2-A	REPAIR PARTY LKR	43.3	0	0		
D06			(none)	(weather overhead)	224	0	0	HS	Y
			3-12-0-Q	CHAIN LKR	(CUI	= AG)			
S3U		S3I	2-16-0-A	BOSUN'S STORES	48	0	0	DWT	X
S3U	S3U		(none)	(weather bulkhead)	32	0	0		
S3U	S3U		(none)	(weather bulkhead)	48	0	0		
S3U	S3U		(none)	(weather bulkhead)	32	0	0		
D06			1-12-0-A	BOSUN'S STORES	24	0	0		
			2-16-0-A	BOSUN'S STORES	(CUI	= AS)			
S3I		S3U	3-12-0-Q	CHAIN LKR	48	0	0	DWT	X
S3U	S3U	S3I	2-32-0-L	CREW WR, WC, SH	88	0	0		
S3U	S3U	S3I	2-32-01-L	CREW BERTHING	56	0	0		
S3I	S3U		(none)	(weather bulkhead)	130.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	130.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	24	0	0		
S3I	S3U		(none)	(weather bulkhead)	24	0	0		
D04			4-16-0-K	FLAMMABLE LIQUIDS ST	90	0	0	HL	X
D04			1-12-0-A	BOSUN'S STORES	51	0	0		
D04			1-20-0-Q	LAUNDRY	166.5	0	0		
D04			1-20-2-A	GENERAL STORES	16.7	0	0		
D04			1-20-4-Q	DECON SHWR	5.8	0	0		
			2-32-0-L	CREW WR, WC, SH	(CUI	= LW)			
S3I	S3U	S3U	2-16-0-A	BOSUN'S STORES	88	0	0		
NSU		S2U	2-32-01-L	CREW BERTHING	60.8	0	0		
NSU		S2U	2-32-01-L	CREW BERTHING	99.2	0	0	DJ	NC
S3I	S3U		(none)	(weather bulkhead)	61.8	0	0		
D06			4-32-0-A	STOREROOM	59.8	0	0		
D06			1-32-0-L	CREW BERTHING	88.9	0	0		
			2-32-01-L	CREW BERTHING	(CUI	= L5)			
S3I	S3U	S3U	3-52-2-M	AMMO HOIST	17.6	0	0		
S3I	S3U	S3U	2-16-0-A	BOSUN'S STORES	56	0	0		
S2U		NSU	2-32-0-L	CREW WR, WC, SH	60.8	0	0		
S2U		NSU	2-32-0-L	CREW WR, WC, SH	99.2	0	0	DJ	NC
S3U	S3U	S3I	2-52-0-L	CREW WR, WC, SH	86.4	0	0		
S3U	S3U	S3U	2-52-01-L	CREW BERTHING	88	0	0		

Table B.2 Barrier Data

Barrier Materials <1>	<2>	<3>		Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
S3I	S3U	S3U	2-52-02-A	CLEANING GEAR LKR	16	0	0		
S3I	S3U		(none)	(weather bulkhead)	101.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	163.2	0	0		
D06			4-32-0-A	STOREROOM	232.2	0	0	HS	X
D04			1-32-0-L	CREW BERTHING	349.9	0	0	HL	X
								HS	X
			2-52-0-L	CREW WR, WC, SH	(CUI	= LW)			
S3I		S3U	3-52-2-M	AMMO HOIST	40	0	0		
S3I		S3U	3-52-2-M	AMMO HOIST	17.6	0	0		
S3I	S3U	S3U	2-32-01-L	CREW BERTHING	86.4	0	0		
NSU		S2U	2-52-01-L	CREW BERTHING	33.6	0	0		
NSU		S2U	2-52-01-L	CREW BERTHING	9.6	0	0		
NSU		S2U	2-52-01-L	CREW BERTHING	92.8	0	0	DJ	NC
NSU		S2U	2-52-01-L	CREW BERTHING	64	0	0		
S3U		S3I	2-52-02-A	CLEANING GEAR LKR	19.2	0	0	DJ	NC
S3I	S3U		(none)	(weather bulkhead)	33.8	0	0		
D06			4-52-0-Q	ARMORY AND WORKSHOP	49	0	0		
D06			4-52-01-L	HANDLING PASSAGE	39.8	0	0		
D06			1-52-0-L	CREW BERTHING	16	0	0		
D06			1-52-2-L	CREW WR, WC, SH	89.6	0	0		
			2-52-01-L	CREW BERTHING	(CUI	= L5)			
S3U	S3U	S3U	2-32-01-L	CREW BERTHING	88	0	0		
S2U		NSU	2-52-0-L	CREW WR, WC, SH	33.6	0	0		
S2U		NSU	2-52-0-L	CREW WR, WC, SH	9.6	0	0		
S2U		NSU	2-52-0-L	CREW WR, WC, SH	92.8	0	0	DJ	NC
S2U		NSU	2-52-0-L	CREW WR, WC, SH	64	0	0		
S3U	S3I	NSU	2-72-0-L	OFFICER WR, WC, SH	44.8	0	0		
S3U	S3I	S3U	2-72-1-L	ENGINEERING OFFICER	104	0	0		
S3U	S3I	NSU	2-72-2-L	OFFICER WR, WC, SH	35.2	0	0		
S3U	S3I	S3U	2-72-4-L	OFFICER SR	56	0	0		
S3I	S3U		(none)	(weather bulkhead)	160.8	0	0		
S3I	S3U		(none)	(weather bulkhead)	86.9	0	0		
D06			4-52-0-Q	ARMORY AND WORKSHOP	21	0	0		
D06			4-52-01-L	HANDLING PASSAGE	65.8	0	0		
D06			4-52-1-M	SMALL ARMS MAG	19.6	0	0		
D04			4-62-0-F	DIESEL OIL TANK	68	0	0		
D06			4-62-1-M	MAGAZINE (25MM) CAL	75	0	0		
D06			4-62-2-M	MAGAZINE (50MM) CAL	80	0	0		
D04			1-52-0-L	CREW BERTHING	199	0	0		
D04			1-52-01A-L	PASSAGE	92	0	0	HL	X
D04			1-52-1-A	SHIPS SERVICE STORE	11.2	0	0		
D04			1-52-2-L	CREW WR, WC, SH	36.5	0	0		
D04			1-57-1-A	FWD REPAIR LKR	21.3	0	0		
D04			1-63-1-Q	FAN ROOM	26.2	0	0		
D04			1-63-2-Q	FAN ROOM	20	0	0		
D04			(none)	(weather overhead)	24.9	0	0		
			2-52-02-A	CLEANING GEAR LKR	(CUI	= AG)			
S3I		S3U	3-52-2-M	AMMO HOIST	40	0	0		
S3U	S3U	S3I	2-32-01-L	CREW BERTHING	16	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S3I		S3U	2-52-0-L	CREW WR, WC, SH	19.2	0	0	DJ	NC
S3I	S3U		(none)	(weather bulkhead)	40.1	0	0		
D06			1-52-2-L	CREW WR, WC, SH	11	0	0		
			2-72-0-L	OFFICER WR, WC, SH	(CUI	= LW)			
NSU	S3I	S3U	2-52-01-L	CREW BERTHING	44.8	0	0		
NSU		S2U	2-72-1-L	ENGINEERING OFFICER	20.8	0	0	DJ	NC
NSU		NSU	2-72-2-L	OFFICER WR, WC, SH	36.8	0	0		
NSU		S2U	2-75-1-A	WARDROBE	16	0	0		
NSU		S2U	2-78-0-A	HS STORES	19.2	0	0		
NSU		S2U	2-78-2-A	REC LKR	25.6	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	25.8	0	0		
D06			1-72-0-A	REPAIR ANNEX	14.7	0	0		
D06			1-72-2-Q	SUPPLY OFFICE	11	0	0		
			2-72-1-L	ENGINEERING OFFICER SR	(CUI	= L1)			
S3U	S3I	S3U	2-52-01-L	CREW BERTHING	104	0	0		
S2U		NSU	2-72-0-L	OFFICER WR, WC, SH	20.8	0	0	DJ	NC
S2U		S2U	2-75-1-A	WARDROBE	16	0	0	DJ	NC
S2U		S2U	2-76-0A-L	PASSAGE	32	0	0	DJ	NC
S2U		S2U	2-76-0A-L	PASSAGE	75.2	0	0		
S2U		S2U	2-84-1-L	OFFICER SR	64	0	0		
S3I	S3U		(none)	(weather bulkhead)	96.3	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	15.6	0	0		
D04			4-72-3-F	DIESEL OIL TANK	64.8	0	0		
D06			1-52-01A-L	PASSAGE	13.6	0	0		
D06			1-52-01B-L	PASSAGE	7.8	0	0		
D06			1-52-01C-L	PASSAGE	17.8	0	0		
D06			1-72-0-A	REPAIR ANNEX	5.2	0	0		
D04			(none)	(weather overhead)	61.2	0	0		
			2-72-2-L	OFFICER WR, WC, SH	(CUI	= LW)			
NSU	S3I	S3U	2-52-01-L	CREW BERTHING	35.2	0	0		
NSU		NSU	2-72-0-L	OFFICER WR, WC, SH	36.8	0	0		
NSU		S2U	2-72-4-L	OFFICER SR	64	0	0		
NSU		S2U	2-72-4-L	OFFICER SR	35.2	0	0	DJ	NC
NSU		S2U	2-78-2-A	REC LKR	27.2	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	35.2	0	0		
D06			1-52-01B-L	PASSAGE	15	0	0		
D06			1-72-2-Q	SUPPLY OFFICE	20.2	0	0		
			2-72-4-L	OFFICER SR	(CUI	= L2)			
S3U	S3I	S3U	2-52-01-L	CREW BERTHING	56	0	0		
S2U		NSU	2-72-2-L	OFFICER WR, WC, SH	64	0	0		
S2U		NSU	2-72-2-L	OFFICER WR, WC, SH	35.2	0	0	DJ	NC
S2U		S2U	2-76-0B-L	PASSAGE	32	0	0	DJ	NC
S2U		S2U	2-84-2-L	OFFICER SR	99.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	96.3	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	17.6	0	0		
D04			4-72-4-F	DIESEL OIL TANK	64.8	0	0		
D06			1-52-01B-L	PASSAGE	10.2	0	0		
D06			1-72-2-Q	SUPPLY OFFICE	13.8	0	0		
D06			1-80-0-L	WARDROOM	29.6	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft²	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D04			(none)	(weather overhead)	54	0	0		
			2-75-1-A	WARDROBE	(CUI	= AG)			
S2U		NSU	2-72-0-L	OFFICER WR, WC, SH	16	0	0		
S2U		S2U	2-72-1-L	ENGINEERING OFFICER	16	0	0	DJ	NC
S2U		S2U	2-76-0A-L	PASSAGE	4.8	0	0		
S2U		S2U	2-76-0A-L	PASSAGE	16	0	0		
S2U		S2U	2-78-0-A	HS STORES	11.2	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	4	0	0		
D06			1-72-0-A	REPAIR ANNEX	4	0	0		
			2-76-0A-L	PASSAGE	(CUI	= LP)			
S2U		S2U	2-72-1-L	ENGINEERING OFFICER	32	0	0	DJ	NC
S2U		S2U	2-72-1-L	ENGINEERING OFFICER	75.2	0	0		
S2U		S2U	2-75-1-A	WARDROBE	4.8	0	0		
S2U		S2U	2-75-1-A	WARDROBE	16	0	0		
000		000	2-76-0B-L	PASSAGE	32	0	0		
S2U		S2U	2-78-0-A	HS STORES	27.2	0	0	DJ	NC
S2U		S2U	2-78-0-A	HS STORES	8	0	0		
S2U		S2U	2-84-1-L	OFFICER SR	44.8	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	46	0	0	HS	X
D04			1-52-01A-L	PASSAGE	2	0	0		
D04			1-52-01B-L	PASSAGE	18.2	0	0	HL	Y
D04			1-52-01C-L	PASSAGE	19.4	0	0		
D04			1-80-0-L	WARDROOM	6.4	0	0		
			2-76-0B-L	PASSAGE	(CUI	= LP)			
S2U		S2U	2-72-4-L	OFFICER SR	32	0	0	DJ	NC
000		000	2-76-0A-L	PASSAGE	32	0	0		
S2U		S2U	2-78-0-A	HS STORES	22.4	0	0		
S2U		S2U	2-78-2-A	REC LKR	25.6	0	0	DJ	NC
S2U		S2U	2-84-1-L	OFFICER SR	32	0	0	DJ	NC
S2U		S2U	2-84-2-L	OFFICER SR	9.6	0	0		
S2U		S2U	2-84-2-L	OFFICER SR	32	0	0	DJ	NC
S2U		NSU	2-88-1-L	OFFICER WR, WC, SH	64	0	0		
S2U		NSU	2-88-2-L	OFFICER WR, WC, SH	64	0	0		
S3U	S3U	S3U	2-96-0-L	PASSAGE	38.4	0	0	DWT	X
D06			3-72-0-C	IC AND GYRO ROOM	24	0	0		
D06			4-84-0-Q	A/C MACHINERY AND SE	57.6	0	0		
D04			1-80-0-L	WARDROOM	79.9	0	0		
			2-78-0-A	HS STORES	(CUI	= AG)			
S2U		NSU	2-72-0-L	OFFICER WR, WC, SH	19.2	0	0		
S2U		S2U	2-75-1-A	WARDROBE	11.2	0	0		
S2U		S2U	2-76-0A-L	PASSAGE	27.2	0	0	DJ	NC
S2U		S2U	2-76-0A-L	PASSAGE	8	0	0		
S2U		S2U	2-76-0B-L	PASSAGE	22.4	0	0		
S2U		S2U	2-78-2-A	REC LKR	27.2	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	12.9	0	0		
D06			1-52-01B-L	PASSAGE	12.9	0	0		
			2-78-2-A	REC LKR	(CUI	= AG)			
S2U		NSU	2-72-0-L	OFFICER WR, WC, SH	25.6	0	0		
S2U		NSU	2-72-2-L	OFFICER WR, WC, SH	27.2	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S2U		S2U	2-76-0B-L	PASSAGE	25.6	0	0	DJ	NC
S2U		S2U	2-78-0-A	HS STORES	27.2	0	0		
D06			3-72-0-C	IC AND GYRO ROOM	10.9	0	0		
D06			1-52-01B-L	PASSAGE	10.9	0	0		
			2-84-1-L	OFFICER SR	(CUI	= L2)			
S2U		S2U	2-72-1-L	ENGINEERING OFFICER	64	0	0		
S2U		S2U	2-76-0A-L	PASSAGE	44.8	0	0		
S2U		S2U	2-76-0B-L	PASSAGE	32	0	0	DJ	NC
S2U		NSU	2-88-1-L	OFFICER WR, WC, SH	32	0	0	DJ	NC
S2U		NSU	2-88-1-L	OFFICER WR, WC, SH	64	0	0		
S3U	S3U	S3I	2-96-1-L	CPO STATEROOM	76.8	0	0		
S3I	S3U		(none)	(weather bulkhead)	96	0	0		
D06			4-84-0-Q	A/C MACHINERY AND SE	121.6	0	0		
D04			1-52-01C-L	PASSAGE	57.6	0	0		
D04			1-80-0-L	WARDROOM	6.4	0	0		
D04			(none)	(weather overhead)	67.2	0	0		
			2-84-2-L	OFFICER SR	(CUI	= L2)			
S2U		S2U	2-72-4-L	OFFICER SR	99.2	0	0		
S2U		S2U	2-76-0B-L	PASSAGE	9.6	0	0		
S2U		S2U	2-76-0B-L	PASSAGE	32	0	0	DJ	NC
S2U		NSU	2-88-2-L	OFFICER WR, WC, SH	32	0	0	DJ	NC
S2U		NSU	2-88-2-L	OFFICER WR, WC, SH	64	0	0		
S3U	S3U	S3I	2-96-2-L	CPO STATEROOM	76.8	0	0		
S3I	S3U		(none)	(weather bulkhead)	96	0	0		
D06			4-84-0-Q	A/C MACHINERY AND SE	121.6	0	0		
D04			1-80-0-L	WARDROOM	64.8	0	0		
D04			1-93-0-L	CPO MESS	6.4	0	0		
D04			(none)	(weather overhead)	60	0	0		
			2-88-1-L	OFFICER WR, WC, SH	(CUI	= LW)			
NSU		S2U	2-76-0B-L	PASSAGE	64	0	0		
NSU		S2U	2-84-1-L	OFFICER SR	32	0	0	DJ	NC
NSU		S2U	2-84-1-L	OFFICER SR	64	0	0		
S3U	S3U	S3U	2-96-0-L	PASSAGE	22.4	0	0		
S3U	S3U	S3I	2-96-1-L	CPO STATEROOM	9.6	0	0		
D06			4-84-0-Q	A/C MACHINERY AND SE	32	0	0		
D06			1-80-0-L	WARDROOM	32	0	0		
			2-88-2-L	OFFICER WR, WC, SH	(CUI	= LW)			
NSU		S2U	2-76-0B-L	PASSAGE	64	0	0		
NSU		S2U	2-84-2-L	OFFICER SR	32	0	0	DJ	NC
NSU		S2U	2-84-2-L	OFFICER SR	64	0	0		
S3U	S3U	S3U	2-96-0-L	PASSAGE	22.4	0	0		
S3U	S3U	S3I	2-96-2-L	CPO STATEROOM	9.6	0	0		
D06			4-84-0-Q	A/C MACHINERY AND SE	32	0	0		
D06			1-80-0-L	WARDROOM	26.4	0	0		
D06			1-93-0-L	CPO MESS	5.6	0	0		
			2-96-0-L	PASSAGE	(CUI	= LP)			
S3U	S3U	S3U	2-76-0B-L	PASSAGE	38.4	0	0	DWT	X
S3U	S3U	S3U	2-88-1-L	OFFICER WR, WC, SH	22.4	0	0		
S3U	S3U	S3U	2-88-2-L	OFFICER WR, WC, SH	22.4	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S2U		S2U	2-96-1-L	CPO STATEROOM	36.8	0	0	DJ	NC
S2U		S2U	2-96-2-L	CPO STATEROOM	25.6	0	0	DJ	NC
S2U		NSU	2-99-0-L	CPO WR, WC, SH	22.4	0	0		
S2U		NSU	2-99-0-L	CPO WR, WC, SH	30.4	0	0		
S2U		NSU	2-99-0-L	CPO WR, WC, SH	38.4	0	0		
S2U		NSU	2-99-0-L	CPO WR, WC, SH	43.2	0	0		
S2U		NSU	2-99-0-L	CPO WR, WC, SH	22.4	0	0	DJ	NC
D06			3-96-0-E	AUX MACHINERY ROOM	112.8	0	0	HS	X
D04			1-52-01C-L	PASSAGE	27.3	0	0		
D04			1-80-0-L	WARDROOM	7	0	0		
D04			1-93-0-L	CPO MESS	45.9	0	0	HL	Y
D04			1-99-1-Q	SHIPS OFFICE	35.6	0	0		
			2-96-1-L	CPO STATEROOM	(CUI	= L2)			
S3I	S3U	S3I	4-108-0-E	ENGINE ROOM	86.4	0	0		
S3I	S3U	S3U	2-84-1-L	OFFICER SR	76.8	0	0		
S3I	S3U	S3U	2-88-1-L	OFFICER WR, WC, SH	9.6	0	0		
S2U		S2U	2-96-0-L	PASSAGE	36.8	0	0	DJ	NC
S2U		NSU	2-99-0-L	CPO WR, WC, SH	59.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	96	0	0		
D06			3-96-0-E	AUX MACHINERY ROOM	33.6	0	0		
D04			4-96-5-F	DIESEL OIL STORAGE	92.4	0	0		
D04			1-52-01C-L	PASSAGE	47.2	0	0		
D04			1-99-1-Q	SHIPS OFFICE	13.3	0	0		
D04			(none)	(weather overhead)	67.2	0	0		
			2-96-2-L	CPO STATEROOM	(CUI	= L2)			
S3I	S3U	S3I	4-108-0-E	ENGINE ROOM	86.4	0	0		
S3I	S3U	S3U	2-84-2-L	OFFICER SR	76.8	0	0		
S3I	S3U	S3U	2-88-2-L	OFFICER WR, WC, SH	9.6	0	0		
S2U		S2U	2-96-0-L	PASSAGE	25.6	0	0	DJ	NC
S2U		NSU	2-99-0-L	CPO WR, WC, SH	72	0	0		
S3I	S3U		(none)	(weather bulkhead)	96	0	0		
D06			3-96-0-E	AUX MACHINERY ROOM	33.6	0	0		
D04			4-96-4-F	DIESEL OIL STORAGE	92.4	0	0		
D04			1-93-0-L	CPO MESS	69.6	0	0		
D04			(none)	(weather overhead)	60	0	0		
			2-99-0-L	CPO WR, WC, SH	(CUI	= LW)			
S3U	S3U	S3I	4-108-0-E	ENGINE ROOM	83.2	0	0		
NSU		S2U	2-96-0-L	PASSAGE	22.4	0	0		
NSU		S2U	2-96-0-L	PASSAGE	30.4	0	0		
NSU		S2U	2-96-0-L	PASSAGE	38.4	0	0		
NSU		S2U	2-96-0-L	PASSAGE	43.2	0	0		
NSU		S2U	2-96-0-L	PASSAGE	22.4	0	0	DJ	NC
NSU		S2U	2-96-1-L	CPO STATEROOM	59.2	0	0		
NSU		S2U	2-96-2-L	CPO STATEROOM	72	0	0		
D06			3-96-0-E	AUX MACHINERY ROOM	63.2	0	0		
D06			1-93-0-L	CPO MESS	39.6	0	0		
D06			1-99-1-Q	SHIPS OFFICE	23.6	0	0		
			2-136-0-C	CONTROL BOOTH	(CUI	= C)			
S2U		S2I	4-108-0-E	ENGINE ROOM	17.6	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S2U		S2I	4-108-0-E	ENGINE ROOM	18.2	0	0	DJ	NC
S2U		S2I	4-108-0-E	ENGINE ROOM	137.6	0	0		
S3I	S3U	S3U	2-140-0A-L	PASSAGE	48	0	0		
S3I	S3U	S3U	2-140-0A-L	PASSAGE	24	0	0		
S3I	S3U	S3U	2-143-2-L	STAIRWAY	36.8	0	0		
S3I	S3U	S3I	2-143-2-Q	ENGINEERING OFFICE	67.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	52.8	0	0		
D06			4-108-0-E	ENGINE ROOM	122.8	0	0		
D06			1-121-0-L	CREWS MESS	85.5	0	0		
D06			(none)	(weather overhead)	38.6	0	0		
			2-140-1-Q	ENGINEERS WORKSHOP	(CUI	= QS)			
S3U	S3U	S3I	4-108-0-E	ENGINE ROOM	72	0	0		
S2I		S2U	2-140-0A-L	PASSAGE	48	0	0		
S2I		S2U	2-140-0A-L	PASSAGE	56	0	0	DJ	NC
S2I		S2U	2-140-0B-L	PASSAGE	56	0	0		
S2I		S2U	2-140-0B-L	PASSAGE	24	0	0		
S2I		S2U	2-140-0B-L	PASSAGE	24	0	0		
S3U	S3U	S3I	2-156-0-A	THAW BOX	8	0	0		
S3U	S3I	S3U	2-156-02-A	DRY PROVISIONS STORE	24	0	0		
S3U	S3U	S3I	2-156-1-A	FREEZER BOX	64	0	0		
S3I	S3U		(none)	(weather bulkhead)	128.3	0	0		
D06			4-108-0-E	ENGINE ROOM	13.2	0	0		
D04			4-143-0-A	ENGINEERS STOREROOM	51	0	0		
D04			4-143-1-F	DIESEL OIL	119.2	0	0		
D06			1-121-0-L	CREWS MESS	33.6	0	0		
D06			1-148-0-Q	GALLEY	76	0	0		
D06			(none)	(weather overhead)	87.4	0	0		
			2-140-0A-L	PASSAGE	(CUI	= LP)			
S3U	S3U	S3I	4-108-0-E	ENGINE ROOM	32	0	0	DWT	Y
S3U	S3U	S3I	2-136-0-C	CONTROL BOOTH	48	0	0		
S3U	S3U	S3I	2-136-0-C	CONTROL BOOTH	24	0	0		
S2U		S2I	2-140-1-Q	ENGINEERS WORKSHOP	48	0	0		
S2U		S2I	2-140-1-Q	ENGINEERS WORKSHOP	56	0	0	DJ	NC
000		000	2-140-0B-L	PASSAGE	24	0	0		
000		000	2-143-2-L	STAIRWAY	24	0	0		
D06			4-108-0-E	ENGINE ROOM	12	0	0		
D04			4-143-0-A	ENGINEERS STOREROOM	27	0	0		
D04			4-143-1-F	DIESEL OIL	3	0	0		
D06			1-121-0-L	CREWS MESS	42	0	0		
			2-140-0B-L	PASSAGE	(CUI	= LP)			
S2U		S2I	2-140-1-Q	ENGINEERS WORKSHOP	56	0	0		
S2U		S2I	2-140-1-Q	ENGINEERS WORKSHOP	24	0	0		
S2U		S2I	2-140-1-Q	ENGINEERS WORKSHOP	24	0	0		
000		000	2-140-0A-L	PASSAGE	24	0	0		
000		000	2-143-2-L	STAIRWAY	12.8	0	0		
S2U		S2I	2-143-2-Q	ENGINEERING OFFICE	80	0	0	DJ	NC
S3U	S3U	S3I	2-156-0-A	THAW BOX	40	0	0		
S3U	S3U	S3U	2-156-01B-L	PASSAGE	20.8	0	0	DWT	Y
D04			4-143-0-A	ENGINEERS STOREROOM	55	0	0	HS	X

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D06			1-148-0-Q	GALLEY	55	0	0		
			2-143-2-L	STAIRWAY	(CUI	= LP)			
S3U	S3U	S3I	2-136-0-C	CONTROL BOOTH	36.8	0	0		
000		000	2-140-0A-L	PASSAGE	24	0	0		
000		000	2-140-0B-L	PASSAGE	12.8	0	0		
S2U		S2I	2-143-2-Q	ENGINEERING OFFICE	24	0	0		
S2U		S2I	2-143-2-Q	ENGINEERING OFFICE	24	0	0		
D04			4-143-0-A	ENGINEERS STOREROOM	9	0	0		
D04			4-143-2-F	DIESEL OIL	4.8	0	0		
D04			1-143-2-L	STAIRWAY	13.8	0	0	HL	Y
			2-143-2-Q	ENGINEERING OFFICE	(CUI	= QO)			
S3I	S3U	S3I	2-136-0-C	CONTROL BOOTH	67.2	0	0		
S2I		S2U	2-140-0B-L	PASSAGE	80	0	0	DJ	NC
S2I		S2U	2-143-2-L	STAIRWAY	24	0	0		
S2I		S2U	2-143-2-L	STAIRWAY	24	0	0		
S3I	S3U	S3U	2-156-01A-L	PASSAGE	24	0	0		
S2U	S3U	S2U	2-156-01B-L	PASSAGE	59.2	0	0		
S3I	S3U		(none)	(weather bulkhead)	104.3	0	0		
D04			4-143-0-A	ENGINEERS STOREROOM	14	0	0		
D04			4-143-2-F	DIESEL OIL	117.4	0	0		
D06			1-143-2-L	STAIRWAY	7.2	0	0		
D06			1-148-0-Q	GALLEY	54	0	0		
D06			(none)	(weather overhead)	71.5	0	0		
			2-156-0-A	THAW BOX	(CUI	= AR)			
S3I	S3U	S3U	2-140-1-Q	ENGINEERS WORKSHOP	8	0	0		
S3I	S3U	S3U	2-140-0B-L	PASSAGE	40	0	0		
S2I		S2U	2-156-01B-L	PASSAGE	64	0	0	DJ	NC
S2I		S2U	2-156-02-A	DRY PROVISIONS STORE	48	0	0		
S2I		S2I	2-156-1-A	FREEZER BOX	64	0	0	DJ	NC
D04			4-156-0-E	AUX MACHINERY SPACE	48	0	0		
D06			1-148-0-Q	GALLEY	18	0	0		
D04			(none)	(weather overhead)	30	0	0		
			2-156-01A-L	PASSAGE	(CUI	= LP)			
S3U	S3U	S3I	2-143-2-Q	ENGINEERING OFFICE	24	0	0		
000		000	2-156-01B-L	PASSAGE	64	0	0		
S2U		S2I	2-164-2-A	CHILL BOX	64	0	0		
S3U	S3U	S3I	2-172-2-Q	ELECTRIC WORKSHOP	16	0	0		
S3I	S3U		(none)	(weather bulkhead)	128.3	0	0		
D04			4-156-0-E	AUX MACHINERY SPACE	22	0	0	HS	X
D04			4-164-0-F	LIQUID STORAGE TANKS	18	0	0		
D06			(none)	(weather overhead)	40	0	0		
			2-156-01B-L	PASSAGE	(CUI	= LP)			
S3U	S3U	S3U	2-140-0B-L	PASSAGE	20.8	0	0	DWT	Y
S2U	S3U	S2U	2-143-2-Q	ENGINEERING OFFICE	59.2	0	0		
S2U		S2I	2-156-0-A	THAW BOX	64	0	0	DJ	NC
000		000	2-156-01A-L	PASSAGE	64	0	0		
000		000	2-156-01C-L	PASSAGE	24	0	0		
S2U		S2I	2-164-2-A	CHILL BOX	56	0	0		
D04			4-156-0-E	AUX MACHINERY SPACE	80	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D06			1-148-0-Q	GALLEY	24	0	0		
D06			1-159-2-A	DRY PROVISIONS STORE	25	0	0		
D04			(none)	(weather overhead)	31	0	0		
			2-156-01C-L	PASSAGE	(CUI	= LP)			
000		000	2-156-01B-L	PASSAGE	24	0	0		
S2U		S2U	2-156-02-A	DRY PROVISIONS STORE	24	0	0		
S2U		S2U	2-156-02-A	DRY PROVISIONS STORE	32	0	0		
S2U		S2U	2-156-02-A	DRY PROVISIONS STORE	40	0	0	DJ	NC
S2U		S2I	2-164-2-A	CHILL BOX	64	0	0	DJ	NC
S3U	S3U	S3U	2-172-0-L	PASSAGE	56	0	0	DWT	Y
D04			4-156-0-E	AUX MACHINERY SPACE	36	0	0	HS	X
D06			(none)	(weather overhead)	36	0	0		
			2-156-02-A	DRY PROVISIONS STOREROOM	(CUI	= AS)			
S3U	S3I	S3U	2-140-1-Q	ENGINEERS WORKSHOP	24	0	0		
S2U		S2I	2-156-0-A	THAW BOX	48	0	0		
S2U		S2U	2-156-01C-L	PASSAGE	24	0	0		
S2U		S2U	2-156-01C-L	PASSAGE	32	0	0		
S2U		S2U	2-156-01C-L	PASSAGE	40	0	0	DJ	NC
S2U		S2I	2-156-1-A	FREEZER BOX	64	0	0		
S2U		S2I	2-156-1-A	FREEZER BOX	64	0	0		
S3U	S3U	S3U	2-172-1-A	HAWSER & RESCUE EQUI	96	0	0		
S3I	S3U		(none)	(weather bulkhead)	128.3	0	0		
D04			4-156-0-E	AUX MACHINERY SPACE	74	0	0		
D04			4-164-0-F	LIQUID STORAGE TANKS	66	0	0		
D06			(none)	(weather overhead)	140	0	0		
			2-156-1-A	FREEZER BOX	(CUI	= AR)			
S3I	S3U	S3U	2-140-1-Q	ENGINEERS WORKSHOP	64	0	0		
S2I		S2I	2-156-0-A	THAW BOX	64	0	0	DJ	NC
S2I		S2U	2-156-02-A	DRY PROVISIONS STORE	64	0	0		
S2I		S2U	2-156-02-A	DRY PROVISIONS STORE	64	0	0		
D04			4-156-0-E	AUX MACHINERY SPACE	64	0	0		
D06			1-148-0-Q	GALLEY	18	0	0		
D06			1-159-1-A	DRY STORES	12	0	0		
D04			(none)	(weather overhead)	34	0	0		
			2-164-2-A	CHILL BOX	(CUI	= AR)			
S2I		S2U	2-156-01A-L	PASSAGE	64	0	0		
S2I		S2U	2-156-01B-L	PASSAGE	56	0	0		
S2I		S2U	2-156-01C-L	PASSAGE	64	0	0	DJ	NC
S3I	S3U	S3U	2-172-2-Q	ELECTRIC WORKSHOP	56	0	0		
D04			4-156-0-E	AUX MACHINERY SPACE	8	0	0		
D04			4-164-0-F	LIQUID STORAGE TANKS	48	0	0		
D04			(none)	(weather overhead)	56	0	0		
			2-172-0-L	PASSAGE	(CUI	= LP)			
S3U	S3U	S3U	4-188-0-E	STEERING GEAR ROOM	56	0	0	DWT	Y
S3U	S3U	S3U	2-156-01C-L	PASSAGE	56	0	0	DWT	Y
000		000	2-172-1-A	HAWSER & RESCUE EQUI	128	0	0	DJ	NC
S2U		S2I	2-172-2-Q	ELECTRIC WORKSHOP	64	0	0	DJ	NC
000		000	2-180-2-A	REPAIR PARTY LKR	64	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D04			4-164-0-F	LIQUID STORAGE TANKS	77	0	0		
D04			4-188-0-E	STEERING GEAR ROOM	35	0	0		
D06			(none)	(weather overhead)	112	0	0	HS	Y
			2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	(CUI	= AS)			
S3U	S3U	S3U	4-188-0-E	STEERING GEAR ROOM	92.8	0	0		
S3U	S3U	S3U	2-156-02-A	DRY PROVISIONS STORE	96	0	0		
000		000	2-172-0-L	PASSAGE	128	0	0	DJ	NC
S3I	S3U		(none)	(weather bulkhead)	128	0	0		
D04			4-164-0-F	LIQUID STORAGE TANKS	130.5	0	0		
D04			4-188-0-E	STEERING GEAR ROOM	58.3	0	0		
D06			(none)	(weather overhead)	188.8	0	0		
			2-172-2-Q	ELECTRIC WORKSHOP	(CUI	= QS)			
S3I	S3U	S3U	2-156-01A-L	PASSAGE	16	0	0		
S3U	S3U	S3I	2-164-2-A	CHILL BOX	56	0	0		
S2I		S2U	2-172-0-L	PASSAGE	64	0	0	DJ	NC
S2I		S2U	2-180-2-A	REPAIR PARTY LKR	70.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	64	0	0		
D04			4-164-0-F	LIQUID STORAGE TANKS	71.2	0	0		
D06			(none)	(weather overhead)	71.2	0	0		
			2-180-2-A	REPAIR PARTY LKR	(CUI	= AG)			
S3U	S3U	S3U	4-188-0-E	STEERING GEAR ROOM	68.8	0	0		
000		000	2-172-0-L	PASSAGE	64	0	0		
S2U		S2I	2-172-2-Q	ELECTRIC WORKSHOP	70.4	0	0		
S3I	S3U		(none)	(weather bulkhead)	64	0	0		
D04			4-164-0-F	LIQUID STORAGE TANKS	26.3	0	0		
D04			4-188-0-E	STEERING GEAR ROOM	43.3	0	0		
D06			(none)	(weather overhead)	69.6	0	0		
			1-1-0-A	GENERAL STORES	(CUI	= AS)			
S3U		S3U	1-12-0-A	BOSUN'S STORES	75.6	0	0	DWT	X
S3I	S3U		(none)	(weather bulkhead)	92.7	0	0		
S3I	S3U		(none)	(weather bulkhead)	92.7	0	0		
D06			(none)	(weather overhead)	39.5	0	0	HS	X
			1-12-0-A	BOSUN'S STORES	(CUI	= AS)			
S3U		S3U	1-1-0-A	GENERAL STORES	75.6	0	0	DWT	X
S3U		S3I	1-20-0-Q	LAUNDRY	135	0	0	DWT	X
S3U		S2U	1-20-4-Q	DECON SHWR	27	0	0	DWT	X
S3I	S3U		(none)	(weather bulkhead)	104.7	0	0		
S3I	S3U		(none)	(weather bulkhead)	104.7	0	0		
D06			3-12-0-Q	CHAIN LKR	24	0	0		
D04			2-16-0-A	BOSUN'S STORES	51	0	0		
D06			(none)	(weather overhead)	139.9	0	0	HL	X
			1-20-0-Q	LAUNDRY	(CUI	= QL)			
S3I		S3U	1-12-0-A	BOSUN'S STORES	135	0	0	DWT	X
S2I		S2U	1-20-2-A	GENERAL STORES	64.8	0	0	DJ	NC
S2I		S2U	1-20-4-Q	DECON SHWR	43.2	0	0		
S3U		S3I	1-32-0-L	CREW BERTHING	171	0	0	DWT	Y
S3I	S3U		(none)	(weather bulkhead)	113.8	0	0		
D04			2-16-0-A	BOSUN'S STORES	166.5	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D06			(none)	(weather overhead)	204	0	0		
			1-20-2-A	GENERAL STORES	(CUI	= AG)			
S2U		S2I	1-20-0-Q	LAUNDRY	64.8	0	0	DJ	NC
S2U		S2U	1-20-4-Q	DECON SHWR	43.2	0	0		
S2U		S2U	1-20-4-Q	DECON SHWR	27	0	0	DJ	NC
S3U		S3I	1-32-0-L	CREW BERTHING	63	0	0		
S3I	S3U		(none)	(weather bulkhead)	113.8	0	0		
D04			2-16-0-A	BOSUN'S STORES	16.7	0	0		
D06			(none)	(weather overhead)	45.6	0	0		
			1-20-4-Q	DECON SHWR	(CUI	= LW)			
S2U		S3U	1-12-0-A	BOSUN'S STORES	27	0	0	DWT	X
S2U		S2I	1-20-0-Q	LAUNDRY	43.2	0	0		
S2U		S2U	1-20-2-A	GENERAL STORES	43.2	0	0		
S2U		S2U	1-20-2-A	GENERAL STORES	27	0	0	DJ	NC
D04			2-16-0-A	BOSUN'S STORES	5.8	0	0		
D06			(none)	(weather overhead)	14.4	0	0		
			1-32-0-L	CREW BERTHING	(CUI	= L5)			
S2I		S2U	3-52-2-M	AMMO HOIST	19.8	0	0		
S3I		S3U	1-20-0-Q	LAUNDRY	171	0	0	DWT	Y
S3I		S3U	1-20-2-A	GENERAL STORES	63	0	0		
S2U		S2I	1-52-0-L	CREW BERTHING	36	0	0		
S2U		S2U	1-52-01A-L	PASSAGE	57.6	0	0	DWT	Y
S2U		S2U	1-52-1-A	SHIPS SERVICE STORE	43.2	0	0		
S2I		S2I	1-52-2-L	CREW WR, WC, SH	37.8	0	0		
S2U		S2I	1-52-2-L	CREW WR, WC, SH	79.2	0	0	DWT	Y
S3I	S3U		(none)	(weather bulkhead)	181.1	0	0		
S3I	S3U		(none)	(weather bulkhead)	181.1	0	0		
D06			2-32-0-L	CREW WR, WC, SH	88.9	0	0		
D04			2-32-01-L	CREW BERTHING	349.9	0	0	HL	X
								HS	X
D06			01-44-0-L	CO SR	64	0	0		
D06			01-44-1-L	CO CABIN	64.8	0	0		
D06			01-44-2-L	CO WR, WC, SH	36	0	0		
D06			(none)	(weather overhead)	399.2	0	0		
			1-52-0-L	CREW BERTHING	(CUI	= L5)			
S2I		S2U	1-32-0-L	CREW BERTHING	36	0	0		
S2U		S2U	1-52-01A-L	PASSAGE	108	0	0		
S2U		S2U	1-52-01A-L	PASSAGE	27	0	0		
S2U		S2U	1-52-01A-L	PASSAGE	72	0	0		
S2U		S2U	1-52-01B-L	PASSAGE	27	0	0		
S2U		NSU	1-52-2-L	CREW WR, WC, SH	99	0	0		
S2U		NSU	1-52-2-L	CREW WR, WC, SH	99	0	0	DJ	NC
S2U		S2I	1-63-2-Q	FAN ROOM	54	0	0		
S2U		S2U	1-72-0-A	REPAIR ANNEX	46.8	0	0		
S2U		S2U	1-72-2-Q	SUPPLY OFFICE	88.2	0	0		
S2I	S3U		(none)	(weather bulkhead)	27	0	0		
D06			2-52-0-L	CREW WR, WC, SH	16	0	0		
D04			2-52-01-L	CREW BERTHING	199	0	0		
D04			01-44-0-L	CO SR	6	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D04			01-44-1-L	CO CABIN	89	0	0		
D04			01-59-0-L	OFFICER SR	55.8	0	0		
D04			01-69-0-L	PASSAGE	43.8	0	0		
D04			(none)	(weather overhead)	20.4	0	0		
			1-52-01A-L	PASSAGE	(CUI	= LP)			
S2U		S2U	1-32-0-L	CREW BERTHING	57.6	0	0	DWT	Y
S2U		S2U	1-52-0-L	CREW BERTHING	108	0	0		
S2U		S2U	1-52-0-L	CREW BERTHING	27	0	0		
S2U		S2U	1-52-0-L	CREW BERTHING	72	0	0		
000		000	1-52-01B-L	PASSAGE	41.4	0	0		
000		000	1-52-01C-L	PASSAGE	30.6	0	0		
S2U		S2U	1-52-1-A	SHIPS SERVICE STORE	36	0	0	DJ	NC
S2U		S2U	1-57-1-A	FWD REPAIR LKR	57.6	0	0	DJ	NC
S2U		S2I	1-63-1-Q	FAN ROOM	59.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	68.4	0	0		
D04			2-52-01-L	CREW BERTHING	92	0	0	HL	X
D06			2-72-1-L	ENGINEERING OFFICER	13.6	0	0		
D04			2-76-0A-L	PASSAGE	2	0	0		
D06			01-44-1-L	CO CABIN	73.4	0	0		
D06			01-69-0-L	PASSAGE	4.6	0	0	HO	O
D04			(none)	(weather overhead)	29.7	0	0		
			1-52-01B-L	PASSAGE	(CUI	= LP)			
S2U		S2U	1-52-0-L	CREW BERTHING	27	0	0		
000		000	1-52-01A-L	PASSAGE	41.4	0	0		
000		000	1-52-01C-L	PASSAGE	30.6	0	0		
S2U		S2U	1-52-01C-L	PASSAGE	27	0	0		
S2U		S2U	1-72-0-A	REPAIR ANNEX	46.8	0	0	DJ	NC
S2U		S2U	1-72-0-A	REPAIR ANNEX	41.4	0	0		
S2U		S2U	1-72-2-Q	SUPPLY OFFICE	88.2	0	0	DJ	NC
S2U		NPU	1-80-0-L	WARDROOM	135	0	0		
S2I	S3U		(none)	(weather bulkhead)	30.6	0	0	DWT	Z
D06			2-72-1-L	ENGINEERING OFFICER	7.8	0	0		
D06			2-72-2-L	OFFICER WR, WC, SH	15	0	0		
D06			2-72-4-L	OFFICER SR	10.2	0	0		
D04			2-76-0A-L	PASSAGE	18.2	0	0	HL	Y
D06			2-78-0-A	HS STORES	12.9	0	0		
D06			2-78-2-A	REC LKR	10.9	0	0		
D06			01-69-0-L	PASSAGE	13.2	0	0		
D06			01-72-0-L	XO SR	22.6	0	0		
D06			01-72-01-L	OPS OFFICER SR	27.6	0	0		
D04			(none)	(weather overhead)	11.6	0	0		
			1-52-01C-L	PASSAGE	(CUI	= LP)			
000		000	1-52-01A-L	PASSAGE	30.6	0	0		
000		000	1-52-01B-L	PASSAGE	30.6	0	0		
S2U		S2U	1-52-01B-L	PASSAGE	27	0	0		
S2U		NPU	1-80-0-L	WARDROOM	68.4	0	0	DJ	NC
S2U		NPU	1-80-0-L	WARDROOM	86.4	0	0		
S2U		NPU	1-80-0-L	WARDROOM	21.6	0	0		
S2U		NPU	1-80-0-L	WARDROOM	72	0	0	DJ	NC

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S2U		NPU	1-93-0-L	CPO MESS	27	0	0	DJ	NC
S2U		NPU	1-93-0-L	CPO MESS	25.2	0	0		
S2U		S2U	1-99-1-Q	SHIPS OFFICE	66.6	0	0	DJ	NC
S2U		S2U	1-99-1-Q	SHIPS OFFICE	48.6	0	0		
S2U		S2U	1-108-1-L	PASSAGE	30.6	0	0	DJ	NC
S2I	S3U		(none)	(weather bulkhead)	282.6	0	0	DWT	Z
D06			2-72-1-L	ENGINEERING OFFICER	17.8	0	0		
D04			2-76-0A-L	PASSAGE	19.4	0	0		
D04			2-84-1-L	OFFICER SR	57.6	0	0		
D04			2-96-0-L	PASSAGE	27.3	0	0		
D04			2-96-1-L	CPO STATEROOM	47.2	0	0		
D06			01-72-01-L	OPS OFFICER SR	27	0	0		
D06			01-87-1-L	OPS OFFICER WR, WC,	8.4	0	0		
D06			01-92-0-Q	HELO SERVICE	16.9	0	0		
D06			01-99-0-Q	UPTAKE AND FAN ROOM	13.1	0	0		
D04			(none)	(weather overhead)	95.4	0	0		
			1-52-1-A	SHIPS SERVICE STORE	(CUI	= AG)			
S2U		S2U	1-32-0-L	CREW BERTHING	43.2	0	0		
S2U		S2U	1-52-01A-L	PASSAGE	36	0	0	DJ	NC
S2U		S2U	1-57-1-A	FWD REPAIR LKR	46.8	0	0		
S2I	S3U		(none)	(weather bulkhead)	36.2	0	0		
D04			2-52-01-L	CREW BERTHING	11.2	0	0		
D06			01-44-1-L	CO CABIN	2.4	0	0		
D06			(none)	(weather overhead)	17.6	0	0		
			1-52-2-L	CREW WR, WC, SH	(CUI	= LW)			
S2I		S2U	3-52-2-M	AMMO HOIST	45	0	0		
S2I		S2U	3-52-2-M	AMMO HOIST	45	0	0		
S2I		S2U	3-52-2-M	AMMO HOIST	19.8	0	0		
S2I		S2I	1-32-0-L	CREW BERTHING	37.8	0	0		
S2I		S2U	1-32-0-L	CREW BERTHING	79.2	0	0	DWT	Y
NSU		S2U	1-52-0-L	CREW BERTHING	99	0	0		
NSU		S2U	1-52-0-L	CREW BERTHING	99	0	0	DJ	NC
NSU		S2I	1-63-2-Q	FAN ROOM	45	0	0		
S3I	S3U		(none)	(weather bulkhead)	99.3	0	0		
D06			2-52-0-L	CREW WR, WC, SH	89.6	0	0		
D04			2-52-01-L	CREW BERTHING	36.5	0	0		
D06			2-52-02-A	CLEANING GEAR LKR	11	0	0		
D06			01-44-0-L	CO SR	27.6	0	0		
D06			01-44-2-L	CO WR, WC, SH	14	0	0		
D06			01-56-2-L	OFFICER WR, WC, SH	46.4	0	0		
D06			01-59-0-L	OFFICER SR	22	0	0		
D06			(none)	(weather overhead)	50.6	0	0		
			1-57-1-A	FWD REPAIR LKR	(CUI	= AG)			
S2U		S2U	1-52-01A-L	PASSAGE	57.6	0	0	DJ	NC
S2U		S2U	1-52-1-A	SHIPS SERVICE STORE	46.8	0	0		
S2U		S2I	1-63-1-Q	FAN ROOM	50.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	57.7	0	0		
D04			2-52-01-L	CREW BERTHING	21.3	0	0		
D06			01-44-1-L	CO CABIN	3.8	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D06			(none)	(weather overhead)	30.7	0	0		
			1-63-1-Q	FAN ROOM	(CUI	= QF)			
S2I		S2U	1-52-01A-L	PASSAGE	59.4	0	0		
S2I		S2U	1-57-1-A	FWD REPAIR LKR	50.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	59.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	50.4	0	0	DJ	NC
D04			2-52-01-L	CREW BERTHING	26.2	0	0		
S2I			01-44-1-L	CO CABIN	2.2	0	0		
D06			(none)	(weather overhead)	34.8	0	0		
			1-63-2-Q	FAN ROOM	(CUI	= QF)			
S2I		S2U	1-52-0-L	CREW BERTHING	54	0	0		
S2I		NSU	1-52-2-L	CREW WR, WC, SH	45	0	0		
S2I	S3U		(none)	(weather bulkhead)	54	0	0		
S2I	S3U		(none)	(weather bulkhead)	45	0	0	DJ	NC
D04			2-52-01-L	CREW BERTHING	20	0	0		
D06			(none)	(weather overhead)	30	0	0		
			1-72-0-A	REPAIR ANNEX	(CUI	= AG)			
S2U		S2U	1-52-0-L	CREW BERTHING	46.8	0	0		
S2U		S2U	1-52-01B-L	PASSAGE	46.8	0	0	DJ	NC
S2U		S2U	1-52-01B-L	PASSAGE	41.4	0	0		
S2U		S2U	1-72-2-Q	SUPPLY OFFICE	41.4	0	0		
D06			2-72-0-L	OFFICER WR, WC, SH	14.7	0	0		
D06			2-72-1-L	ENGINEERING OFFICER	5.2	0	0		
D06			2-75-1-A	WARDROBE	4	0	0		
D04			01-72-0-L	XO SR	2.8	0	0		
D04			01-72-01-L	OPS OFFICER SR	21.2	0	0		
			1-72-2-Q	SUPPLY OFFICE	(CUI	= QO)			
S2U		S2U	1-52-0-L	CREW BERTHING	88.2	0	0		
S2U		S2U	1-52-01B-L	PASSAGE	88.2	0	0	DJ	NC
S2U		S2U	1-72-0-A	REPAIR ANNEX	41.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	41.4	0	0		
D06			2-72-0-L	OFFICER WR, WC, SH	11	0	0		
D06			2-72-2-L	OFFICER WR, WC, SH	20.2	0	0		
D06			2-72-4-L	OFFICER SR	13.8	0	0		
D04			01-69-0-L	PASSAGE	13.8	0	0		
D04			01-72-0-L	XO SR	15.6	0	0		
D04			(none)	(weather overhead)	15.6	0	0		
			1-80-0-L	WARDROOM	(CUI	= LL)			
NPU		S2U	1-52-01B-L	PASSAGE	135	0	0		
NPU		S2U	1-52-01C-L	PASSAGE	68.4	0	0	DJ	NC
NPU		S2U	1-52-01C-L	PASSAGE	86.4	0	0		
NPU		S2U	1-52-01C-L	PASSAGE	21.6	0	0		
NPU		S2U	1-52-01C-L	PASSAGE	72	0	0	DJ	NC
NPU		NPU	1-93-0-L	CPO MESS	88.2	0	0		
NPU		NPU	1-93-0-L	CPO MESS	27	0	0		
S2I	S3U		(none)	(weather bulkhead)	131.4	0	0		
D06			2-72-4-L	OFFICER SR	29.6	0	0		
D04			2-76-0A-L	PASSAGE	6.4	0	0		
D04			2-76-0B-L	PASSAGE	79.9	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
D04			2-84-1-L	OFFICER SR	6.4	0	0		
D04			2-84-2-L	OFFICER SR	64.8	0	0		
D06			2-88-1-L	OFFICER WR, WC, SH	32	0	0		
D06			2-88-2-L	OFFICER WR, WC, SH	26.4	0	0		
D04			2-96-0-L	PASSAGE	7	0	0		
D06			01-72-0-L	XO SR	60.4	0	0		
D06			01-72-01-L	OPS OFFICER SR	28	0	0		
D06			01-89-2-A	EQPT LKR	10.8	0	0		
D06			01-87-0-L	XO WR, WC, SH	30	0	0		
D06			01-87-1-L	OPS OFFICER WR, WC,	19.6	0	0		
D06			01-92-0-Q	HELO SERVICE	59.2	0	0		
D06			(none)	(weather overhead)	49.6	0	0		
			1-93-0-L	CPO MESS	(CUI	= LL)			
NPU		S2U	1-52-01C-L	PASSAGE	27	0	0	DJ	NC
NPU		S2U	1-52-01C-L	PASSAGE	25.2	0	0		
NPU		NPU	1-80-0-L	WARDROOM	88.2	0	0		
NPU		NPU	1-80-0-L	WARDROOM	27	0	0		
NPU		S2U	1-99-1-Q	SHIPS OFFICE	66.6	0	0		
S2I		S2I	1-108-0-Q	UPTAKE	113.4	0	0		
S2I	S3U		(none)	(weather bulkhead)	120.6	0	0		
D04			2-84-2-L	OFFICER SR	6.4	0	0		
D06			2-88-2-L	OFFICER WR, WC, SH	5.6	0	0		
D04			2-96-0-L	PASSAGE	45.9	0	0	HL	Y
D04			2-96-2-L	CPO STATEROOM	69.6	0	0		
D06			2-99-0-L	CPO WR, WC, SH	39.6	0	0		
D06			01-92-0-Q	HELO SERVICE	28.2	0	0		
D06			01-99-0-Q	UPTAKE AND FAN ROOM	78.3	0	0		
D06			(none)	(weather overhead)	45.6	0	0		
			1-99-1-Q	SHIPS OFFICE	(CUI	= QO)			
S2U		S2U	1-52-01C-L	PASSAGE	66.6	0	0	DJ	NC
S2U		S2U	1-52-01C-L	PASSAGE	48.6	0	0		
S2U		NPU	1-93-0-L	CPO MESS	66.6	0	0		
S2I		S2I	1-108-0-Q	UPTAKE	48.6	0	0		
D04			2-96-0-L	PASSAGE	35.6	0	0		
D04			2-96-1-L	CPO STATEROOM	13.3	0	0		
D06			2-99-0-L	CPO WR, WC, SH	23.6	0	0		
D04			01-99-0-Q	UPTAKE AND FAN ROOM	40	0	0		
			1-108-0-Q	UPTAKE	(CUI	= TU)			
S2I		S2I	1-93-0-L	CPO MESS	113.4	0	0		
S2I		S2I	1-99-1-Q	SHIPS OFFICE	48.6	0	0		
S2I		S2U	1-108-1-L	PASSAGE	54	0	0		
S2I		S2U	1-114-0-L	DISPENSARY	73.8	0	0		
S2I		NSU	1-114-2-Q	SCULLERY	88.2	0	0		
S2I	S3U		(none)	(weather bulkhead)	54	0	0	DWT	Z
D06			4-108-0-E	ENGINE ROOM	108	0	0		
S2I			01-99-0-Q	UPTAKE AND FAN ROOM	87.6	0	0		
D04			(none)	(weather overhead)	20.4	0	0		
			1-108-1-L	PASSAGE	(CUI	= LP)			
S2U		S2U	1-52-01C-L	PASSAGE	30.6	0	0	DJ	NC

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
S2U		S2I	1-108-0-Q	UPTAKE	54	0	0		
S2U		S2U	1-114-0-L	DISPENSARY	63	0	0	DJ	NC
000		000	1-121-0-L	CREWS MESS	30.6	0	0		
S2I	S3U		(none)	(weather bulkhead)	117	0	0		
D06			4-108-0-E	ENGINE ROOM	44.2	0	0		
D04			(none)	(weather overhead)	44.2	0	0		
			1-114-0-L	DISPENSARY	(CUI	= LM)			
S2U		S2I	1-108-0-Q	UPTAKE	73.8	0	0		
S2U		S2U	1-108-1-L	PASSAGE	63	0	0	DJ	NC
S2U		NSU	1-114-2-Q	SCULLERY	63	0	0		
S2U		S2U	1-121-0-L	CREWS MESS	73.8	0	0		
D06			4-108-0-E	ENGINE ROOM	57.4	0	0		
D04			(none)	(weather overhead)	57.4	0	0		
			1-114-2-Q	SCULLERY	(CUI	= QG)			
NSU		S2I	1-108-0-Q	UPTAKE	88.2	0	0		
NSU		S2U	1-114-0-L	DISPENSARY	63	0	0		
NSU		S2U	1-121-0-L	CREWS MESS	88.2	0	0	DJ	NO
NSU	S3I		(none)	(weather bulkhead)	63	0	0		
D06			4-108-0-E	ENGINE ROOM	68.6	0	0		
NSU			(none)	(weather overhead)	68.6	0	0		
			1-121-0-L	CREWS MESS	(CUI	= LL)			
000		000	1-108-1-L	PASSAGE	30.6	0	0		
S2U		S2U	1-114-0-L	DISPENSARY	73.8	0	0		
S2U		NSU	1-114-2-Q	SCULLERY	88.2	0	0	DJ	NO
NPU		S2U	1-143-2-L	STAIRWAY	27	0	0		
S2U		S2U	1-143-2-L	STAIRWAY	27	0	0		
S2U		S2U	1-143-2-L	STAIRWAY	63	0	0	DJ	NC
NSU		NSU	1-148-0-Q	GALLEY	45	0	0		
NSU		NSU	1-148-0-Q	GALLEY	27	0	0		
NSU		NSU	1-148-0-Q	GALLEY	72	0	0	DJ	NC
								DJ	NO
S2I	S3U		(none)	(weather bulkhead)	198.2	0	0	DWT	Z
S2I	S3U		(none)	(weather bulkhead)	252	0	0	DWT	Z
S2I	S3U		(none)	(weather bulkhead)	27	0	0	DWT	Z
D06			4-108-0-E	ENGINE ROOM	349.5	0	0		
D06			2-136-0-C	CONTROL BOOTH	85.5	0	0		
D06			2-140-1-Q	ENGINEERS WORKSHOP	33.6	0	0		
D06			2-140-0A-L	PASSAGE	42	0	0		
D06			(none)	(weather overhead)	510.6	0	0		
			1-143-2-L	STAIRWAY	(CUI	= LP)			
S2U		NPU	1-121-0-L	CREWS MESS	27	0	0		
S2U		S2U	1-121-0-L	CREWS MESS	27	0	0		
S2U		S2U	1-121-0-L	CREWS MESS	63	0	0	DJ	NC
S2U		NSU	1-148-0-Q	GALLEY	63	0	0		
D04			2-143-2-L	STAIRWAY	13.8	0	0	HL	Y
D06			2-143-2-Q	ENGINEERING OFFICE	7.2	0	0		
D04			(none)	(weather overhead)	21	0	0		
			1-148-0-Q	GALLEY	(CUI	= QG)			
NSU		NSU	1-121-0-L	CREWS MESS	45	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft²	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
NSU		NSU	1-121-0-L	CREWS MESS	27	0	0		
NSU		NSU	1-121-0-L	CREWS MESS	72	0	0	DJ	NC
								DJ	NO
NSU		S2U	1-143-2-L	STAIRWAY	63	0	0		
000		000	1-159-1-A	DRY STORES	45	0	0		
NSU		S2I	1-159-2-A	DRY PROVISIONS STORE	45	0	0	DJ	NC
NSU	S3I		(none)	(weather bulkhead)	90	0	0		
NSU	S3I		(none)	(weather bulkhead)	117	0	0	DWT	Z
NSU	S3I		(none)	(weather bulkhead)	90	0	0		
D06			2-140-1-Q	ENGINEERS WORKSHOP	76	0	0		
D06			2-140-0B-L	PASSAGE	55	0	0		
D06			2-143-2-Q	ENGINEERING OFFICE	54	0	0		
D06			2-156-0-A	THAW BOX	18	0	0		
D06			2-156-01B-L	PASSAGE	24	0	0		
D06			2-156-1-A	FREEZER BOX	18	0	0		
D04			(none)	(weather overhead)	245	0	0		
			1-159-1-A	DRY STORES	(CUI	= AS)			
000		000	1-148-0-Q	GALLEY	45	0	0		
S2I	S3U		(none)	(weather bulkhead)	21.6	0	0		
S2U	S3U		(none)	(weather bulkhead)	45	0	0		
NSU	S3U		(none)	(weather bulkhead)	21.6	0	0		
D06			2-156-1-A	FREEZER BOX	12	0	0		
D04			(none)	(weather overhead)	12	0	0		
			1-159-2-A	DRY PROVISIONS STORE	(CUI	= AS)			
S2I		NSU	1-148-0-Q	GALLEY	45	0	0	DJ	NC
S2I	S3U		(none)	(weather bulkhead)	45	0	0		
S2I	S3U		(none)	(weather bulkhead)	45	0	0		
S2I	S3U		(none)	(weather bulkhead)	45	0	0		
D06			2-156-01B-L	PASSAGE	25	0	0		
D06			(none)	(weather overhead)	25	0	0		
			01-44-0-L	CO SR	(CUI	= L1)			
NPU		NPU	01-44-1-L	CO CABIN	22.5	0	0		
NPU		NPU	01-44-1-L	CO CABIN	15	0	0		
NPU		NPU	01-44-1-L	CO CABIN	82.5	0	0	DJ	NC
NPU		NSU	01-44-2-L	CO WR, WC, SH	82.5	0	0	DJ	NC
NPU		NSU	01-56-2-L	OFFICER WR, WC, SH	24	0	0		
NPU		NSU	01-56-2-L	OFFICER WR, WC, SH	22.5	0	0		
NPU		NSU	01-56-2-L	OFFICER WR, WC, SH	21	0	0		
A2I	A2U		(none)	(weather bulkhead)	60	0	0		
D06			1-32-0-L	CREW BERTHING	64	0	0		
D04			1-52-0-L	CREW BERTHING	6	0	0		
D06			1-52-2-L	CREW WR, WC, SH	27.6	0	0		
A2I			02-56-2-C	CIC ROOM	10.9	0	0		
A2I			(none)	(weather overhead)	85.4	0	0		
			01-44-1-L	CO CABIN	(CUI	= L1)			
NPU		NPU	01-44-0-L	CO SR	22.5	0	0		
NPU		NPU	01-44-0-L	CO SR	15	0	0		
NPU		NPU	01-44-0-L	CO SR	82.5	0	0	DJ	NC
NPU		NSU	01-56-2-L	OFFICER WR, WC, SH	22.5	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
NPU		NPU	01-59-0-L	OFFICER SR	60	0	0		
NPU		NPU	01-69-0-L	PASSAGE	57	0	0	DJ	NC
NPI	A2U		(none)	(weather bulkhead)	22.5	0	0		
NPI	A2U		(none)	(weather bulkhead)	25.5	0	0		
NPI	A2U		(none)	(weather bulkhead)	153	0	0		
NPI	A2U		(none)	(weather bulkhead)	68.6	0	0		
D06			1-32-0-L	CREW BERTHING	64.8	0	0		
D04			1-52-0-L	CREW BERTHING	89	0	0		
D06			1-52-01A-L	PASSAGE	73.4	0	0		
D06			1-52-1-A	SHIPS SERVICE STORE	2.4	0	0		
D06			1-57-1-A	FWD REPAIR LKR	3.8	0	0		
S2I			1-63-1-Q	FAN ROOM	2.2	0	0		
A2I			02-56-1-C	RADIO ROOM	131.4	0	0		
A2I			(none)	(weather overhead)	104.2	0	0		
			01-44-2-L	CO WR, WC, SH	(CUI	= LW)			
NSU		A2U	3-52-2-M	AMMO HOIST	16.5	0	0		
NSU		A2U	3-52-2-M	AMMO HOIST	37.5	0	0		
NSU		NPU	01-44-0-L	CO SR	82.5	0	0	DJ	NC
NSU		NSU	01-56-2-L	OFFICER WR, WC, SH	15	0	0		
NSU		NSU	01-56-2-L	OFFICER WR, WC, SH	21	0	0		
NSU	A2U		(none)	(weather bulkhead)	48	0	0		
NSU	A2U		(none)	(weather bulkhead)	39.4	0	0		
D06			1-32-0-L	CREW BERTHING	36	0	0		
D06			1-52-2-L	CREW WR, WC, SH	14	0	0		
D04			(none)	(weather overhead)	49.1	0	0		
			01-56-2-L	OFFICER WR, WC, SH	(CUI	= LW)			
NSU		A2U	3-52-2-M	AMMO HOIST	16.5	0	0		
NSU		NPU	01-44-0-L	CO SR	24	0	0		
NSU		NPU	01-44-0-L	CO SR	22.5	0	0		
NSU		NPU	01-44-0-L	CO SR	21	0	0		
NSU		NPU	01-44-1-L	CO CABIN	22.5	0	0		
NSU		NSU	01-44-2-L	CO WR, WC, SH	15	0	0		
NSU		NSU	01-44-2-L	CO WR, WC, SH	21	0	0		
NSU		NPU	01-59-0-L	OFFICER SR	82.5	0	0	DJ	NC
NSU	A2U		(none)	(weather bulkhead)	30	0	0		
D06			1-52-2-L	CREW WR, WC, SH	46.4	0	0		
A2I			02-56-2-C	CIC ROOM	43.1	0	0		
A2I			(none)	(weather overhead)	3.4	0	0		
			01-59-0-L	OFFICER SR	(CUI	= L2)			
NPU		NPU	01-44-1-L	CO CABIN	60	0	0		
NPU		NSU	01-56-2-L	OFFICER WR, WC, SH	82.5	0	0	DJ	NC
A2I		NPU	01-69-0-L	PASSAGE	57	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	37.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	25.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	22.5	0	0		
D04			1-52-0-L	CREW BERTHING	55.8	0	0		
D06			1-52-2-L	CREW WR, WC, SH	22	0	0		
A2U			02-56-2-C	CIC ROOM	77.8	0	0		
			01-69-0-L	PASSAGE	(CUI	= LP)			

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
NPU		NPU	01-44-1-L	CO CABIN	57	0	0	DJ	NC
NPU		A2I	01-59-0-L	OFFICER SR	57	0	0	DJ	NC
NPU		A2U	01-72-0-L	XO SR	22.5	0	0		
NPU		A2U	01-72-0-L	XO SR	37.5	0	0		
NPU		A2U	01-72-0-L	XO SR	30	0	0	DJ	NC
NPU		A2U	01-72-01-L	OPS OFFICER SR	39	0	0	DJ	NC
NPU		A2U	01-72-01-L	OPS OFFICER SR	37.5	0	0		
NPU		A2U	01-72-01-L	OPS OFFICER SR	22.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	60	0	0	DWT	Z
A2I	A2U		(none)	(weather bulkhead)	60	0	0	DWT	Z
D04			1-52-0-L	CREW BERTHING	43.8	0	0		
D06			1-52-01A-L	PASSAGE	4.6	0	0	HO	O
D06			1-52-01B-L	PASSAGE	13.2	0	0		
D04			1-72-2-Q	SUPPLY OFFICE	13.8	0	0		
A2U			02-56-1-C	RADIO ROOM	37.8	0	0		
A2U			02-56-2-C	CIC ROOM	7.6	0	0		
A2U			02-69-2-L	PASSAGE	24.2	0	0		
A2U			02-69-4-L	VESTIBULE	6	0	0		
			01-72-0-L	XO SR	(CUI	= L1)			
A2U		NPU	01-69-0-L	PASSAGE	22.5	0	0		
A2U		NPU	01-69-0-L	PASSAGE	37.5	0	0		
A2U		NPU	01-69-0-L	PASSAGE	30	0	0	DJ	NC
NPU		NPU	01-72-01-L	OPS OFFICER SR	52.5	0	0		
NPU		NPU	01-72-01-L	OPS OFFICER SR	4.5	0	0		
NPU		NPU	01-72-01-L	OPS OFFICER SR	60	0	0		
A2U		A2I	01-89-2-A	EQPT LKR	27	0	0		
NPI		NSU	01-87-0-L	XO WR, WC, SH	15	0	0		
NPI		NSU	01-87-0-L	XO WR, WC, SH	30	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	90	0	0		
D06			1-52-01B-L	PASSAGE	22.6	0	0		
D04			1-72-0-A	REPAIR ANNEX	2.8	0	0		
D04			1-72-2-Q	SUPPLY OFFICE	15.6	0	0		
D06			1-80-0-L	WARDROOM	60.4	0	0		
A2U			02-69-2-L	PASSAGE	48.6	0	0		
A2U			02-81-2-Q	FAN ROOM	52.8	0	0		
			01-72-01-L	OPS OFFICER SR	(CUI	= L1)			
A2U		NPU	01-69-0-L	PASSAGE	39	0	0	DJ	NC
A2U		NPU	01-69-0-L	PASSAGE	37.5	0	0		
A2U		NPU	01-69-0-L	PASSAGE	22.5	0	0		
NPU		NPU	01-72-0-L	XO SR	52.5	0	0		
NPU		NPU	01-72-0-L	XO SR	4.5	0	0		
NPU		NPU	01-72-0-L	XO SR	60	0	0		
NPI		NSU	01-87-0-L	XO WR, WC, SH	15	0	0		
NPI		NSU	01-87-1-L	OPS OFFICER WR, WC,	42	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	75	0	0		
D06			1-52-01B-L	PASSAGE	27.6	0	0		
D06			1-52-01C-L	PASSAGE	27	0	0		
D04			1-72-0-A	REPAIR ANNEX	21.2	0	0		
D06			1-80-0-L	WARDROOM	28	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
A2U			02-56-1-C	RADIO ROOM	30.6	0	0		
A2U			02-69-2-L	PASSAGE	4.8	0	0		
A2U			02-78-1-Q	ELEC LAB AND STORAGE	68.4	0	0		
			01-89-2-A	EQPT LKR	(CUI	= AG)			
A2I		A2U	01-72-0-L	XO SR	27	0	0		
A2I		NSU	01-87-0-L	XO WR, WC, SH	22.5	0	0		
A2U		A2I	01-92-0-Q	HELO SERVICE	27	0	0		
A2I	A2U		(none)	(weather bulkhead)	22.5	0	0	DJ	NC
D06			1-80-0-L	WARDROOM	10.8	0	0		
A2I			02-81-2-Q	FAN ROOM	3.6	0	0		
A2I			02-90-0-Q	PLENUM ROOM	7.2	0	0		
			01-87-0-L	XO WR, WC, SH	(CUI	= LW)			
NSU		NPI	01-72-0-L	XO SR	15	0	0		
NSU		NPI	01-72-0-L	XO SR	30	0	0	DJ	NC
NSU		NPI	01-72-01-L	OPS OFFICER SR	15	0	0		
NSU		A2I	01-89-2-A	EQPT LKR	22.5	0	0		
NSU		NSU	01-87-1-L	OPS OFFICER WR, WC,	37.5	0	0		
NSU		A2I	01-92-0-Q	HELO SERVICE	45	0	0		
D06			1-80-0-L	WARDROOM	30	0	0		
A2I			02-78-1-Q	ELEC LAB AND STORAGE	10	0	0		
A2I			02-81-2-Q	FAN ROOM	12	0	0		
A2I			02-90-0-Q	PLENUM ROOM	8	0	0		
			01-87-1-L	OPS OFFICER WR, WC, SH	(CUI	= LW)			
NSU		NPI	01-72-01-L	OPS OFFICER SR	42	0	0	DJ	NC
NSU		NSU	01-87-0-L	XO WR, WC, SH	37.5	0	0		
NSU		A2I	01-92-0-Q	HELO SERVICE	42	0	0		
NSU	A2U		(none)	(weather bulkhead)	37.5	0	0		
D06			1-52-01C-L	PASSAGE	8.4	0	0		
D06			1-80-0-L	WARDROOM	19.6	0	0		
A2I			02-78-1-Q	ELEC LAB AND STORAGE	28	0	0		
			01-92-0-Q	HELO SERVICE	(CUI	= QA)			
A2I		A2U	01-89-2-A	EQPT LKR	27	0	0		
A2I		NSU	01-87-0-L	XO WR, WC, SH	45	0	0		
A2I		NSU	01-87-1-L	OPS OFFICER WR, WC,	42	0	0		
A2U		A2I	01-99-0-Q	UPTAKE AND FAN ROOM	109.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	52.7	0	0		
A2I	A2U		(none)	(weather bulkhead)	52.5	0	0	DJ	NC
D06			1-52-01C-L	PASSAGE	16.9	0	0		
D06			1-80-0-L	WARDROOM	59.2	0	0		
D06			1-93-0-L	CPO MESS	28.2	0	0		
A2I			02-90-0-Q	PLENUM ROOM	104.3	0	0		
			01-99-0-Q	UPTAKE AND FAN ROOM	(CUI	= TU)			
A2I		A2U	01-92-0-Q	HELO SERVICE	109.5	0	0		
A2U		A2I	02-90-0-Q	PLENUM ROOM	116.8	0	0		
A2I	A2U		(none)	(weather bulkhead)	109.5	0	0		
A2I	A2U		(none)	(weather bulkhead)	112.5	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	112.5	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	116.8	0	0		
A2I	A2U		(none)	(weather bulkhead)	120	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
A2I	A2U		(none)	(weather bulkhead)	120	0	0		
D06			1-52-01C-L	PASSAGE	13.1	0	0		
D06			1-93-0-L	CPO MESS	78.3	0	0		
D04			1-99-1-Q	SHIPS OFFICE	40	0	0		
S2I			1-108-0-Q	UPTAKE	87.6	0	0		
A2I			(none)	(weather overhead)	219	0	0		
			02-56-1-C	RADIO ROOM	(CUI	= C)			
A2U		A2U	02-56-2-C	CIC ROOM	128	0	0		
A2I		A2U	02-69-2-L	PASSAGE	64	0	0	DJ	NC
A2I		A2U	02-78-1-Q	ELEC LAB AND STORAGE	60.8	0	0		
A2I	A2U		(none)	(weather bulkhead)	139.7	0	0		
A2I	A2U		(none)	(weather bulkhead)	80	0	0		
A2I	A2U		(none)	(weather bulkhead)	70.4	0	0		
A2I	A2U		(none)	(weather bulkhead)	64	0	0		
A2I			01-44-1-L	CO CABIN	131.4	0	0		
A2U			01-69-0-L	PASSAGE	37.8	0	0		
A2U			01-72-01-L	OPS OFFICER SR	30.6	0	0		
A2I			03-62-0-C	PILOT HOUSE	155	0	0		
A2I			(none)	(weather overhead)	119	0	0		
			02-56-2-C	CIC ROOM	(CUI	= C)			
A2U		A2U	02-56-1-C	RADIO ROOM	128	0	0		
A2I		A2U	02-69-2-L	PASSAGE	36.8	0	0		
A2I		A2U	02-69-4-L	VESTIBULE	24	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	139.7	0	0		
A2I	A2U		(none)	(weather bulkhead)	80	0	0		
A2I	A2U		(none)	(weather bulkhead)	70.4	0	0		
A2I			01-44-0-L	CO SR	10.9	0	0		
A2I			01-56-2-L	OFFICER WR, WC, SH	43.1	0	0		
A2U			01-59-0-L	OFFICER SR	77.8	0	0		
A2U			01-69-0-L	PASSAGE	7.6	0	0		
A2I			03-62-0-C	PILOT HOUSE	99	0	0		
A2I			(none)	(weather overhead)	114.2	0	0		
			02-69-2-L	PASSAGE	(CUI	= LP)			
A2U		A2I	02-56-1-C	RADIO ROOM	64	0	0	DJ	NC
A2U		A2I	02-56-2-C	CIC ROOM	36.8	0	0		
A2U		A2U	02-69-4-L	VESTIBULE	24	0	0		
A2U		A2U	02-69-4-L	VESTIBULE	16	0	0	DJ	NC
A2U		A2U	02-78-1-Q	ELEC LAB AND STORAGE	24	0	0	DJ	NC
A2U		A2I	02-81-2-Q	FAN ROOM	60.8	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	72	0	0		
A2U			01-69-0-L	PASSAGE	24.2	0	0		
A2U			01-72-0-L	XO SR	48.6	0	0		
A2U			01-72-01-L	OPS OFFICER SR	4.8	0	0		
A2I			03-62-0-C	PILOT HOUSE	58.2	0	0		
A2I			(none)	(weather overhead)	19.4	0	0		
			02-69-4-L	VESTIBULE	(CUI	= LP)			
A2U		A2I	02-56-2-C	CIC ROOM	24	0	0	DJ	NC
A2U		A2U	02-69-2-L	PASSAGE	24	0	0		
A2U		A2U	02-69-2-L	PASSAGE	16	0	0	DJ	NC

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
A2I	A2U		(none)	(weather bulkhead)	16	0	0		
A2U			01-69-0-L	PASSAGE	6	0	0		
A2I			03-62-0-C	PILOT HOUSE	4.8	0	0	HO	O
			02-78-1-Q	ELEC LAB AND STORAGE	(CUI	= QS)			
A2U		A2I	02-56-1-C	RADIO ROOM	60.8	0	0		
A2U		A2U	02-69-2-L	PASSAGE	24	0	0	DJ	NC
A2U		A2I	02-81-2-Q	FAN ROOM	72	0	0		
A2U		A2I	02-90-0-Q	PLENUM ROOM	16	0	0		
A2U		A2I	02-90-0-Q	PLENUM ROOM	60.8	0	0		
A2I	A2U		(none)	(weather bulkhead)	112	0	0		
A2U			01-72-01-L	OPS OFFICER SR	68.4	0	0		
A2I			01-87-0-L	XO WR, WC, SH	10	0	0		
A2I			01-87-1-L	OPS OFFICER WR, WC,	28	0	0		
A2I			03-62-0-C	PILOT HOUSE	7	0	0		
A2I			(none)	(weather overhead)	99.4	0	0		
			02-81-2-Q	FAN ROOM	(CUI	= QF)			
A2I		A2U	02-69-2-L	PASSAGE	60.8	0	0	DJ	NC
A2I		A2U	02-78-1-Q	ELEC LAB AND STORAGE	72	0	0		
A2U		A2I	02-90-0-Q	PLENUM ROOM	60.8	0	0	DWT	X
A2I	A2U		(none)	(weather bulkhead)	72	0	0		
A2U			01-72-0-L	XO SR	52.8	0	0		
A2I			01-89-2-A	EQPT LKR	3.6	0	0		
A2I			01-87-0-L	XO WR, WC, SH	12	0	0		
A2I			(none)	(weather overhead)	68.4	0	0		
			02-90-0-Q	PLENUM ROOM	(CUI	= QF)			
A2I		A2U	01-99-0-Q	UPTAKE AND FAN ROOM	116.8	0	0		
A2I		A2U	02-78-1-Q	ELEC LAB AND STORAGE	16	0	0		
A2I		A2U	02-78-1-Q	ELEC LAB AND STORAGE	60.8	0	0		
A2I		A2U	02-81-2-Q	FAN ROOM	60.8	0	0	DWT	X
A2I	A2U		(none)	(weather bulkhead)	56.2	0	0		
A2I	A2U		(none)	(weather bulkhead)	72	0	0		
A2I			01-89-2-A	EQPT LKR	7.2	0	0		
A2I			01-87-0-L	XO WR, WC, SH	8	0	0		
A2I			01-92-0-Q	HELO SERVICE	104.3	0	0		
A2I			(none)	(weather overhead)	119.5	0	0		
			03-62-0-C	PILOT HOUSE	(CUI	= C)			
A2I	A2U		(none)	(weather bulkhead)	112	0	0		
A2I	A2U		(none)	(weather bulkhead)	72	0	0		
A2I	A2U		(none)	(weather bulkhead)	32	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	56	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	93.6	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	93.6	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	56	0	0	DJ	NC
A2I	A2U		(none)	(weather bulkhead)	32	0	0	DJ	NC
								DWT	Z
A2I	A2U		(none)	(weather bulkhead)	72	0	0		
A2I			02-56-1-C	RADIO ROOM	155	0	0		
A2I			02-56-2-C	CIC ROOM	99	0	0		
A2I			02-69-2-L	PASSAGE	58.2	0	0		

Table B.2 Barrier Data

Barrier Materials				Compartment	Area ft^2	Therm adj	Durab adj	Door/ Hatch	Read
<1>	<2>	<3>							
A2I			02-69-4-L	VESTIBULE	4.8	0	0	HO	O
A2I			02-78-1-Q	ELEC LAB AND STORAGE	7	0	0		
A2I			(none)	(weather overhead)	324	0	0		

Table B.2.1 SAFE Provided Barrier Materials (attachment)

ID	Descripton	Structural or Non	Thickness Inches	Density lb/ft^3	Spec Ht BTU/lb.F°	Therm.Cond BTU/min.ft.F°	Ht Rel %	Tbar X-1 kBTU/min.ft^2	Tbar X-2 kBTU/min.ft^2	Tbar X-3 kBTU/min.ft^2	Dbar X-1 kBTU/min.ft^2	Dbar X-2 kBTU/min.ft^2	Dbar X-3 kBTU/min.ft^2
000	Zero-strength (includes screening and grating)	N	0.000	0	0.000	96.29	100	0	0	0	0	0	0
A2I	1/4" Aluminum with thermal insulation	S	2.000	162	0.048	0.05	5	3	6	10	3	6	10
A2U	1/4" Aluminum	S	0.250	166	0.230	1.22	15	0	2	4	4	6	10
C5U	5/8" Celotex (overhead: below crawl space layer)	N	0.625	1	0.167	0.00	25	1	3	4	1	3	4
F2U	1/4" Fiberglass Toilet/Shower Enclosure	N	0.250	86	0.229	0.00	35	2	5	7	25	35	40
NPI	Nomex honeycomb core - plastic laminate & insulation	N	2.000	3	0.289	0.00	30	2	8	10	9	18	22
NPU	Nomex honeycomb core - plastic laminate facing	N	0.625	3	0.289	0.00	30	2	6	14	3	12	20
NSU	Nomex honeycomb core - stainless steel facing	N	0.625	3	0.289	0.00	25	8	20	30	55	80	105
P7P	7/8" Plywood - plastic laminate facing, both sides	N	0.875	34	0.290	0.00	15	6	12	21	10	20	27
S2I	1/4" Steel with thermal insulation	S	2.000	487	0.024	0.01	5	5	15	18	75	100	120
S2U	1/4" Steel	S	0.250	490	0.119	0.44	5	1	4	10	60	80	100
S3I	3/8" Steel with thermal insulation	S	2.000	487	0.024	0.01	5	6	18	20	80	110	130
S3U	3/8" Steel	S	0.375	490	0.119	0.44	5	1	4	10	65	85	105
S4I	1/2" Steel with thermal insulation	S	2.000	487	0.024	0.01	5	6	18	20	80	110	130
S4U	1/2" Steel	S	0.500	490	0.119	0.44	5	2	5	12	70	90	110
S5U	5/8" Steel	S	0.625	490	0.119	0.44	5	2	5	12	75	95	115

Table B.3 Fire Safety Objectives

Plan ID	Compartment Name	MAL Rating	FAL (Years)	FREQ EB
CUI=AG (Gear Locker)				
3-12-0-Q	CHAIN LKR	3	12	0.0010
2-52-02-A	CLEANING GEAR LKR	4	8	0.0010
2-75-1-A	WARDROBE	3	16	0.0010
2-78-0-A	HS STORES	3	18	0.0010
2-78-2-A	REC LKR	3	12	0.0010
2-180-2-A	REPAIR PARTY LKR	3	18	0.0010
1-20-2-A	GENERAL STORES	2	25	0.0010
1-52-1-A	SHIPS SERVICE STORE	3	12	0.0010
1-57-1-A	FWD REPAIR LKR	3	18	0.0010
1-72-0-A	REPAIR ANNEX	3	12	0.0010
01-89-2-A	EQPT LKR	3	16	0.0010
CUI=AR (Refrigerated Storage)				
2-156-0-A	THAW BOX	2	23	0.0009
2-156-1-A	FREEZER BOX	2	23	0.0009
2-164-2-A	CHILL BOX	2	23	0.0009
CUI=AS (Storeroom)				
4-32-0-A	STOREROOM	2	21	0.0009
4-143-0-A	ENGINEERS STOREROOM	2	25	0.0009
2-16-0-A	BOSUN'S STORES	2	23	0.0009
2-156-02-A	DRY PROVISIONS STOREROOM	2	23	0.0009
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	2	22	0.0009
1-1-0-A	GENERAL STORES	2	25	0.0009
1-12-0-A	BOSUN'S STORES	2	23	0.0009
1-159-1-A	DRY STORES	2	23	0.0009
1-159-2-A	DRY PROVISIONS STORE	2	23	0.0009
CUI=C (Ship Control/Communications)				
3-72-0-C	IC AND GYRO ROOM	2	26	0.0012
2-136-0-C	CONTROL BOOTH	2	26	0.0012
02-56-1-C	RADIO ROOM	2	26	0.0012
02-56-2-C	CIC ROOM	2	26	0.0012
03-62-0-C	PILOT HOUSE	2	26	0.0012
CUI=EM (Main Propulsion - Mechanical)				
4-108-0-E	ENGINE ROOM	2	26	0.0272
CUI=K (Hazardous Material Storage)				
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	1	30	0.0013
CUI=L1 (Senior Officer's Cabin)				
2-72-1-L	ENGINEERING OFFICER SR	3	14	0.0008
01-44-0-L	CO SR	3	14	0.0008
01-44-1-L	CO CABIN	3	14	0.0008
01-72-0-L	XO SR	3	14	0.0008
01-72-01-L	OPS OFFICER SR	3	14	0.0008
CUI=L2 (Officer/CPO Quarters)				
2-72-4-L	OFFICER SR	3	14	0.0008

Table B.3 Fire Safety Objectives

Plan ID	Compartment Name	MAL Rating	FAL (Years)	FREQ EB
2-84-1-L	OFFICER SR	3	14	0.0008
2-84-2-L	OFFICER SR	3	14	0.0008
2-96-1-L	CPO STATEROOM	3	14	0.0008
2-96-2-L	CPO STATEROOM	3	14	0.0008
01-59-0-L	OFFICER SR	3	14	0.0008
CUI=L5 (Crews Berthing)				
2-32-01-L	CREW BERTHING	3	14	0.0008
2-52-01-L	CREW BERTHING	3	14	0.0008
1-32-0-L	CREW BERTHING	3	14	0.0008
1-52-0-L	CREW BERTHING	3	14	0.0008
CUI=LL (Wardroom/Mess/Lounge Areas)				
1-80-0-L	WARDROOM	2	24	0.0008
1-93-0-L	CPO MESS	2	24	0.0008
1-121-0-L	CREWS MESS	2	24	0.0008
CUI=LM (Medical/Dental Spaces)				
1-114-0-L	DISPENSARY	2	22	0.0004
CUI=LP (Passageway/Staircase/Vestibule)				
4-52-01-L	HANDLING PASSAGE	3	17	0.0001
2-76-0A-L	PASSAGE	3	17	0.0001
2-76-0B-L	PASSAGE	3	17	0.0001
2-96-0-L	PASSAGE	3	17	0.0001
2-140-0A-L	PASSAGE	3	17	0.0001
2-140-0B-L	PASSAGE	3	17	0.0001
2-143-2-L	STAIRWAY	3	17	0.0001
2-156-01A-L	PASSAGE	3	17	0.0001
2-156-01B-L	PASSAGE	3	17	0.0001
2-156-01C-L	PASSAGE	3	17	0.0001
2-172-0-L	PASSAGE	3	17	0.0001
1-52-01A-L	PASSAGE	3	17	0.0001
1-52-01B-L	PASSAGE	3	17	0.0001
1-52-01C-L	PASSAGE	3	17	0.0001
1-108-1-L	PASSAGE	3	17	0.0001
1-143-2-L	STAIRWAY	3	17	0.0001
01-69-0-L	PASSAGE	3	17	0.0001
02-69-2-L	PASSAGE	3	17	0.0001
02-69-4-L	VESTIBULE	3	17	0.0001
CUI=LW (Sanitary Spaces)				
2-32-0-L	CREW WR, WC, SH	4	8	0.0002
2-52-0-L	CREW WR, WC, SH	4	8	0.0002
2-72-0-L	OFFICER WR, WC, SH	4	8	0.0002
2-72-2-L	OFFICER WR, WC, SH	4	8	0.0002
2-88-1-L	OFFICER WR, WC, SH	4	8	0.0002
2-88-2-L	OFFICER WR, WC, SH	4	8	0.0002
2-99-0-L	CPO WR, WC, SH	4	8	0.0002

Table B.3 Fire Safety Objectives

Plan ID	Compartment Name	MAL Rating	FAL (Years)	FREQ EB
1-20-4-Q	DECON SHWR	3	17	0.0002
1-52-2-L	CREW WR, WC, SH	4	8	0.0002
01-44-2-L	CO WR, WC, SH	4	8	0.0002
01-56-2-L	OFFICER WR, WC, SH	4	8	0.0002
01-87-0-L	XO WR, WC, SH	4	8	0.0002
01-87-1-L	OPS OFFICER WR, WC, SH	4	8	0.0002
CUI=QA (Aux Machinery Spaces)				
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	2	26	0.0029
3-96-0-E	AUX MACHINERY ROOM	2	26	0.0029
4-156-0-E	AUX MACHINERY SPACE	2	26	0.0029
4-188-0-E	STEERING GEAR ROOM	2	26	0.0029
01-92-0-Q	HELO SERVICE	2	22	0.0029
CUI=QF (Fan Room)				
1-63-1-Q	FAN ROOM	3	18	0.0004
1-63-2-Q	FAN ROOM	3	18	0.0004
02-81-2-Q	FAN ROOM	3	18	0.0004
02-90-0-Q	PLENUM ROOM	3	18	0.0004
CUI=QG (Galley/Pantry/Scullery)				
1-114-2-Q	SCULLERY	2	20	0.0026
1-148-0-Q	GALLEY	2	20	0.0026
CUI=QL (Laundry)				
1-20-0-Q	LAUNDRY	3	19	0.0031
CUI=QO (Office Spaces)				
2-143-2-Q	ENGINEERING OFFICE	2	22	0.0004
1-72-2-Q	SUPPLY OFFICE	2	22	0.0004
1-99-1-Q	SHIPS OFFICE	2	22	0.0004
CUI=QS (Shops)				
2-140-1-Q	ENGINEERS WORKSHOP	3	19	0.0018
2-172-2-Q	ELECTRIC WORKSHOP	3	19	0.0018
02-78-1-Q	ELEC LAB AND STORAGE	3	19	0.0018
CUI=TH (Trunks/Hoists/Dumbwaiters)				
3-52-2-M	AMMO HOIST	3	18	0.0001
CUI=TU (Stacks/Engine Uptakes)				
1-108-0-Q	UPTAKE	2	23	0.0013
01-99-0-Q	UPTAKE AND FAN ROOM	2	23	0.0013

Table B.4 Fire Detection

Plan ID	Compartment Name	Detection Systems		% Time Monitored		Est. Min. to Detect.	
		Quantity	Type	at Sea	in Port	at Sea	in Port
CUI=AG (Gear Locker)							
3-12-0-Q	CHAIN LKR	None		50	40	6	8
2-52-02-A	CLEANING GEAR LKR	None		50	40	6	8
2-75-1-A	WARDROBE	None		50	40	6	8
2-78-0-A	HS STORES	None		50	40	6	8
2-78-2-A	REC LKR	None		50	40	6	8
2-180-2-A	REPAIR PARTY LKR	None		50	40	6	8
1-20-2-A	GENERAL STORES	None		50	40	6	8
1-52-1-A	SHIPS SERVICE STORE	None		50	40	6	8
1-57-1-A	FWD REPAIR LKR	None		50	40	6	8
1-72-0-A	REPAIR ANNEX	None		50	40	6	8
01-89-2-A	EQPT LKR	None		50	40	6	8
CUI=AR (Refrigerated Storage)							
2-156-0-A	THAW BOX	None		50	40	6	8
2-156-1-A	FREEZER BOX	None		50	40	6	8
2-164-2-A	CHILL BOX	None		50	40	6	8
CUI=AS (Storeroom)							
4-32-0-A	STOREROOM	1	SMO	50	40	6	8
4-143-0-A	ENGINEERS STOREROOM	1	SMO	50	40	6	8
2-16-0-A	BOSUN'S STORES	1	SMO	50	40	6	8
2-156-02-A	DRY PROVISIONS STOREROOM	1	SMO	50	40	6	8
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	1	SMO	50	40	6	8
1-1-0-A	GENERAL STORES	None		50	40	6	8
1-12-0-A	BOSUN'S STORES	None		50	40	6	8
1-159-1-A	DRY STORES	None		50	40	6	8
1-159-2-A	DRY PROVISIONS STORE	None		50	40	6	8
CUI=C (Ship Control/Communications)							
3-72-0-C	IC AND GYRO ROOM	1	SMO	70	70	2	2
2-136-0-C	CONTROL BOOTH	1	SMO	100	100	1	1
02-56-1-C	RADIO ROOM	2	SMO	80	80	1	1
02-56-2-C	CIC ROOM	1	SMO	70	70	2	2
03-62-0-C	PILOT HOUSE	1	SMO	100	100	1	1
CUI=EM (Main Propulsion - Mechanical)							
4-108-0-E	ENGINE ROOM	4	SMO	80	80	1	1
CUI=K (Hazardous Material Storage)							
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	1	TMP	70	70	2	2
CUI=L1 (Senior Officer's Cabin)							
2-72-1-L	ENGINEERING OFFICER SR	1	SMO	70	70	2	2
01-44-0-L	CO SR	1	SMO	70	70	2	2
01-44-1-L	CO CABIN	1	SMO	70	70	2	2
01-72-0-L	XO SR	1	SMO	70	70	2	2
01-72-01-L	OPS OFFICER SR	1	SMO	70	70	2	2
CUI=L2 (Officer/CPO Quarters)							
2-72-4-L	OFFICER SR	1	SMO	70	70	2	2
2-84-1-L	OFFICER SR	1	SMO	70	70	2	2
2-84-2-L	OFFICER SR	1	SMO	70	70	2	2
2-96-1-L	CPO STATEROOM	1	SMO	70	70	2	2

Table B.4 Fire Detection

Plan ID	Compartment Name	Detection Systems		% Time Monitored		Est. Min. to Detect.	
		Quantity	Type	at Sea	in Port	at Sea	in Port
2-96-2-L	CPO STATEROOM	1	SMO	70	70	2	2
01-59-0-L	OFFICER SR	1	SMO	70	70	2	2
CUI=L5 (Crews Berthing)							
2-32-01-L	CREW BERTHING	1	SMO	80	80	1	1
2-52-01-L	CREW BERTHING	2	SMO	80	80	1	1
1-32-0-L	CREW BERTHING	1	SMO	80	70	1	2
1-52-0-L	CREW BERTHING	1	SMO	80	70	1	2
CUI=LL (Wardroom/Mess/Lounge Areas)							
1-80-0-L	WARDROOM	1	SMO	70	70	2	2
1-93-0-L	CPO MESS	1	SMO	70	70	2	2
1-121-0-L	CREWS MESS	2	SMO	80	80	1	1
CUI=LM (Medical/Dental Spaces)							
1-114-0-L	DISPENSARY	1	SMO	60	50	4	6
CUI=LP (Passageway/Staircase/Vestibule)							
4-52-01-L	HANDLING PASSAGE	1	TMP	60	50	4	6
2-76-0A-L	PASSAGE	None		60	50	4	6
2-76-0B-L	PASSAGE	None		60	50	4	6
2-96-0-L	PASSAGE	None		60	50	4	6
2-140-0A-L	PASSAGE	None		60	50	4	6
2-140-0B-L	PASSAGE	None		60	50	4	6
2-143-2-L	STAIRWAY	None		60	50	4	6
2-156-01A-L	PASSAGE	None		70	70	2	2
2-156-01B-L	PASSAGE	None		70	70	2	2
2-156-01C-L	PASSAGE	None		70	70	2	2
2-172-0-L	PASSAGE	None		60	50	4	6
1-52-01A-L	PASSAGE	None		60	50	4	6
1-52-01B-L	PASSAGE	None		60	50	4	6
1-52-01C-L	PASSAGE	None		60	50	4	6
1-108-1-L	PASSAGE	None		60	50	4	6
1-143-2-L	STAIRWAY	None		60	50	4	6
01-69-0-L	PASSAGE	None		60	50	4	6
02-69-2-L	PASSAGE	None		60	50	4	6
02-69-4-L	VESTIBULE	None		60	50	4	6
CUI=LW (Sanitary Spaces)							
2-32-0-L	CREW WR, WC, SH	None		60	50	4	6
2-52-0-L	CREW WR, WC, SH	None		60	50	4	6
2-72-0-L	OFFICER WR, WC, SH	None		60	50	4	6
2-72-2-L	OFFICER WR, WC, SH	None		60	50	4	6
2-88-1-L	OFFICER WR, WC, SH	None		60	50	4	6
2-88-2-L	OFFICER WR, WC, SH	None		60	50	4	6
2-99-0-L	CPO WR, WC, SH	None		60	50	4	6
1-20-4-Q	DECON SHWR	None		60	50	4	6
1-52-2-L	CREW WR, WC, SH	None		60	50	4	6
01-44-2-L	CO WR, WC, SH	None		60	50	4	6
01-56-2-L	OFFICER WR, WC, SH	None		60	50	4	6
01-87-0-L	XO WR, WC, SH	None		60	50	4	6
01-87-1-L	OPS OFFICER WR, WC, SH	None		60	50	4	6
CUI=QA (Aux Machinery Spaces)							

Table B.4 Fire Detection

Plan ID	Compartment Name	Detection Systems		% Time Monitored		Est. Min. to Detect.	
		Quantity	Type	at Sea	in Port	at Sea	in Port
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	1	SMO	60	50	4	6
3-96-0-E	AUX MACHINERY ROOM	1	SMO	40	40	8	8
4-156-0-E	AUX MACHINERY SPACE	1	SMO	60	50	4	6
4-188-0-E	STEERING GEAR ROOM	1	SMO	60	50	4	6
01-92-0-Q	HELO SERVICE	1	SMO	70	70	2	2
CUI=QF (Fan Room)							
1-63-1-Q	FAN ROOM	None		50	40	6	8
1-63-2-Q	FAN ROOM	None		50	40	6	8
02-81-2-Q	FAN ROOM	None		50	40	6	8
02-90-0-Q	PLENUM ROOM	None		50	40	6	8
CUI=QG (Galley/Pantry/Scullery)							
1-114-2-Q	SCULLERY	1	SMO	70	70	2	2
1-148-0-Q	GALLEY	1	SMO	70	70	2	2
CUI=QL (Laundry)							
1-20-0-Q	LAUNDRY	1	SMO	70	70	2	2
CUI=QO (Office Spaces)							
2-143-2-Q	ENGINEERING OFFICE	1	SMO	70	70	2	2
1-72-2-Q	SUPPLY OFFICE	1	SMO	70	70	2	2
1-99-1-Q	SHIPS OFFICE	1	SMO	70	70	2	2
CUI=QS (Shops)							
2-140-1-Q	ENGINEERS WORKSHOP	1	SMO	60	60	4	4
2-172-2-Q	ELECTRIC WORKSHOP	None		60	60	4	4
02-78-1-Q	ELEC LAB AND STORAGE	1	SMO	60	60	4	4
CUI=TH (Trunks/Hoists/Dumbwaiters)							
3-52-2-M	AMMO HOIST	None		50	40	6	8
CUI=TU (Stacks/Engine Uptakes)							
1-108-0-Q	UPTAKE	None		50	40	6	8
01-99-0-Q	UPTAKE AND FAN ROOM	None		50	40	6	8

Table B.5 Automated and Manual Fire Protection Systems

Plan ID	Compartment Name	Automated Systems	Manual Firefighting Equipment		
			Portable Extinguishers	3 % AFFF	Fire Main
CUI=AG (Gear Locker)					
3-12-0-Q	CHAIN LKR				
2-52-02-A	CLEANING GEAR LKR				
2-75-1-A	WARDROBE				
2-78-0-A	HS STORES				
2-78-2-A	REC LKR				
2-180-2-A	REPAIR PARTY LKR		2 CO2		
			1 PKP		
1-20-2-A	GENERAL STORES				
1-52-1-A	SHIPS SERVICE STORE				
1-57-1-A	FWD REPAIR LKR		1 PKP		
1-72-0-A	REPAIR ANNEX		2 CO2		
01-89-2-A	EQPT LKR				
CUI=AR (Refrigerated Storage)					
2-156-0-A	THAW BOX				
2-156-1-A	FREEZER BOX				
2-164-2-A	CHILL BOX				
CUI=AS (Storeroom)					
4-32-0-A	STOREROOM				
4-143-0-A	ENGINEERS STOREROOM				
2-16-0-A	BOSUN'S STORES		1 PKP		
2-156-02-A	DRY PROVISIONS STOREROOM				
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE		2 CO2		
			1 PKP		
1-1-0-A	GENERAL STORES				
1-12-0-A	BOSUN'S STORES				
1-159-1-A	DRY STORES				
1-159-2-A	DRY PROVISIONS STORE				
CUI=C (Ship Control/Communications)					
3-72-0-C	IC AND GYRO ROOM				
2-136-0-C	CONTROL BOOTH		1 CO2		
			1 PKP		
02-56-1-C	RADIO ROOM		2 CO2		
02-56-2-C	CIC ROOM				
03-62-0-C	PILOT HOUSE				
CUI=EM (Main Propulsion - Mechanical)					
4-108-0-E	ENGINE ROOM	1 A3F			
			4 CO2		
			4 PKP		
					2 SW
CUI=K (Hazardous Material Storage)					
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	1 CO2			
			1 PKP		
CUI=L1 (Senior Officer's Cabin)					
2-72-1-L	ENGINEERING OFFICER SR				
01-44-0-L	CO SR				
01-44-1-L	CO CABIN				

Table B.5 Automated and Manual Fire Protection Systems

Plan ID	Compartment Name	Automated Systems	Manual Firefighting Equipment		
			Portable Extinguishers	3 % AFFF	Fire Main
01-72-0-L	XO SR				
01-72-01-L	OPS OFFICER SR				
CUI=L2 (Officer/CPO Quarters)					
2-72-4-L	OFFICER SR				
2-84-1-L	OFFICER SR				
2-84-2-L	OFFICER SR				
2-96-1-L	CPO STATEROOM				
2-96-2-L	CPO STATEROOM				
01-59-0-L	OFFICER SR				
CUI=L5 (Crews Berthing)					
2-32-01-L	CREW BERTHING				
2-52-01-L	CREW BERTHING		1 PKP		
					1 SW
1-32-0-L	CREW BERTHING				
1-52-0-L	CREW BERTHING				
CUI=LL (Wardroom/Mess/Lounge Areas)					
1-80-0-L	WARDROOM				
1-93-0-L	CPO MESS				
1-121-0-L	CREWS MESS				
CUI=LM (Medical/Dental Spaces)					
1-114-0-L	DISPENSARY				
CUI=LP (Passageway/Staircase/Vestibule)					
4-52-01-L	HANDLING PASSAGE	1 W			
			2 CO2		
2-76-0A-L	PASSAGE				
2-76-0B-L	PASSAGE				
2-96-0-L	PASSAGE				
2-140-0A-L	PASSAGE				
2-140-0B-L	PASSAGE				
2-143-2-L	STAIRWAY				
2-156-01A-L	PASSAGE				
2-156-01B-L	PASSAGE				
2-156-01C-L	PASSAGE				
2-172-0-L	PASSAGE		1 CO2		
			1 PKP		
1-52-01A-L	PASSAGE		1 CO2		
			4 PKP		
					1 SW
1-52-01B-L	PASSAGE				1 SW
1-52-01C-L	PASSAGE				1 SW
1-108-1-L	PASSAGE				
1-143-2-L	STAIRWAY				
01-69-0-L	PASSAGE				
02-69-2-L	PASSAGE				
02-69-4-L	VESTIBULE				
CUI=LW (Sanitary Spaces)					
2-32-0-L	CREW WR, WC, SH				

Table B.5 Automated and Manual Fire Protection Systems

Plan ID	Compartment Name	Automated Systems	Manual Firefighting Equipment		
			Portable Extinguishers	3 % AFFF	Fire Main
2-52-0-L	CREW WR, WC, SH				
2-72-0-L	OFFICER WR, WC, SH				
2-72-2-L	OFFICER WR, WC, SH				
2-88-1-L	OFFICER WR, WC, SH				
2-88-2-L	OFFICER WR, WC, SH				
2-99-0-L	CPO WR, WC, SH				
1-20-4-Q	DECON SHWR				
1-52-2-L	CREW WR, WC, SH				
01-44-2-L	CO WR, WC, SH				
01-56-2-L	OFFICER WR, WC, SH				
01-87-0-L	XO WR, WC, SH				
01-87-1-L	OPS OFFICER WR, WC, SH				
CUI=QA (Aux Machinery Spaces)					
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM				
3-96-0-E	AUX MACHINERY ROOM	1 A3F			
			2 PKP		
4-156-0-E	AUX MACHINERY SPACE				
4-188-0-E	STEERING GEAR ROOM	1 A3F			
01-92-0-Q	HELO SERVICE				
CUI=QF (Fan Room)					
1-63-1-Q	FAN ROOM				
1-63-2-Q	FAN ROOM				
02-81-2-Q	FAN ROOM				
02-90-0-Q	PLENUM ROOM				
CUI=QG (Galley/Pantry/Scullery)					
1-114-2-Q	SCULLERY				
1-148-0-Q	GALLEY				
CUI=QL (Laundry)					
1-20-0-Q	LAUNDRY		1 CO2		
			1 PKP		
					1 SW
CUI=QO (Office Spaces)					
2-143-2-Q	ENGINEERING OFFICE				
1-72-2-Q	SUPPLY OFFICE				
1-99-1-Q	SHIPS OFFICE				
CUI=QS (Shops)					
2-140-1-Q	ENGINEERS WORKSHOP				
2-172-2-Q	ELECTRIC WORKSHOP				
02-78-1-Q	ELEC LAB AND STORAGE				
CUI=TH (Trunks/Hoists/Dumbwaiters)					
3-52-2-M	AMMO HOIST				
CUI=TU (Stacks/Engine Uptakes)					
1-108-0-Q	UPTAKE				
01-99-0-Q	UPTAKE AND FAN ROOM				

Table B.6.1 Probability of Flame Termination: Passive and Automated Measures

Plan ID	Compartment Name	I Values			A Values		
		EB	TBAR	DBAR	EB	TBAR	DBAR
CUI=AG (Gear Locker) Frequency of EB=0.0010							
3-12-0-Q	CHAIN LKR	27	33	16	0	0	0
2-52-02-A	CLEANING GEAR LKR	27	33	16	0	0	0
2-75-1-A	WARDROBE	27	33	16	0	0	0
2-78-0-A	HS STORES	27	33	16	0	0	0
2-78-2-A	REC LKR	27	33	16	0	0	0
2-180-2-A	REPAIR PARTY LKR	27	33	16	0	0	0
1-20-2-A	GENERAL STORES	27	33	16	0	0	0
1-52-1-A	SHIPS SERVICE STORE	27	33	16	0	0	0
1-57-1-A	FWD REPAIR LKR	27	33	16	0	0	0
1-72-0-A	REPAIR ANNEX	27	33	16	0	0	0
01-89-2-A	EQPT LKR	27	33	16	0	0	0
CUI=AR (Refrigerated Storage) Frequency of EB=0.0009							
2-156-0-A	THAW BOX	49	58	39	0	0	0
2-156-1-A	FREEZER BOX	49	58	39	0	0	0
2-164-2-A	CHILL BOX	49	58	39	0	0	0
CUI=AS (Storeroom) Frequency of EB=0.0009							
4-32-0-A	STOREROOM	39	42	23	0	0	0
4-143-0-A	ENGINEERS STOREROOM	39	42	23	0	0	0
2-16-0-A	BOSUN'S STORES	39	42	23	0	0	0
2-156-02-A	DRY PROVISIONS STOREROOM	39	42	23	0	0	0
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	27	29	16	0	0	0
1-1-0-A	GENERAL STORES	39	42	23	0	0	0
1-12-0-A	BOSUN'S STORES	39	42	23	0	0	0
1-159-1-A	DRY STORES	39	42	23	0	0	0
1-159-2-A	DRY PROVISIONS STORE	39	42	23	0	0	0
CUI=C (Ship Control/Communications) Frequency of EB=0.0012							
3-72-0-C	IC AND GYRO ROOM	32	35	19	0	0	0
2-136-0-C	CONTROL BOOTH	32	35	19	0	0	0
02-56-1-C	RADIO ROOM	32	35	19	0	0	0
02-56-2-C	CIC ROOM	32	35	19	0	0	0
03-62-0-C	PILOT HOUSE	39	42	23	0	0	0
CUI=EM (Main Propulsion – Mechanical) Frequency of EB=0.0272							
4-108-0-E	ENGINE ROOM	43	47	25	15	15	7
CUI=K (Hazardous Material Storage) Frequency of EB=0.0013							
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	25	25	12	24	24	12
CUI=L1 (Senior Officer's Cabin) Frequency of EB=0.0008							
2-72-1-L	ENGINEERING OFFICER SR	55	66	27	0	0	0
01-44-0-L	CO SR	55	66	27	0	0	0
01-44-1-L	CO CABIN	55	66	27	0	0	0
01-72-0-L	XO SR	55	66	27	0	0	0
01-72-01-L	OPS OFFICER SR	55	66	27	0	0	0
CUI=L2 (Officer/CPO Quarters) Frequency of EB=0.0008							
2-72-4-L	OFFICER SR	46	50	27	0	0	0
2-84-1-L	OFFICER SR	46	50	27	0	0	0
2-84-2-L	OFFICER SR	46	50	27	0	0	0
2-96-1-L	CPO STATEROOM	55	60	33	0	0	0
2-96-2-L	CPO STATEROOM	55	60	33	0	0	0
01-59-0-L	OFFICER SR	46	50	27	0	0	0

Table B.6.1 Probability of Flame Termination: Passive and Automated Measures

Plan ID	Compartment Name	I Values			A Values		
		EB	TBAR	DBAR	EB	TBAR	DBAR
CUI=L5 (Crews Berthing) Frequency of EB=0.0008							
2-32-01-L	CREW BERTHING	39	39	23	0	0	0
2-52-01-L	CREW BERTHING	39	39	23	0	0	0
1-32-0-L	CREW BERTHING	39	39	23	0	0	0
1-52-0-L	CREW BERTHING	39	39	23	0	0	0
CUI=LL (Wardroom/Mess/Lounge Areas) Frequency of EB=0.0008							
1-80-0-L	WARDROOM	50	55	30	0	0	0
1-93-0-L	CPO MESS	39	42	23	0	0	0
1-121-0-L	CREWS MESS	59	64	35	0	0	0
CUI=LM (Medical/Dental Spaces) Frequency of EB=0.0004							
1-114-0-L	DISPENSARY	35	38	21	0	0	0
CUI=LP (Passageway/Staircase/Vestibule) Frequency of EB=0.0001							
4-52-01-L	HANDLING PASSAGE	84	84	75	32	32	16
2-76-0A-L	PASSAGE	84	84	75	0	0	0
2-76-0B-L	PASSAGE	84	84	75	0	0	0
2-96-0-L	PASSAGE	84	84	75	0	0	0
2-140-0A-L	PASSAGE	84	84	75	0	0	0
2-140-0B-L	PASSAGE	84	84	75	0	0	0
2-143-2-L	STAIRWAY	87	87	78	0	0	0
2-156-01A-L	PASSAGE	84	84	75	0	0	0
2-156-01B-L	PASSAGE	84	84	75	0	0	0
2-156-01C-L	PASSAGE	84	84	75	0	0	0
2-172-0-L	PASSAGE	84	84	75	0	0	0
1-52-01A-L	PASSAGE	84	84	75	0	0	0
1-52-01B-L	PASSAGE	84	84	75	0	0	0
1-52-01C-L	PASSAGE	84	84	75	0	0	0
1-108-1-L	PASSAGE	84	84	75	0	0	0
1-143-2-L	STAIRWAY	87	87	78	0	0	0
01-69-0-L	PASSAGE	84	84	75	0	0	0
02-69-2-L	PASSAGE	84	84	75	0	0	0
02-69-4-L	VESTIBULE	77	77	69	0	0	0
CUI=LW (Sanitary Spaces) Frequency of EB=0.0002							
2-32-0-L	CREW WR, WC, SH	88	88	70	0	0	0
2-52-0-L	CREW WR, WC, SH	88	88	70	0	0	0
2-72-0-L	OFFICER WR, WC, SH	88	88	70	0	0	0
2-72-2-L	OFFICER WR, WC, SH	88	88	70	0	0	0
2-88-1-L	OFFICER WR, WC, SH	88	88	70	0	0	0
2-88-2-L	OFFICER WR, WC, SH	88	88	70	0	0	0
2-99-0-L	CPO WR, WC, SH	88	88	70	0	0	0
1-20-4-Q	DECON SHWR	88	88	70	0	0	0
1-52-2-L	CREW WR, WC, SH	88	88	70	0	0	0
01-44-2-L	CO WR, WC, SH	88	88	70	0	0	0
01-56-2-L	OFFICER WR, WC, SH	88	88	70	0	0	0
01-87-0-L	XO WR, WC, SH	88	88	70	0	0	0
01-87-1-L	OPS OFFICER WR, WC, SH	88	88	70	0	0	0
CUI=QA (Aux Machinery Spaces) Frequency of EB=0.0029							
4-84-0-Q	A/C MACHINERY & SEWAGE DISPOSAL RM	49	49	34	0	0	0
3-96-0-E	AUX MACHINERY ROOM	43	43	30	6	6	3
4-156-0-E	AUX MACHINERY SPACE	43	43	30	13	13	6

Table B.6.1 Probability of Flame Termination: Passive and Automated Measures

Plan ID	Compartment Name	I Values			A Values		
		EB	TBAR	DBAR	EB	TBAR	DBAR
4-188-0-E	STEERING GEAR ROOM	73	73	51	17	17	8
01-92-0-Q	HELO SERVICE	73	73	51	0	0	0
CUI=QF (Fan Room) Frequency of EB=0.0004							
1-63-1-Q	FAN ROOM	66	52	39	0	0	0
1-63-2-Q	FAN ROOM	66	52	39	0	0	0
02-81-2-Q	FAN ROOM	66	52	39	0	0	0
02-90-0-Q	PLENUM ROOM	66	52	39	0	0	0
CUI=QG (Galley/Pantry/Scullery) Frequency of EB=0.0026							
1-114-2-Q	SCULLERY	58	58	34	0	0	0
1-148-0-Q	GALLEY	58	58	34	29	29	14
CUI=QL (Laundry) Frequency of EB=0.0031							
1-20-0-Q	LAUNDRY	32	40	24	0	0	0
CUI=QO (Office Spaces) Frequency of EB=0.0004							
2-143-2-Q	ENGINEERING OFFICE	42	50	25	0	0	0
1-72-2-Q	SUPPLY OFFICE	42	50	25	0	0	0
1-99-1-Q	SHIPS OFFICE	42	50	25	0	0	0
CUI=QS	(Shops) Frequency of EB=0.0018						
2-140-1-Q	ENGINEERS WORKSHOP	39	42	23	0	0	0
2-172-2-Q	ELECTRIC WORKSHOP	39	42	23	0	0	0
02-78-1-Q	ELEC LAB AND STORAGE	39	42	23	0	0	0
CUI=TH (Trunks/Hoists/Dumbwaiters) Frequency of EB=0.0001							
3-52-2-M	AMMO HOIST	95	100	57	0	0	0
CUI=TU (Stacks/Engine Uptakes) Frequency of EB=0.0013							
1-108-0-Q	UPTAKE	35	38	21	0	0	0
01-99-0-Q	UPTAKE AND FAN ROOM	35	38	21	0	0	0

Table B6.1.1 Detailed Spreadsheet for I-Values Calculations

Plan ID	CUI	Comp	IEBAR	ICBAR	IRBAR	IBAR	I|EB
3-12-0-Q	AG	CHAIN LOCKER	0.90	0.90	0.90	0.73	0.27
2-52-02-A	AG	CLEANING GEAR LOCKER	0.90	0.90	0.90	0.73	0.27
2-75-1-A	AG	WARDROBE	0.90	0.90	0.90	0.73	0.27
2-78-0-A	AG	HS STORES	0.90	0.90	0.90	0.73	0.27
2-78-2-A	AG	REC LKR	0.90	0.90	0.90	0.73	0.27
2-180-2-A	AG	REPAIR PARTY LOCKER	0.90	0.90	0.90	0.73	0.27
1-20-2-A	AS	GENERAL STORES	0.90	0.90	0.90	0.73	0.27
1-52-1-A	AG	SHIPS SERVICE STORE	0.90	0.90	0.90	0.73	0.27
1-57-1-A	AG	FWD REPAIR LOCKER	0.90	0.90	0.90	0.73	0.27
1-72-0-A	AG	REPAIR ANNEX	0.90	0.90	0.90	0.73	0.27
01-89-2-A	AG	EQPT LKR	0.90	0.90	0.90	0.73	0.27
2-156-0-A	AR	THAW BOX	0.75	0.80	0.85	0.51	0.49
2-156-1-A	AR	FREEZER BOX	0.75	0.80	0.85	0.51	0.49
2-164-2-A	AR	CHILL BOX	0.75	0.80	0.85	0.51	0.49
4-32-0-A	AS	STOREROOM	0.80	0.85	0.90	0.61	0.39
4-143-0-A	AS	ENGINEERS STOREROOM	0.80	0.85	0.90	0.61	0.39
2-16-0-A	AS	BOSUN'S STORES	0.80	0.85	0.90	0.61	0.39
2-156-02-A	AS	DRY PROVISIONS STORES	0.80	0.85	0.90	0.61	0.39
2-172-1-A	AS	HAWSER & RESCUE EQUIPMENT STORAGE	0.85	0.90	0.95	0.73	0.27
1-1-0-A	AS	GENERAL STORES	0.80	0.85	0.90	0.61	0.39
1-12-0-A	AS	BOSUN'S STORES	0.80	0.85	0.90	0.61	0.39
1-159-1-A	AS	DRY STORES	0.80	0.85	0.90	0.61	0.39
1-159-2-A	AS	DRY PROVISIONS STORES	0.80	0.85	0.90	0.61	0.39
3-72-0-C	C	IC AND GYRO ROOM	0.80	0.90	0.95	0.68	0.32
2-136-0-C	C	CONTROL BOOTH	0.80	0.90	0.95	0.68	0.32
02-56-1-C	C	RADIO ROOM	0.80	0.90	0.95	0.68	0.32
02-56-2-C	C	CIC ROOM	0.80	0.90	0.95	0.68	0.32
03-62-0-C	C	PILOT HOUSE	0.75	0.85	0.95	0.61	0.39
4-108-0-E	EM	ENGINE ROOM	0.70	0.85	0.95	0.57	0.43
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	0.80	0.95	0.99	0.75	0.25
01-44-0-L	L1	CO STATEROOM	0.70	0.80	0.80	0.45	0.55
01-44-1-L	L1	CO CABIN	0.70	0.80	0.80	0.45	0.55
01-72-0-L	L1	EXEC OFF STATEROOM	0.70	0.80	0.80	0.45	0.55
01-72-01-L	L1	OPS OFFICER STATEROOM	0.70	0.80	0.80	0.45	0.55
2-72-4-L	L2	OFFICER STATEROOM	0.70	0.85	0.90	0.54	0.46
2-84-1-L	L2	OFFICER STATEROOM	0.70	0.85	0.90	0.54	0.46
2-84-2-L	L2	OFFICER STATEROOM	0.70	0.85	0.90	0.54	0.46
2-96-1-L	L2	CPO STATEROOM	0.70	0.80	0.80	0.45	0.55
2-96-2-L	L2	CPO STATEROOM	0.70	0.80	0.80	0.45	0.55
01-59-0-L	L2	OFFICER STATEROOM	0.70	0.85	0.90	0.54	0.46
2-32-01-L	L5	CREWS BERTHING	0.75	0.85	0.95	0.61	0.39
2-52-01-L	L5	CREWS BERTHING	0.75	0.85	0.95	0.61	0.39
1-32-0-L	L5	CREWS BERTHING	0.75	0.85	0.95	0.61	0.39
1-52-0-L	L5	CREWS BERTHING	0.75	0.85	0.95	0.61	0.39
1-80-0-L	LL	WARDROOM	0.70	0.80	0.90	0.50	0.50
1-93-0-L	LL	CPO MESS	0.75	0.85	0.95	0.61	0.39
1-121-0-L	LL	CREWS MESS	0.65	0.75	0.85	0.41	0.59
1-114-0-L	LM	DISPENSARY	0.85	0.85	0.90	0.65	0.35
4-52-01-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-76-0A-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84

Table B6.1.1 Detailed Spreadsheet for I-Values Calculations

Plan ID	CUI	Comp	IEBAR	ICBAR	IRBAR	IBAR	I|EB
2-76-0B-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-96-0-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-140-0A-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-140-0B-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-143-2-L	LP	STAIRWAY	0.60	0.55	0.40	0.13	0.87
2-156-01A-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-156-01B-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-156-01C-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
2-172-0-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
1-52-01A-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
1-52-01B-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
1-52-01C-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
1-108-1-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
1-143-2-L	LP	STAIRWAY	0.60	0.55	0.40	0.13	0.87
01-69-0-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
02-69-2-L	LP	PASSAGEWAY	0.50	0.55	0.60	0.17	0.84
02-69-4-L	LP	VESTIBULE	0.60	0.60	0.65	0.23	0.77
2-32-0-L	LW	CREWS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-52-0-L	LW	CREWS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-72-0-L	LW	OFFICERS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-72-2-L	LW	OFFICERS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-88-1-L	LW	OFFICERS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-88-2-L	LW	OFFICERS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
2-99-0-L	LW	CPO SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
1-20-4-Q	LW	DECON SHWR	0.45	0.50	0.55	0.12	0.88
1-52-2-L	LW	CREWS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
01-44-2-L	LW	CO SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
01-56-2-L	LW	OFFICERS SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
01-87-0-L	LW	XO SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
01-87-1-L	LW	OPS OFFICER SANITARY SPACE	0.45	0.50	0.55	0.12	0.88
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE DISPOSAL RM	0.75	0.80	0.85	0.51	0.49
3-96-0-E	QA	AUX MACHINERY SPACE	0.70	0.90	0.90	0.57	0.43
4-156-0-E	QA	AUX MACHINERY SPACE	0.70	0.90	0.90	0.57	0.43
4-188-0-E	QA	STEERING GEAR ROOM	0.60	0.65	0.70	0.27	0.73
01-92-0-Q	QA	HELO SERVICE	0.60	0.65	0.70	0.27	0.73
1-63-1-Q	QF	FAN ROOM	0.65	0.70	0.75	0.34	0.66
1-63-2-Q	QF	FAN ROOM	0.65	0.70	0.75	0.34	0.66
02-81-2-Q	QF	FAN ROOM	0.65	0.70	0.75	0.34	0.66
02-90-0-Q	QF	PLENUM ROOM	0.65	0.70	0.75	0.34	0.66
1-114-2-Q	QG	SCULLERY	0.70	0.75	0.80	0.42	0.58
1-146-0-Q	QG	GALLEY	0.70	0.75	0.80	0.42	0.58
1-20-0-Q	QL	LAUNDRY	0.80	0.90	0.95	0.68	0.32
2-143-2-Q	QO	ENGINEERING OFFICE	0.80	0.85	0.85	0.58	0.42
1-72-2-Q	QO	SUPPLY OFFICE	0.80	0.85	0.85	0.58	0.42
1-99-1-Q	QO	SHIPS OFFICE	0.80	0.85	0.85	0.58	0.42
2-140-1-Q	QS	ENGINEERS WORKSHOP	0.80	0.85	0.90	0.61	0.39
2-172-2-Q	QS	ELECTRIC WORKSHOP	0.80	0.85	0.90	0.61	0.39
02-78-1-Q	QS	ELEC LAB AND STORAGE	0.80	0.85	0.90	0.61	0.39
3-52-2-M	TH	AMMO HOIST	0.60	0.40	0.20	0.05	0.95
1-108-0-Q	TU	UPTAKE	0.85	0.80	0.95	0.65	0.35

Table B6.1.1 Detailed Spreadsheet for I-Values Calculations

Plan ID	CUI	Comp	IEBAR	ICBAR	IRBAR	IBAR	I|EB
01-99-0-Q	TU	UPTAKE AND FAN ROOM	0.85	0.80	0.95	0.65	0.35

Table B.6.1.2 Detailed Spreadsheet for A-Values Calculations

Plan ID	CUI	Comp	FRI	Class	Size	dan	nan	san	An	fap	vap	pap	Ap	saa	aaa	daa	Aa	qae	cae	bae	Ae	A|EB
4-108-0-E	EM	ENGINE ROOM	3	B	L	0.8	0.8	0.95	0.608	0.8	0.8	0.8	0.512	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.152
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	2	B	L	0.7	0.7	0.95	0.465	1	0.8	0.9	0.72	0.95	1	1	0.95	1	0.9	0.85	0.765	0.243
3-96-0-E	QA	AUX MACHINERY SPACE	2	B	M	0.4	0.4	0.95	0.152	1	0.9	0.85	0.765	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.056
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	L	0.6	0.9	0.95	0.513	0.7	0.9	0.85	0.535	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.134
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.6	0.9	0.95	0.513	0.9	0.9	0.85	0.688	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.172
1-146-0-Q	QG	GALLEY	2	B	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.9	1	1	0.9	1	1	0.9	0.9	0.288

An=dan*nan*san where dan=detection of fire, nan=notification of Bridge, and san=sound the alarm
Ap=fap*vap*cap where fap=secure the fuel supply, vap=secure the ventilation, and cap=secure the electrical power
Aa=saa*aaa*daa where saa=alignment of automated system, aaa=agent discharges from nozzle, and daa=agent discharges on the fire
Ae=qae*cae*bae where qae=quantity of agent is adequate, cae=concentration of agent is adequate, and bae=blackout occurs
A|EB=An*Ap*Aa*Ae where An=Notification, Ap=Preparation, Aa=Agent Application, and Ae=Fire Extinguishment

Installed Automated Systems:
Fixed CO2 Total Flooding System in the Flammable Liquids Storeroom, Aqueous Potassium Carbonate System in the Galley, And AFFF Bilge Sprinkling in the Engine Room, Auxiliary Machinery Spaces and Steering Gear Room.

Notes:
The Galley is occupied 30% of the time, however, it is assumed that if a grease fire occurs on the Galley stove, it is assumed that a crew member is present in the Galley.
The probability of the Galley's automated system successfully extinguishing the fire is based on grease fires on the stove only.

Table B.6.2 Probability of Flame Termination: Manual Measures (In Port)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
CUI=AG	(Gear Locker) Frequency of EB=0.0010			
3-12-0-Q	CHAIN LKR	19	22	11
2-52-02-A	CLEANING GEAR LKR	26	31	15
2-75-1-A	WARDROBE	24	28	14
2-78-0-A	HS STORES	16	19	9
2-78-2-A	REC LKR	21	25	12
2-180-2-A	REPAIR PARTY LKR	17	20	10
1-20-2-A	GENERAL STORES	20	24	12
1-52-1-A	SHIPS SERVICE STORE	24	28	14
1-57-1-A	FWD REPAIR LKR	24	28	14
1-72-0-A	REPAIR ANNEX	2	2	1
01-89-2-A	EQPT LKR	26	31	15
CUI=AR	(Refrigerated Storage) Frequency of EB=0.0009			
2-156-0-A	THAW BOX	11	13	8
2-156-1-A	FREEZER BOX	11	13	8
2-164-2-A	CHILL BOX	11	13	8
CUI=AS	(Storeroom) Frequency of EB=0.0009			
4-32-0-A	STOREROOM	26	52	26
4-143-0-A	ENGINEERS STOREROOM	9	18	9
2-16-0-A	BOSUN'S STORES	27	54	27
2-156-02-A	DRY PROVISIONS STOREROOM	20	40	20
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	7	14	7
1-1-0-A	GENERAL STORES	20	40	20
1-12-0-A	BOSUN'S STORES	20	40	20
1-159-1-A	DRY STORES	20	40	20
1-159-2-A	DRY PROVISIONS STORE	20	40	20
CUI=C	(Ship Control/Communications) Frequency of EB=0.0012			
3-72-0-C	IC AND GYRO ROOM	28	30	16
2-136-0-C	CONTROL BOOTH	42	46	25
02-56-1-C	RADIO ROOM	18	19	10
02-56-2-C	CIC ROOM	15	16	9
03-62-0-C	PILOT HOUSE	40	44	24
CUI=EM	(Main Propulsion - Mechanical) Frequency of EB=0.0272			
4-108-0-E	ENGINE ROOM	7	8	4
CUI=K	(Hazardous Material Storage) Frequency of EB=0.0013			
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	6	6	3
CUI=L1	(Senior Officer's Cabin) Frequency of EB=0.0008			
2-72-1-L	ENGINEERING OFFICER SR	27	35	16
01-44-0-L	CO SR	27	35	16
01-44-1-L	CO CABIN	27	35	16
01-72-0-L	XO SR	27	35	16
01-72-01-L	OPS OFFICER SR	27	35	16
CUI=L2	(Officer/CPO Quarters) Frequency of EB=0.0008			
2-72-4-L	OFFICER SR	27	43	18
2-84-1-L	OFFICER SR	27	43	18
2-84-2-L	OFFICER SR	26	41	18
2-96-1-L	CPO STATEROOM	27	43	18
2-96-2-L	CPO STATEROOM	27	43	18
01-59-0-L	OFFICER SR	27	43	18

Table B.6.2 Probability of Flame Termination: Manual Measures (In Port)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
CUI=L5	(Crews Berthing) Frequency of EB=0.0008			
2-32-01-L	CREW BERTHING	35	70	31
2-52-01-L	CREW BERTHING	35	70	31
1-32-0-L	CREW BERTHING	27	54	24
1-52-0-L	CREW BERTHING	27	54	24
CUI=LL	(Wardroom/Mess/Lounge Areas) Frequency of EB=0.0008			
1-80-0-L	WARDROOM	26	32	15
1-93-0-L	CPO MESS	26	32	15
1-121-0-L	CREWS MESS	33	41	19
CUI=LM	(Medical/Dental Spaces) Frequency of EB=0.0004			
1-114-0-L	DISPENSARY	21	26	12
CUI=LP	(Passageway/Staircase/Vestibule) Frequency of EB=0.0001			
4-52-01-L	HANDLING PASSAGE	33	36	29
2-76-0A-L	PASSAGE	33	36	29
2-76-0B-L	PASSAGE	33	36	29
2-96-0-L	PASSAGE	33	36	29
2-140-0A-L	PASSAGE	33	36	29
2-140-0B-L	PASSAGE	33	36	29
2-143-2-L	STAIRWAY	33	36	29
2-156-01A-L	PASSAGE	36	39	32
2-156-01B-L	PASSAGE	36	39	32
2-156-01C-L	PASSAGE	36	39	32
2-172-0-L	PASSAGE	33	36	29
1-52-01A-L	PASSAGE	33	36	29
1-52-01B-L	PASSAGE	33	36	29
1-52-01C-L	PASSAGE	33	36	29
1-108-1-L	PASSAGE	33	36	29
1-143-2-L	STAIRWAY	33	36	29
01-69-0-L	PASSAGE	33	36	29
02-69-2-L	PASSAGE	33	36	29
02-69-4-L	VESTIBULE	33	36	29
CUI=LW	(Sanitary Spaces) Frequency of EB=0.0002			
2-32-0-L	CREW WR, WC, SH	33	36	29
2-52-0-L	CREW WR, WC, SH	33	36	29
2-72-0-L	OFFICER WR, WC, SH	33	36	29
2-72-2-L	OFFICER WR, WC, SH	33	36	29
2-88-1-L	OFFICER WR, WC, SH	33	36	29
2-88-2-L	OFFICER WR, WC, SH	33	36	29
2-99-0-L	CPO WR, WC, SH	33	36	29
1-20-4-Q	DECON SHWR	33	36	29
1-52-2-L	CREW WR, WC, SH	33	36	29
01-44-2-L	CO WR, WC, SH	33	36	29
01-56-2-L	OFFICER WR, WC, SH	33	36	29
01-87-0-L	XO WR, WC, SH	33	36	29
01-87-1-L	OPS OFFICER WR, WC, SH	33	36	29
CUI=QA	(Aux Machinery Spaces) Frequency of EB=0.0029			
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	6	6	4
3-96-0-E	AUX MACHINERY ROOM	2	2	1
4-156-0-E	AUX MACHINERY SPACE	4	4	3

Table B.6.2 Probability of Flame Termination: Manual Measures (In Port)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
4-188-0-E	STEERING GEAR ROOM	4	4	3
01-92-0-Q	HELO SERVICE	6	6	4
CUI=QF	(Fan Room) Frequency of EB=0.0004			
1-63-1-Q	FAN ROOM	2	5	1
1-63-2-Q	FAN ROOM	2	5	1
02-81-2-Q	FAN ROOM	5	12	3
02-90-0-Q	PLENUM ROOM	5	12	3
CUI=QG	(Galley/Pantry/Scullery) Frequency of EB=0.0026			
1-114-2-Q	SCULLERY	10	14	8
1-148-0-Q	GALLEY	6	8	4
CUI=QL	(Laundry) Frequency of EB=0.0031			
1-20-0-Q	LAUNDRY	9	13	5
CUI=QO	(Office Spaces) Frequency of EB=0.0004			
2-143-2-Q	ENGINEERING OFFICE	26	32	15
1-72-2-Q	SUPPLY OFFICE	23	28	13
1-99-1-Q	SHIPS OFFICE	12	15	7
CUI=QS	(Shops) Frequency of EB=0.0018			
2-140-1-Q	ENGINEERS WORKSHOP	21	25	12
2-172-2-Q	ELECTRIC WORKSHOP	21	25	12
02-78-1-Q	ELEC LAB AND STORAGE	17	20	10
CUI=TH	(Trunks/Hoists/Dumbwaiters) Frequency of EB=0.0001			
3-52-2-M	AMMO HOIST	7	8	4
CUI=TU	(Stacks/Engine Uptakes) Frequency of EB=0.0013			
1-108-0-Q	UPTAKE	3	3	1
01-99-0-Q	UPTAKE AND FAN ROOM	5	6	3

Table B.6.2.1 Detailed Spreadsheet for M-Values In Port Calculations

Plan ID	CUI	Comp	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	M|EB
3-12-0-Q	AG	CHAIN LOCKER	15	A	S	0.4	0.9	0.95	0.342	1	0.8	0.9	0.72	1	1	0.8	0.8	1	1	0.95	0.95	0.18
2-52-02-A	AG	CLEANING GEAR LOCKER	31	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.26
2-75-1-A	AG	WARDROBE	∞	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
2-78-0-A	AG	HS STORES	∞	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	0.8	0.72	1	1	0.8	0.8	0.15
2-78-2-A	AG	REC LKR	11	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	0.9	0.81	1	1	0.95	0.95	0.21
2-180-2-A	AG	REPAIR PARTY LOCKER	4	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.7	0.9	1	0.63	1	1	0.95	0.95	0.16
1-20-2-A	AG	GENERAL STORES	16	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-52-1-A	AG	SHIPS SERVICE STORE	∞	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
1-57-1-A	AG	FWD REPAIR LOCKER	14	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
1-72-0-A	AG	REPAIR ANNEX	1	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.1	0.9	0.9	0.081	1	1	0.95	0.95	0.02
01-89-2-A	AG	EQPT LKR	∞	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.26
2-156-0-A	AR	THAW BOX	4	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.11
2-156-1-A	AR	FREEZER BOX	4	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.11
2-164-2-A	AR	CHILL BOX	4	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.11
4-32-0-A	AS	STOREROOM	8	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	0.95	0.9	1	0.855	1	1	0.8	0.8	0.25
4-143-0-A	AS	ENGINEERS STOREROOM	12	A	M	0.4	0.4	0.95	0.152	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.08
2-16-0-A	AS	BOSUN'S STORES	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-156-02-A	AS	DRY PROVISIONS STORES	29	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
2-172-1-A	AS	HAWSER & RESCUE EQUIPMENT STORAGE	2	A	M	0.6	0.6	0.95	0.342	1	0.9	0.9	0.81	0.3	1	1	0.3	1	1	0.8	0.8	0.06
1-1-0-A	AS	GENERAL STORES	18	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-12-0-A	AS	BOSUN'S STORES	∞	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-159-1-A	AS	DRY STORES	∞	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-159-2-A	AS	DRY PROVISIONS STORES	22	A	M	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
3-72-0-C	C	IC AND GYRO ROOM	7	C	M	0.7	0.9	0.95	0.598	1	0.9	0.85	0.765	0.95	1	1	0.95	0.9	0.9	0.8	0.648	0.28
2-136-0-C	C	CONTROL BOOTH	5	C	M	1	1	0.95	0.95	1	0.9	0.85	0.765	0.9	1	1	0.9	0.9	0.9	0.8	0.648	0.42
02-56-1-C	C	RADIO ROOM	8	C	M	0.8	0.8	0.95	0.608	1	0.9	0.85	0.765	0.95	0.8	0.8	0.608	0.9	0.9	0.8	0.648	0.18
02-56-2-C	C	CIC ROOM	7	C	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.95	0.8	0.85	0.646	0.9	0.9	0.8	0.648	0.14
03-62-0-C	C	PILOT HOUSE	9	C	M	1	1	1	1	1	0.9	0.85	0.765	0.95	1	0.85	0.807	0.9	0.9	0.8	0.648	0.40
4-108-0-E	EM	ENGINE ROOM	3	B	L	0.8	0.8	0.95	0.608	0.8	0.8	0.8	0.512	0.5	1	0.8	0.4	0.95	0.95	0.65	0.586	0.07
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	2	B	L	0.7	0.7	0.95	0.465	1	0.8	0.9	0.72	0.3	1	1	0.3	0.95	0.95	0.65	0.586	0.05
2-72-1-L	L1	ENGINEERING OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-44-0-L	L1	CO STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-44-1-L	L1	CO CABIN	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-72-0-L	L1	EXEC OFF STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-72-01-L	L1	OPS OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-72-4-L	L2	OFFICER STATEROOM	31	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27

Table B.6.2.1 Detailed Spreadsheet for M-Values In Port Calculations

Plan ID	CUI	Comp	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	M|EB
2-84-1-L	L2	OFFICER STATEROOM	26	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-84-2-L	L2	OFFICER STATEROOM	26	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	0.95	0.9	1	0.855	1	1	0.8	0.8	0.25
2-96-1-L	L2	CPO STATEROOM	25	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-96-2-L	L2	CPO STATEROOM	24	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-59-0-L	L2	OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-32-01-L	L5	CREWS BERTHING	∞	A	M	0.8	0.8	0.95	0.608	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.35
2-52-01-L	L5	CREWS BERTHING	∞	A	M	0.8	0.8	0.95	0.608	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.35
1-32-0-L	L5	CREWS BERTHING	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.27
1-52-0-L	L5	CREWS BERTHING	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.27
1-80-0-L	LL	WARDROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.25
1-93-0-L	LL	CPO MESS	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.25
1-121-0-L	LL	CREWS MESS	∞	A	M	0.8	0.8	0.95	0.608	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.33
1-114-0-L	LM	DISPENSARY	∞	A	M	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.21
4-52-01-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-76-0A-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-76-0B-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-96-0-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-140-0A-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-140-0B-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-143-2-L	LP	STAIRWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-156-01A-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-156-01B-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-156-01C-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-172-0-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-01A-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-01B-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-01C-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-108-1-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-143-2-L	LP	STAIRWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-69-0-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
02-69-2-L	LP	PASSAGEWAY	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
02-69-4-L	LP	VESTIBULE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-32-0-L	LW	CREWS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-52-0-L	LW	CREWS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-72-0-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-72-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-88-1-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-88-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-99-0-L	LW	CPO SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32

Table B.6.2.1 Detailed Spreadsheet for M-Values In Port Calculations

Plan ID	CUI	Comp	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	M|EB
1-20-4-Q	LW	DECON SHWR	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-2-L	LW	CREWS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-44-2-L	LW	CO SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-56-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-87-0-L	LW	XO SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-87-1-L	LW	OPS OFFICER SANITARY SPACE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	2	C	M	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.05
3-96-0-E	QA	AUX MACHINERY SPACE	2	C	M	0.4	0.4	0.95	0.152	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.02
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	M	0.5	0.9	0.95	0.427	0.7	0.9	0.85	0.535	0.3	1	0.9	0.27	0.85	0.85	0.8	0.578	0.03
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.5	0.9	0.95	0.427	0.9	0.9	0.85	0.688	0.3	1	0.8	0.24	0.85	0.85	0.8	0.578	0.04
01-92-0-Q	QA	HELO SERVICE	2	C	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.06
1-63-1-Q	QF	FAN ROOM	1	C	S	0.4	0.9	0.95	0.342	1	0.9	0.85	0.765	0.1	1	0.9	0.09	0.9	0.9	0.95	0.769	0.01
1-63-2-Q	QF	FAN ROOM	1	C	S	0.4	0.9	0.95	0.342	1	0.9	0.85	0.765	0.1	1	0.9	0.09	0.9	0.9	0.95	0.769	0.01
02-81-2-Q	QF	FAN ROOM	2	C	S	0.4	0.9	0.95	0.342	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.95	0.769	0.05
02-90-0-Q	QF	PLENUM ROOM	2	C	S	0.4	0.9	0.95	0.342	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.95	0.769	0.05
1-114-2-Q	QG	SCULLERY	2	A	S	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	1	1	0.3	1	1	0.95	0.95	0.10
1-146-0-Q	QG	GALLEY	2	B	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	0.9	1	0.27	0.85	0.85	0.8	0.578	0.05
1-20-0-Q	QL	LAUNDRY	3	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	1	1	0.3	1	1	0.8	0.8	0.08
2-143-2-Q	QO	ENGINEERING OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	0.9	1	0.9	1	1	0.8	0.8	0.25
1-72-2-Q	QO	SUPPLY OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.23
1-99-1-Q	QO	SHIPS OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.5	0.9	0.9	0.405	1	1	0.8	0.8	0.11
2-140-1-Q	QS	ENGINEERS WORKSHOP	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.21
2-172-2-Q	QS	ELECTRIC WORKSHOP	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.21
02-78-1-Q	QS	ELEC LAB AND STORAGE	∞	A	M	0.6	0.6	0.95	0.342	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.16
3-52-2-M	TH	AMMO HOIST	2	A	S	0.4	0.9	0.95	0.342	1	0.9	0.9	0.81	0.3	1	0.9	0.27	1	1	0.95	0.95	0.07
1-108-0-Q	TU	UPTAKE	2	B	L	0.4	0.9	0.95	0.342	1	0.8	0.9	0.72	0.3	1	0.9	0.27	0.85	0.85	0.65	0.469	0.03
01-99-0-Q	TU	UPTAKE AND FAN ROOM	3	B	L	0.4	0.9	0.95	0.342	1	0.8	0.9	0.72	0.5	1	0.9	0.45	0.85	0.85	0.65	0.469	0.05

Table B.6.3 Probability of Flame Termination: Manual Measures (At Sea)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
CUI=AG	(Gear Locker) Frequency of EB=0.0010			
3-12-0-Q	CHAIN LKR	19	22	11
2-52-02-A	CLEANING GEAR LKR	33	39	19
2-75-1-A	WARDROBE	30	36	18
2-78-0-A	HS STORES	30	36	18
2-78-2-A	REC LKR	30	36	18
2-180-2-A	REPAIR PARTY LKR	21	25	12
1-20-2-A	GENERAL STORES	25	30	15
1-52-1-A	SHIPS SERVICE STORE	30	36	18
1-57-1-A	FWD REPAIR LKR	30	36	18
1-72-0-A	REPAIR ANNEX	30	36	18
01-89-2-A	EQPT LKR	33	39	19
CUI=AR	(Refrigerated Storage) Frequency of EB=0.0009			
2-156-0-A	THAW BOX	14	16	11
2-156-1-A	FREEZER BOX	14	16	11
2-164-2-A	CHILL BOX	14	16	11
CUI=AS	(Storeroom) Frequency of EB=0.0009			
4-32-0-A	STOREROOM	26	52	26
4-143-0-A	ENGINEERS STOREROOM	9	18	9
2-16-0-A	BOSUN'S STORES	27	54	27
2-156-02-A	DRY PROVISIONS STOREROOM	25	50	25
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	7	14	7
1-1-0-A	GENERAL STORES	25	50	25
1-12-0-A	BOSUN'S STORES	25	50	25
1-159-1-A	DRY STORES	25	50	25
1-159-2-A	DRY PROVISIONS STORE	25	50	25
CUI=C	(Ship Control/Communications) Frequency of EB=0.0012			
3-72-0-C	IC AND GYRO ROOM	28	30	16
2-136-0-C	CONTROL BOOTH	42	46	25
02-56-1-C	RADIO ROOM	18	19	10
02-56-2-C	CIC ROOM	15	16	9
03-62-0-C	PILOT HOUSE	40	44	24
CUI=EM	(Main Propulsion - Mechanical) Frequency of EB=0.0272			
4-108-0-E	ENGINE ROOM	7	8	4
CUI=K	(Hazardous Material Storage) Frequency of EB=0.0013			
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	6	6	3
CUI=L1	(Senior Officer's Cabin) Frequency of EB=0.0008			
2-72-1-L	ENGINEERING OFFICER SR	27	35	16
01-44-0-L	CO SR	27	35	16
01-44-1-L	CO CABIN	27	35	16
01-72-0-L	XO SR	27	35	16
01-72-01-L	OPS OFFICER SR	27	35	16
CUI=L2	(Officer/CPO Quarters) Frequency of EB=0.0008			
2-72-4-L	OFFICER SR	27	43	18
2-84-1-L	OFFICER SR	27	43	18
2-84-2-L	OFFICER SR	27	43	18
2-96-1-L	CPO STATEROOM	27	43	18
2-96-2-L	CPO STATEROOM	27	43	18
01-59-0-L	OFFICER SR	27	43	18

Table B.6.3 Probability of Flame Termination: Manual Measures (At Sea)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
CUI=L5	(Crews Berthing) Frequency of EB=0.0008			
2-32-01-L	CREW BERTHING	35	70	31
2-52-01-L	CREW BERTHING	35	70	31
1-32-0-L	CREW BERTHING	27	54	24
1-52-0-L	CREW BERTHING	27	54	24
CUI=LL	(Wardroom/Mess/Lounge Areas) Frequency of EB=0.0008			
1-80-0-L	WARDROOM	26	32	15
1-93-0-L	CPO MESS	26	32	15
1-121-0-L	CREWS MESS	33	41	19
CUI=LM	(Medical/Dental Spaces) Frequency of EB=0.0004			
1-114-0-L	DISPENSARY	25	31	15
CUI=LP	(Passageway/Staircase/Vestibule) Frequency of EB=0.0001			
4-52-01-L	HANDLING PASSAGE	39	42	35
2-76-0A-L	PASSAGE	39	42	35
2-76-0B-L	PASSAGE	39	42	35
2-96-0-L	PASSAGE	39	42	35
2-140-0A-L	PASSAGE	39	42	35
2-140-0B-L	PASSAGE	39	42	35
2-143-2-L	STAIRWAY	39	42	35
2-156-01A-L	PASSAGE	36	39	32
2-156-01B-L	PASSAGE	36	39	32
2-156-01C-L	PASSAGE	36	39	32
2-172-0-L	PASSAGE	39	42	35
1-52-01A-L	PASSAGE	39	42	35
1-52-01B-L	PASSAGE	39	42	35
1-52-01C-L	PASSAGE	39	42	35
1-108-1-L	PASSAGE	39	42	35
1-143-2-L	STAIRWAY	39	42	35
01-69-0-L	PASSAGE	39	42	35
02-69-2-L	PASSAGE	39	42	35
02-69-4-L	VESTIBULE	39	42	35
CUI=LW	(Sanitary Spaces) Frequency of EB=0.0002			
2-32-0-L	CREW WR, WC, SH	39	42	35
2-52-0-L	CREW WR, WC, SH	39	42	35
2-72-0-L	OFFICER WR, WC, SH	39	42	35
2-72-2-L	OFFICER WR, WC, SH	39	42	35
2-88-1-L	OFFICER WR, WC, SH	39	42	35
2-88-2-L	OFFICER WR, WC, SH	39	42	35
2-99-0-L	CPO WR, WC, SH	39	42	35
1-20-4-Q	DECON SHWR	39	42	35
1-52-2-L	CREW WR, WC, SH	39	42	35
01-44-2-L	CO WR, WC, SH	39	42	35
01-56-2-L	OFFICER WR, WC, SH	39	42	35
01-87-0-L	XO WR, WC, SH	39	42	35
01-87-1-L	OPS OFFICER WR, WC, SH	39	42	35
CUI=QA	(Aux Machinery Spaces) Frequency of EB=0.0029			
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	7	7	5
3-96-0-E	AUX MACHINERY ROOM	2	2	1
4-156-0-E	AUX MACHINERY SPACE	4	4	3

Table B.6.3 Probability of Flame Termination: Manual Measures (At Sea)

Plan ID	Compartment Name	M Values		
		EB	TBAR	DBAR
4-188-0-E	STEERING GEAR ROOM	5	5	3
01-92-0-Q	HELO SERVICE	6	6	4
CUI=QF	(Fan Room) Frequency of EB=0.0004			
1-63-1-Q	FAN ROOM	2	5	1
1-63-2-Q	FAN ROOM	2	5	1
02-81-2-Q	FAN ROOM	7	17	5
02-90-0-Q	PLENUM ROOM	7	17	5
CUI=QG	(Galley/Pantry/Scullery) Frequency of EB=0.0026			
1-114-2-Q	SCULLERY	10	14	8
1-148-0-Q	GALLEY	6	8	4
CUI=QL	(Laundry) Frequency of EB=0.0031			
1-20-0-Q	LAUNDRY	14	21	8
CUI=QO	(Office Spaces) Frequency of EB=0.0004			
2-143-2-Q	ENGINEERING OFFICE	26	32	15
1-72-2-Q	SUPPLY OFFICE	23	28	13
1-99-1-Q	SHIPS OFFICE	23	28	13
CUI=QS	(Shops) Frequency of EB=0.0018			
2-140-1-Q	ENGINEERS WORKSHOP	25	30	15
2-172-2-Q	ELECTRIC WORKSHOP	25	30	15
02-78-1-Q	ELEC LAB AND STORAGE	17	20	10
CUI=TH	(Trunks/Hoists/Dumbwaiters) Frequency of EB=0.0001			
3-52-2-M	AMMO HOIST	9	10	5
CUI=TU	(Stacks/Engine Uptakes) Frequency of EB=0.0013			
1-108-0-Q	UPTAKE	4	5	2
01-99-0-Q	UPTAKE AND FAN ROOM	7	9	4

Table B.6.3.1 Detailed Spreadsheet for M-Values At Sea Calculations

Plan ID	CUI	Comp	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	M|EB
3-12-0-Q	AG	CHAIN LOCKER	15	A	S	0.4	0.9	0.95	0.342	1	0.8	0.9	0.72	1	1	0.8	0.8	1	1	0.95	0.95	0.18
2-52-02-A	AG	CLEANING GEAR LOCKER	31	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.38
2-75-1-A	AG	WARDROBE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-78-0-A	AG	HS STORES	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-78-2-A	AG	REC LKR	11	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-180-2-A	AG	REPAIR PARTY LOCKER	4	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	0.7	0.9	1	0.63	1	1	0.95	0.95	0.20
1-20-2-A	AS	GENERAL STORES	16	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.29
1-52-1-A	AG	SHIPS SERVICE STORE	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
1-57-1-A	AG	FWD REPAIR LOCKER	14	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
1-72-0-A	AG	REPAIR ANNEX	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
01-89-2-A	AG	EQPT LKR	∞	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-156-0-A	AR	THAW BOX	4	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.13
2-156-1-A	AR	FREEZER BOX	4	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.13
2-164-2-A	AR	CHILL BOX	4	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	0.7	0.8	0.9	0.504	1	1	0.8	0.8	0.13
4-32-0-A	AS	STOREROOM	8	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	0.95	0.9	1	0.855	1	1	0.8	0.8	0.25
4-143-0-A	AS	ENGINEERS STOREROOM	12	A	M	0.4	0.4	0.95	0.152	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.08
2-16-0-A	AS	BOSUN'S STORES	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-156-02-A	AS	DRY PROVISIONS STORES	29	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
2-172-1-A	AS	HAWSER & RESCUE EQUIPMENT STORAGE	2	A	M	0.6	0.6	0.95	0.342	1	0.9	0.9	0.81	0.3	1	1	0.3	1	1	0.8	0.8	0.06
1-1-0-A	AS	GENERAL STORES	18	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-12-0-A	AS	BOSUN'S STORES	∞	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-159-1-A	AS	DRY STORES	∞	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-159-2-A	AS	DRY PROVISIONS STORES	22	A	M	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
3-72-0-C	C	IC AND GYRO ROOM	7	C	M	0.7	0.9	0.95	0.598	1	0.9	0.85	0.765	0.95	1	1	0.95	0.9	0.9	0.8	0.648	0.28
2-136-0-C	C	CONTROL BOOTH	5	C	M	1	1	0.95	0.95	1	0.9	0.85	0.765	0.9	1	1	0.9	0.9	0.9	0.8	0.648	0.42
02-56-1-C	C	RADIO ROOM	8	C	M	0.8	0.8	0.95	0.608	1	0.9	0.85	0.765	0.95	0.8	0.8	0.608	0.9	0.9	0.8	0.648	0.18
02-56-2-C	C	CIC ROOM	7	C	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.95	0.8	0.85	0.646	0.9	0.9	0.8	0.648	0.14
03-62-0-C	C	PILOT HOUSE	9	C	M	1	1	1	1	1	0.9	0.85	0.765	0.95	1	0.85	0.807	0.9	0.9	0.8	0.648	0.40
4-108-0-E	EM	ENGINE ROOM	3	B	L	0.8	0.8	0.95	0.608	0.8	0.8	0.8	0.512	0.5	1	0.8	0.4	0.95	0.95	0.65	0.586	0.07
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	2	B	L	0.7	0.7	0.95	0.465	1	0.8	0.9	0.72	0.3	1	1	0.3	0.95	0.95	0.65	0.586	0.05
2-72-1-L	L1	ENGINEERING OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-44-0-L	L1	CO STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-44-1-L	L1	CO CABIN	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-72-0-L	L1	EXEC OFF STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
01-72-01-L	L1	OPS OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-72-4-L	L2	OFFICER STATEROOM	31	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-84-1-L	L2	OFFICER STATEROOM	26	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-84-2-L	L2	OFFICER STATEROOM	26	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-96-1-L	L2	CPO STATEROOM	25	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-96-2-L	L2	CPO STATEROOM	24	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27

Table B.6.3.1 Detailed Spreadsheet for M-Values At Sea Calculations

01-59-0-L	L2	OFFICER STATEROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.27
2-32-01-L	L5	CREWS BERTHING	11	A	M	0.8	0.8	0.95	0.608	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.35
2-52-01-L	L5	CREWS BERTHING	11	A	M	0.8	0.8	0.95	0.608	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.35
1-32-0-L	L5	CREWS BERTHING	11	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.27
1-52-0-L	L5	CREWS BERTHING	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.27
1-80-0-L	LL	WARDROOM	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.25
1-93-0-L	LL	CPO MESS	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.25
1-121-0-L	LL	CREWS MESS	∞	A	M	0.8	0.8	0.95	0.608	1	0.9	0.85	0.765	1	1	0.9	0.9	1	1	0.8	0.8	0.33
1-114-0-L	LM	DISPENSARY	∞	A	M	0.6	0.9	0.95	0.513	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.25
4-52-01-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-76-0A-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-76-0B-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-96-0-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-140-0A-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-140-0B-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-143-2-L	LP	STAIRWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-156-01A-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-156-01B-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-156-01C-L	LP	PASSAGEWAY	∞	A	S	0.7	0.7	0.95	0.465	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.35
2-172-0-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01A-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01B-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01C-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-108-1-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-143-2-L	LP	STAIRWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-69-0-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
02-69-2-L	LP	PASSAGEWAY	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
02-69-4-L	LP	VESTIBULE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-32-0-L	LW	CREWS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-52-0-L	LW	CREWS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-72-0-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-72-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-88-1-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-88-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-99-0-L	LW	CPO SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-20-4-Q	LW	DECON SHWR	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-2-L	LW	CREWS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-44-2-L	LW	CO SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-56-2-L	LW	OFFICERS SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-87-0-L	LW	XO SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-87-1-L	LW	OPS OFFICER SANITARY SPACE	∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE	2	C	M	0.6	0.9	0.95	0.513	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.06

Table B.6.3.1 Detailed Spreadsheet for M-Values At Sea Calculations

		DISPOSAL ROOM																				
3-96-0-E	QA	AUX MACHINERY SPACE	2	C	M	0.4	0.4	0.95	0.152	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.02
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	M	0.6	0.9	0.95	0.513	0.7	0.9	0.85	0.5355	0.3	1	0.9	0.27	0.85	0.85	0.8	0.578	0.04
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.6	0.9	0.95	0.513	0.9	0.9	0.85	0.6885	0.3	1	0.8	0.24	0.85	0.85	0.8	0.578	0.04
01-92-0-Q	QA	HELO SERVICE	2	C	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.8	0.648	0.06
1-63-1-Q	QF	FAN ROOM	1	C	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	0.1	1	0.9	0.09	0.9	0.9	0.95	0.769	0.02
1-63-2-Q	QF	FAN ROOM	1	C	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	0.1	1	0.9	0.09	0.9	0.9	0.95	0.769	0.02
02-81-2-Q	QF	FAN ROOM	2	C	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.95	0.769	0.06
02-90-0-Q	QF	PLENUM ROOM	2	C	S	0.5	0.9	0.95	0.427	1	0.9	0.85	0.765	0.3	1	0.9	0.27	0.9	0.9	0.95	0.769	0.06
1-114-2-Q	QG	SCULLERY	2	A	S	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	1	1	0.3	1	1	0.95	0.95	0.10
1-146-0-Q	QG	GALLEY	2	B	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.3	0.9	1	0.27	0.85	0.85	0.8	0.578	0.05
1-20-0-Q	QL	LAUNDRY	3	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	0.5	1	1	0.5	1	1	0.8	0.8	0.14
2-143-2-Q	QO	ENGINEERING OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	0.9	1	0.9	1	1	0.8	0.8	0.25
1-72-2-Q	QO	SUPPLY OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.23
1-99-1-Q	QO	SHIPS OFFICE	∞	A	M	0.7	0.7	0.95	0.465	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.23
2-140-1-Q	QS	ENGINEERS WORKSHOP	∞	A	M	0.6	0.9	0.95	0.513	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.25
2-172-2-Q	QS	ELECTRIC WORKSHOP	∞	A	M	0.6	0.9	0.95	0.513	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.25
02-78-1-Q	QS	ELEC LAB AND STORAGE	∞	A	M	0.6	0.6	0.95	0.342	1	0.9	0.85	0.765	1	0.9	0.9	0.81	1	1	0.8	0.8	0.16
3-52-2-M	TH	AMMO HOIST	2	A	S	0.5	0.9	0.95	0.427	1	0.9	0.9	0.81	0.3	1	0.9	0.27	1	1	0.95	0.95	0.08
1-108-0-Q	TU	UPTAKE	2	B	L	0.5	0.9	0.95	0.427	1	0.8	0.9	0.72	0.3	1	0.9	0.27	0.85	0.85	0.65	0.469	0.03
01-99-0-Q	TU	UPTAKE AND FAN ROOM	3	B	L	0.5	0.9	0.95	0.427	1	0.8	0.9	0.72	0.5	1	0.9	0.45	0.85	0.85	0.65	0.469	0.06

Table B.7 Fuel Loads

Plan ID	Compartment Name	Cellulosics (psf)	Plastics (psf)	Flam. Liq. (gals)	Total Fuel (kBTUs/sf)	Growth Model	Stack Ht. %	% Deck Occupied
CUI=AG	(Gear Locker)							
3-12-0-Q	CHAIN LKR	2	3	0	64	5	NA	90
2-52-02-A	CLEANING GEAR LKR	7.6	2.5	0	100.8	5	NA	90
2-75-1-A	WARDROBE	3	2	0	56	5	NA	90
2-78-0-A	HS STORES	6.4	6.8	0	160	5	NA	90
2-78-2-A	REC LKR	13.6	5.5	0	196.8	5	NA	90
2-180-2-A	REPAIR PARTY LKR	0.3	3	0	50.4	5	NA	90
1-20-2-A	GENERAL STORES	18.3	3.7	0	205.6	5	NA	90
1-52-1-A	SHIPS SERVICE STORE	8.3	0.8	0	79.2	5	NA	60
1-57-1-A	FWD REPAIR LKR	2.4	2.4	0	57.6	5	NA	90
1-72-0-A	REPAIR ANNEX	5.2	12.2	0	236.8	5	NA	60
01-89-2-A	EQPT LKR	2.6	0.5	0	28.8	5	NA	90
CUI=AR	(Refrigerated Storage)							
2-156-0-A	THAW BOX	0.2	0.2	0	4.8	4	NA	90
2-156-1-A	FREEZER BOX	0.2	0.2	0	4.8	4	NA	60
2-164-2-A	CHILL BOX	0.2	0.1	0	3.2	4	NA	90
CUI=AS	(Storeroom)							
4-32-0-A	STOREROOM	1	2.5	0	48	5	NA	75
4-143-0-A	ENGINEERS STOREROOM	0.9	1.3	1	28.8	5	NA	75
2-16-0-A	BOSUN'S STORES	16.5	4.1	1	198.1	5	NA	20
2-156-02-A	DRY PROVISIONS STOREROOM	1	0.2	0	11.2	5	NA	90
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	13.2	1	1	122.3	5	NA	80
1-1-0-A	GENERAL STORES	10	10	1	243.2	5	NA	80
1-12-0-A	BOSUN'S STORES	21.4	5.4	0	257.6	5	NA	20
1-159-1-A	DRY STORES	1.9	1.4	0	37.6	5	NA	90
1-159-2-A	DRY PROVISIONS STORE	4.4	0.9	0	49.6	5	NA	90
CUI=C	(Ship Control/Communications)							
3-72-0-C	IC AND GYRO ROOM	0.3	0.1	0	4	7	NA	50
2-136-0-C	CONTROL BOOTH	0.3	1.5	0	26.4	7	NA	75
02-56-1-C	RADIO ROOM	1	2.5	0	48	7	NA	75
02-56-2-C	CIC ROOM	1	1.5	0	32	7	NA	75
03-62-0-C	PILOT HOUSE	0.3	0.9	0	16.8	7	NA	50
CUI=EM	(Main Propulsion - Mechanical)							
4-108-0-E	ENGINE ROOM	1	0.3	5	13.4	13	NA	20
CUI=K	(Hazardous Material Storage)							
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	0.1	0.4	150	220.5	3	90	90
CUI=L1	(Senior Officer's Cabin)							
2-72-1-L	ENGINEERING OFFICER SR	1.5	2	0	44	10	NA	60
01-44-0-L	CO SR	1	2	0	40	10	NA	60
01-44-1-L	CO CABIN	2	2	0	48	10	NA	60
01-72-0-L	XO SR	2	2	0	48	10	NA	60

Table B.7 Fuel Loads

Plan ID	Compartment Name	Cellulosics (psf)	Plastics (psf)	Flam. Liq. (gals)	Total Fuel (kBTUs/sf)	Growth Model	Stack Ht. %	% Deck Occupied
01-72-01-L	OPS OFFICER SR	2	4	0	80	10	NA	60
CUI=L2	(Officer/CPO Quarters)							
2-72-4-L	OFFICER SR	1	2	0	40	10	NA	70
2-84-1-L	OFFICER SR	1	2	0	40	10	NA	70
2-84-2-L	OFFICER SR	1	2	0	40	10	NA	70
2-96-1-L	CPO STATEROOM	1	2	0	40	10	NA	70
2-96-2-L	CPO STATEROOM	1	2	0	40	10	NA	70
01-59-0-L	OFFICER SR	2	2	0	48	10	NA	70
CUI=L5	(Crews Berthing)							
2-32-01-L	CREW BERTHING	0.8	1.6	0	32	10	NA	90
2-52-01-L	CREW BERTHING	0.8	1.6	0	32	10	NA	90
1-32-0-L	CREW BERTHING	0.8	0.6	0	16	10	NA	90
1-52-0-L	CREW BERTHING	0.8	0.2	0	9.6	10	NA	90
CUI=LL	(Wardroom/Mess/Lounge Areas)							
1-80-0-L	WARDROOM	0.3	1.2	0	21.6	9	NA	50
1-93-0-L	CPO MESS	0.3	0.5	0	10.4	9	NA	60
1-121-0-L	CREWS MESS	0.1	0.8	0	13.6	9	NA	60
CUI=LM	(Medical/Dental Spaces)							
1-114-0-L	DISPENSARY	0.3	0.3	0	7.2	9	NA	80
CUI=LP	(Passageway/Staircase/Vestibule)							
4-52-01-L	HANDLING PASSAGE	5	0.5	0	48	15	NA	20
2-76-0A-L	PASSAGE	0.1	0.1	0	2.4	15	NA	20
2-76-0B-L	PASSAGE	0.1	0.1	0	2.4	15	NA	20
2-96-0-L	PASSAGE	0.1	0.1	0	2.4	15	NA	20
2-140-0A-L	PASSAGE	0.1	0.1	0	2.4	15	NA	20
2-140-0B-L	PASSAGE	0.1	0.1	0	2.4	15	NA	20
2-143-2-L	STAIRWAY	3.3	1.7	0	53.6	15	NA	20
2-156-01A-L	PASSAGE	0.1	0.2	0	4	15	NA	20
2-156-01B-L	PASSAGE	0.1	0.2	0	4	15	NA	20
2-156-01C-L	PASSAGE	0.1	0.2	0	4	15	NA	20
2-172-0-L	PASSAGE	0.3	0.1	0	4	15	NA	20
1-52-01A-L	PASSAGE	0.5	2.8	0	48.8	15	NA	20
1-52-01B-L	PASSAGE	0.3	0.9	0	16.8	15	NA	20
1-52-01C-L	PASSAGE	0.2	1.6	0	27.2	15	NA	20
1-108-1-L	PASSAGE	0.2	0.1	0	3.2	15	NA	20
1-143-2-L	STAIRWAY	0.2	1.2	0	20.8	15	NA	20
01-69-0-L	PASSAGE	0.1	1.3	0	21.6	15	NA	20
02-69-2-L	PASSAGE	0.3	2.6	0	44	15	NA	20
02-69-4-L	VESTIBULE	5.8	1.7	0	73.6	15	NA	20
CUI=LW	(Sanitary Spaces)							
2-32-0-L	CREW WR, WC, SH	0.3	0.1	0	4	16	NA	20
2-52-0-L	CREW WR, WC, SH	0.2	0.1	0	3.2	16	NA	20
2-72-0-L	OFFICER WR, WC, SH	0.9	0.4	0	13.6	16	NA	20
2-72-2-L	OFFICER WR, WC, SH	0.6	0.3	0	9.6	16	NA	20
2-88-1-L	OFFICER WR, WC, SH	0.5	0.2	0	7.2	16	NA	20
2-88-2-L	OFFICER WR, WC, SH	0.5	0.2	0	7.2	16	NA	20

Table B.7 Fuel Loads

Plan ID	Compartment Name	Cellulosics (psf)	Plastics (psf)	Flam. Liq. (gals)	Total Fuel (kBTUs/sf)	Growth Model	Stack Ht. %	% Deck Occupied
2-99-0-L	CPO WR, WC, SH	0.1	0.1	0	2.4	16	NA	20
1-20-4-Q	DECON SHWR	0.1	0.1	0	2.4	16	NA	20
1-52-2-L	CREW WR, WC, SH	0.2	0.1	0	3.2	16	NA	20
01-44-2-L	CO WR, WC, SH	0.2	0.4	0	8	16	NA	20
01-56-2-L	OFFICER WR, WC, SH	0.2	0.4	0	8	16	NA	20
01-87-0-L	XO WR, WC, SH	0.2	0.3	0	6.4	16	NA	20
01-87-1-L	OPS OFFICER WR, WC, SH	0.2	0.4	0	8	16	NA	20
CUI=QA	(Aux Machinery Spaces)							
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	0.2	0.1	0	3.2	13	NA	50
3-96-0-E	AUX MACHINERY ROOM	0.1	0.2	2	5.3	13	NA	50
4-156-0-E	AUX MACHINERY SPACE	0.3	0.1	3	5.1	13	NA	60
4-188-0-E	STEERING GEAR ROOM	0.1	0.2	1	4.3	13	NA	50
01-92-0-Q	HELO SERVICE	0.2	1.9	1	33.2	13	NA	50
CUI=QF	(Fan Room)							
1-63-1-Q	FAN ROOM	0.5	0.3	0	8.8	13	NA	50
1-63-2-Q	FAN ROOM	8.3	0.7	0	77.6	13	NA	50
02-81-2-Q	FAN ROOM	0.2	2.9	0	48	13	NA	50
02-90-0-Q	PLENUM ROOM	0.9	0.3	0	12	13	NA	50
CUI=QG	(Galley/Pantry/Scullery)							
1-114-2-Q	SCULLERY	0.3	0.4	0	8.8	13	NA	50
1-148-0-Q	GALLEY	0.4	0.4	0	9.6	13	NA	50
CUI=QL	(Laundry)							
1-20-0-Q	LAUNDRY	1	0.5	0	16	12	NA	50
CUI=QO	(Office Spaces)							
2-143-2-Q	ENGINEERING OFFICE	0.5	0.4	0	10.4	8	NA	70
1-72-2-Q	SUPPLY OFFICE	2.4	0.5	0	27.2	8	NA	70
1-99-1-Q	SHIPS OFFICE	4.5	0.5	0	44	8	NA	70
CUI=QS	(Shops)							
2-140-1-Q	ENGINEERS WORKSHOP	0.2	0.2	1	5.4	5	NA	50
2-172-2-Q	ELECTRIC WORKSHOP	0.1	0.2	0	4	5	NA	50
02-78-1-Q	ELEC LAB AND STORAGE	0.8	1.2	0	25.6	5	NA	50
CUI=TH	(Trunks/Hoists/Dumbwaiters)							
3-52-2-M	AMMO HOIST	0	2.3	0	36.8	13	NA	20
CUI=TU	(Stacks/Engine Uptakes)							
1-108-0-Q	UPTAKE	9.3	4.6	0	148	13	NA	20
01-99-0-Q	UPTAKE AND FAN ROOM	3.8	4.5	0	102.4	13	NA	20

Table B.8 Fire Growth Models, Heat Release Rates, and FRI Times

Plan ID	Compartment Name	Growth Model	Alpha kW/sec2	Maximum Q kW	FRI XRAY	Time YOKE	(Min.) ZEBRA	Post-XRAY	FRI Q YOKE	(kW) ZEBRA
CUI=AG	(Gear Locker)									
3-12-0-Q	CHAIN LKR	5	0.1	130	15	15	15	0	0	0
2-52-02-A	CLEANING GEAR LKR	5	0.1	59	31	31	31	0	0	0
2-75-1-A	WARDROBE	5	0.1	22	999	999	999	0	0	0
2-78-0-A	HS STORES	5	0.1	70	999	999	999	70	70	70
2-78-2-A	REC LKR	5	0.1	59	11	11	11	59	59	59
2-180-2-A	REPAIR PARTY LKR	5	0.1	376	4	4	4	376	376	376
1-20-2-A	GENERAL STORES	5	0.1	246	16	16	16	16	16	16
1-52-1-A	SHIPS SERVICE STORE	5	0.1	72	999	999	999	19	19	19
1-57-1-A	FWD REPAIR LKR	5	0.1	187	14	14	14	6	6	6
1-72-0-A	REPAIR ANNEX	5	0.1	86	1	1	1	86	86	86
01-89-2-A	EQPT LKR	5	0.4	34	999	999	999	0	0	0
CUI=AR	(Refrigerated Storage)									
2-156-0-A	THAW BOX	4	0.01	1595	4	4	4	0	0	0
2-156-1-A	FREEZER BOX	4	0.01	1418	4	4	4	0	0	0
2-164-2-A	CHILL BOX	4	0.01	1861	4	4	4	0	0	0
CUI=AS	(Storeroom)									
4-32-0-A	STOREROOM	5	0.4	766	8	8	8	9	9	9
4-143-0-A	ENGINEERS STOREROOM	5	0.4	410	12	12	12	132	132	132
2-16-0-A	BOSUN'S STORES	5	0.1	288	999	999	999	288	288	288
2-156-02-A	DRY PROVISIONS STOREROOM	5	0.4	441	29	29	29	441	441	441
2-172-1-A	HAWSER & RESCUE EQUIPMENT STORAGE	5	0.1	906	2	2	2	906	906	906
1-1-0-A	GENERAL STORES	5	0.1	190	18	18	18	0	0	0
1-12-0-A	BOSUN'S STORES	5	0.1	168	999	999	999	168	168	168
1-159-1-A	DRY STORES	5	0.4	38	999	999	999	38	38	38
1-159-2-A	DRY PROVISIONS STORE	5	0.1	135	22	22	22	0	0	0
CUI=C	(Ship Control/Communications)									
3-72-0-C	IC AND GYRO ROOM	7	0.01	624	7	7	7	0	0	0
2-136-0-C	CONTROL BOOTH	7	0.01	3994	5	5	5	0	0	0
02-56-1-C	RADIO ROOM	7	0.01	16029	8	8	8	987	987	987
02-56-2-C	CIC ROOM	7	0.01	8315	7	7	7	310	310	310
03-62-0-C	PILOT HOUSE	7	0.01	4423	9	9	9	4423	4423	4423
CUI=EM	(Main Propulsion - Mechanical)									
4-108-0-E	ENGINE ROOM	13	0.2	28954	3	3	3	2871	781	781
CUI=K	(Hazardous Material Storage)									
4-16-0-K	FLAMMABLE LIQUIDS STOREROOM	3	0.2	3234	2	2	2	19	19	19
CUI=L1	(Senior Officer's Cabin)									
2-72-1-L	ENGINEERING OFFICER SR	10	0.1	238	999	999	999	147	147	147
01-44-0-L	CO SR	10	0.1	220	999	999	999	158	158	158
01-44-1-L	CO CABIN	10	0.1	530	999	999	999	158	158	158
01-72-0-L	XO SR	10	0.1	228	999	999	999	158	158	158
01-72-01-L	OPS OFFICER SR	10	0.1	234	999	999	999	158	158	158
CUI=L2	(Officer/CPO Quarters)									
2-72-4-L	OFFICER SR	10	0.1	282	31	31	31	147	147	147
2-84-1-L	OFFICER SR	10	0.1	344	26	26	26	147	147	147
2-84-2-L	OFFICER SR	10	0.1	344	26	26	26	147	147	147
2-96-1-L	CPO STATEROOM	10	0.1	340	25	25	25	75	75	75

Table B.8 Fire Growth Models, Heat Release Rates, and FRI Times

Plan ID	Compartment Name	Growth Model	Alpha kW/sec2	Maximum Q kW	FRI XRAY	Time YOKE	(Min.) ZEBRA	Post- XRAY	FRI Q YOKE	(kW) ZEBRA
2-96-2-L	CPO STATEROOM	10	0.1	340	24	24	24	67	67	67
01-59-0-L	OFFICER SR	10	0.1	204	999	999	999	158	158	158
CUI=L5	(Crews Berthing)									
2-32-01-L	CREW BERTHING	10	0.01	913	11	11	11	104	104	104
2-52-01-L	CREW BERTHING	10	0.01	1125	11	11	11	66	66	66
1-32-0-L	CREW BERTHING	10	0.01	1472	11	11	11	1472	23	23
1-52-0-L	CREW BERTHING	10	0.01	561	999	999	999	186	186	186
CUI=LL	(Wardroom/Mess/Lounge Areas)									
1-80-0-L	WARDROOM	9	0.2	290	999	999	999	290	290	290
1-93-0-L	CPO MESS	9	0.2	205	999	999	999	205	8	8
1-121-0-L	CREWS MESS	9	0.2	689	999	999	999	689	689	689
CUI=LM	(Medical/Dental Spaces)									
1-114-0-L	DISPENSARY	9	0.2	103	999	999	999	103	103	103
CUI=LP	(Passageway/Staircase/Vestibule)									
4-52-01-L	HANDLING PASSAGE	15	0.01	253	999	999	999	5	5	5
2-76-0A-L	PASSAGE	15	0.01	6	999	999	999	6	6	6
2-76-0B-L	PASSAGE	15	0.01	10	999	999	999	10	10	10
2-96-0-L	PASSAGE	15	0.01	57	999	999	999	57	57	57
2-140-0A-L	PASSAGE	15	0.01	5	999	999	999	5	5	5
2-140-0B-L	PASSAGE	15	0.01	7	999	999	999	7	7	7
2-143-2-L	STAIRWAY	15	0.01	37	999	999	999	37	37	37
2-156-01A-L	PASSAGE	15	0.01	8	999	999	999	8	8	8
2-156-01B-L	PASSAGE	15	0.01	16	999	999	999	16	16	16
2-156-01C-L	PASSAGE	15	0.01	7	999	999	999	7	7	7
2-172-0-L	PASSAGE	15	0.01	22	999	999	999	22	22	22
1-52-01A-L	PASSAGE	15	0.01	263	999	999	999	263	263	263
1-52-01B-L	PASSAGE	15	0.01	63	999	999	999	63	63	63
1-52-01C-L	PASSAGE	15	0.01	219	999	999	999	219	219	219
1-108-1-L	PASSAGE	15	0.01	7	999	999	999	7	7	7
1-143-2-L	STAIRWAY	15	0.01	22	999	999	999	22	0	0
01-69-0-L	PASSAGE	15	0.01	82	999	999	999	82	82	82
02-69-2-L	PASSAGE	15	0.01	171	999	999	999	171	171	171
02-69-4-L	VESTIBULE	15	0.01	22	999	999	999	22	22	22
CUI=LW	(Sanitary Spaces)									
2-32-0-L	CREW WR, WC, SH	16	0.001	4	999	999	999	4	4	4
2-52-0-L	CREW WR, WC, SH	16	0.001	4	999	999	999	4	4	4
2-72-0-L	OFFICER WR, WC, SH	16	0.001	4	999	999	999	4	4	4
2-72-2-L	OFFICER WR, WC, SH	16	0.001	4	999	999	999	4	4	4
2-88-1-L	OFFICER WR, WC, SH	16	0.001	3	999	999	999	3	3	3
2-88-2-L	OFFICER WR, WC, SH	16	0.001	3	999	999	999	3	3	3
2-99-0-L	CPO WR, WC, SH	16	0.001	2	999	999	999	2	2	2
1-20-4-Q	DECON SHWR	16	0.001	0	999	999	999	0	0	0
1-52-2-L	CREW WR, WC, SH	16	0.001	6	999	999	999	6	6	6
01-44-2-L	CO WR, WC, SH	16	0.001	5	999	999	999	5	5	5
01-56-2-L	OFFICER WR, WC, SH	16	0.001	5	999	999	999	5	5	5
01-87-0-L	XO WR, WC, SH	16	0.001	2	999	999	999	2	2	2
01-87-1-L	OPS OFFICER WR, WC, SH	16	0.001	3	999	999	999	3	3	3
CUI=QA	(Aux Machinery Spaces)									
4-84-0-Q	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	13	0.2	5837	2	2	2	67	67	67

Table B.8 Fire Growth Models, Heat Release Rates, and FRI Times

Plan ID	Compartment Name	Growth Model	Alpha kW/sec2	Maximum Q kW	FRI XRAY	Time YOKE	(Min.) ZEBRA	Post- XRAY	FRI Q YOKE	(kW) ZEBRA
3-96-0-E	AUX MACHINERY ROOM	13	0.2	4480	2	2	2	56	56	56
4-156-0-E	AUX MACHINERY SPACE	13	0.2	9216	2	2	2	73	73	73
4-188-0-E	STEERING GEAR ROOM	13	0.2	8100	2	2	2	4008	182	182
01-92-0-Q	HELO SERVICE	13	0.2	17008	2	2	2	137	137	137
CUI=QF	(Fan Room)									
1-63-1-Q	FAN ROOM	13	0.2	1626	1	1	1	240	240	240
1-63-2-Q	FAN ROOM	13	0.2	11640	1	1	1	0	0	0
02-81-2-Q	FAN ROOM	13	0.2	16416	2	2	2	41	41	41
02-90-0-Q	PLENUM ROOM	13	0.2	7170	2	2	2	5260	5260	5260
CUI=QG	(Galley/Pantry/Scullery)									
1-114-2-Q	SCULLERY	13	0.2	3018	2	2	2	3018	3018	271
1-148-0-Q	GALLEY	13	0.2	11760	2	2	2	11760	11760	11760
CUI=QL	(Laundry)									
1-20-0-Q	LAUNDRY	12	0.1	3448	3	3	3	2318	310	310
CUI=QO	(Office Spaces)									
2-143-2-Q	ENGINEERING OFFICE	8	0.3	279	999	999	999	217	217	217
1-72-2-Q	SUPPLY OFFICE	8	0.3	158	999	999	999	11	11	11
1-99-1-Q	SHIPS OFFICE	8	0.3	140	999	999	999	68	68	68
CUI=QS	(Shops)									
2-140-1-Q	ENGINEERS WORKSHOP	5	0.4	345	999	999	999	63	63	63
2-172-2-Q	ELECTRIC WORKSHOP	5	0.4	125	999	999	999	20	20	20
02-78-1-Q	ELEC LAB AND STORAGE	5	0.4	186	999	999	999	186	186	186
CUI=TH	(Trunks/Hoists/Dumbwaiters)									
3-52-2-M	AMMO HOIST	13	0.2	810	2	2	2	810	810	0
CUI=TU	(Stacks/Engine Uptakes)									
1-108-0-Q	UPTAKE	13	0.2	31968	2	2	2	14733	14733	13645
01-99-0-Q	UPTAKE AND FAN ROOM	13	0.2	44851	3	3	3	3849	3849	3849

Appendix C
Baseline Fire Safety Analysis Results

The various reports produced in the performance of the baseline fire safety analysis on the CGC DEPENDABLE using the target output option in SAFE, version 2.2, are documented in this appendix. The following table correlates the results from SAFE computer run numbers with page numbers in this appendix:

SAFE Run Number	SAFE Output Option	Scenario	Page Number
10-37	Individual Target Option	XRAY, In Port, I, A, & M	C-2
10-38	Individual Target Option	XRAY, In Port, I & A	C-3
10-39	Individual Target Option	XRAY, In Port, I & M	C-4
10-40	Individual Target Option	XRAY, In Port, I	C-5
10-41	Individual Target Option	YOKE, In Port, I, A, & M	C-6
10-42	Individual Target Option	YOKE, In Port, I & A	C-7
10-43	Individual Target Option	YOKE, In Port, I & M	C-8
10-44	Individual Target Option	YOKE, In Port, I	C-9
6-17	Individual Target Option	YOKE, At Sea, I, A, & M	C-10
6-18	Individual Target Option	YOKE, At Sea, I & A	C-11
6-19	Individual Target Option	YOKE, At Sea, I & M	C-12
6-20	Individual Target Option	YOKE, At Sea, I	C-13

CGC DEPENDABLE
11/17/98
MODEL RUN 10-37

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0130	0.3377
01-99-0-Q	2	23 years	0.0046	0.1054
03-62-0-C	2	26 years	0.0040	0.1035
02-56-1-C	2	26 years	0.0024	0.0616
02-90-0-Q	3	18 years	0.0024	0.0440
02-56-2-C	2	26 years	0.0016	0.0417
1-108-0-Q	2	23 years	0.0018	0.0407
01-92-0-Q	2	22 years	0.0018	0.0396
1-114-2-Q	2	20 years	0.0019	0.0384
2-172-1-A	2	22 years	0.0017	0.0375
1-20-0-Q	3	19 years	0.0019	0.0364
1-93-0-L	2	24 years	0.0014	0.0340
1-121-0-L	2	24 years	0.0014	0.0326
4-188-0-E	2	26 years	0.0012	0.0319
1-99-1-Q	2	22 years	0.0012	0.0272
1-20-2-A	2	25 years	0.0010	0.0244
2-136-0-C	2	26 years	0.0009	0.0241
1-148-0-Q	2	20 years	0.0012	0.0231
2-156-02-A	2	23 years	0.0009	0.0216
1-159-2-A	2	23 years	0.0007	0.0163
1-159-1-A	2	23 years	0.0007	0.0163
4-143-0-A	2	25 years	0.0005	0.0125
2-156-1-A	2	23 years	0.0002	0.0044
2-156-0-A	2	23 years	0.0002	0.0044
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-38

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0141	0.3657
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0054	0.1241
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
02-90-0-Q	3	18 years	0.0028	0.0503
1-93-0-L	2	24 years	0.0020	0.0484
2-136-0-C	2	26 years	0.0018	0.0479
1-121-0-L	2	24 years	0.0020	0.0479
2-172-1-A	2	22 years	0.0021	0.0472
1-108-0-Q	2	23 years	0.0020	0.0453
1-114-2-Q	2	20 years	0.0022	0.0447
01-92-0-Q	2	22 years	0.0020	0.0443
1-20-0-Q	3	19 years	0.0021	0.0401
4-188-0-E	2	26 years	0.0014	0.0370
2-156-02-A	2	23 years	0.0016	0.0360
1-20-2-A	2	25 years	0.0014	0.0353
1-99-1-Q	2	22 years	0.0015	0.0325
1-148-0-Q	2	20 years	0.0014	0.0277
1-159-1-A	2	23 years	0.0011	0.0252
1-159-2-A	2	23 years	0.0011	0.0245
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0003	0.0060
2-156-0-A	2	23 years	0.0003	0.0060
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-39

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0153	0.3983
01-99-0-Q	2	23 years	0.0047	0.1081
03-62-0-C	2	26 years	0.0040	0.1035
02-56-1-C	2	26 years	0.0024	0.0616
02-90-0-Q	3	18 years	0.0025	0.0449
1-108-0-Q	2	23 years	0.0018	0.0424
02-56-2-C	2	26 years	0.0016	0.0417
1-114-2-Q	2	20 years	0.0021	0.0410
2-172-1-A	2	22 years	0.0018	0.0404
01-92-0-Q	2	22 years	0.0018	0.0402
4-188-0-E	2	26 years	0.0014	0.0370
1-20-0-Q	3	19 years	0.0019	0.0364
1-121-0-L	2	24 years	0.0015	0.0363
1-93-0-L	2	24 years	0.0015	0.0361
1-148-0-Q	2	20 years	0.0015	0.0304
2-136-0-C	2	26 years	0.0011	0.0283
1-99-1-Q	2	22 years	0.0013	0.0283
1-20-2-A	2	25 years	0.0010	0.0244
2-156-02-A	2	23 years	0.0010	0.0226
1-159-2-A	2	23 years	0.0009	0.0215
1-159-1-A	2	23 years	0.0009	0.0215
4-143-0-A	2	25 years	0.0005	0.0125
2-156-1-A	2	23 years	0.0003	0.0058
2-156-0-A	2	23 years	0.0003	0.0058
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-40

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0166	0.4317
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
2-136-0-C	2	26 years	0.0022	0.0564
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
2-172-1-A	2	22 years	0.0023	0.0508
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
4-188-0-E	2	26 years	0.0016	0.0428
1-20-0-Q	3	19 years	0.0021	0.0401
2-156-02-A	2	23 years	0.0017	0.0382
1-148-0-Q	2	20 years	0.0018	0.0360
1-20-2-A	2	25 years	0.0014	0.0353
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-41

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0046	0.1054
03-62-0-C	2	26 years	0.0040	0.1035
02-56-1-C	2	26 years	0.0024	0.0616
02-90-0-Q	3	18 years	0.0024	0.0440
02-56-2-C	2	26 years	0.0016	0.0417
1-108-0-Q	2	23 years	0.0018	0.0407
01-92-0-Q	2	22 years	0.0018	0.0396
1-114-2-Q	2	20 years	0.0019	0.0384
1-93-0-L	2	24 years	0.0014	0.0340
1-121-0-L	2	24 years	0.0014	0.0326
1-99-1-Q	2	22 years	0.0012	0.0272
1-148-0-Q	2	20 years	0.0012	0.0231
2-172-1-A	2	22 years	0.0010	0.0229
4-108-0-E	2	26 years	0.0007	0.0191
1-159-2-A	2	23 years	0.0007	0.0163
1-159-1-A	2	23 years	0.0007	0.0163
2-156-02-A	2	23 years	0.0007	0.0163
4-143-0-A	2	25 years	0.0005	0.0125
4-188-0-E	2	26 years	0.0003	0.0089
2-156-1-A	2	23 years	0.0002	0.0044
2-156-0-A	2	23 years	0.0002	0.0044
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-42

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0054	0.1241
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
02-90-0-Q	3	18 years	0.0028	0.0503
1-93-0-L	2	24 years	0.0020	0.0484
1-121-0-L	2	24 years	0.0020	0.0479
1-108-0-Q	2	23 years	0.0020	0.0453
1-114-2-Q	2	20 years	0.0022	0.0447
01-92-0-Q	2	22 years	0.0020	0.0443
1-99-1-Q	2	22 years	0.0015	0.0325
2-172-1-A	2	22 years	0.0013	0.0290
1-148-0-Q	2	20 years	0.0014	0.0277
1-159-1-A	2	23 years	0.0011	0.0252
2-156-02-A	2	23 years	0.0011	0.0250
1-159-2-A	2	23 years	0.0011	0.0245
4-108-0-E	2	26 years	0.0009	0.0231
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0004	0.0113
2-156-1-A	2	23 years	0.0003	0.0060
2-156-0-A	2	23 years	0.0003	0.0060
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-43

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0047	0.1081
03-62-0-C	2	26 years	0.0040	0.1035
02-56-1-C	2	26 years	0.0024	0.0616
02-90-0-Q	3	18 years	0.0025	0.0449
1-108-0-Q	2	23 years	0.0018	0.0424
02-56-2-C	2	26 years	0.0016	0.0417
1-114-2-Q	2	20 years	0.0021	0.0410
01-92-0-Q	2	22 years	0.0018	0.0402
1-121-0-L	2	24 years	0.0015	0.0363
1-93-0-L	2	24 years	0.0015	0.0361
1-148-0-Q	2	20 years	0.0015	0.0304
1-99-1-Q	2	22 years	0.0013	0.0283
4-108-0-E	2	26 years	0.0009	0.0234
2-172-1-A	2	22 years	0.0011	0.0233
1-159-2-A	2	23 years	0.0009	0.0215
1-159-1-A	2	23 years	0.0009	0.0215
2-156-02-A	2	23 years	0.0007	0.0164
4-143-0-A	2	25 years	0.0005	0.0125
4-188-0-E	2	26 years	0.0004	0.0107
2-156-1-A	2	23 years	0.0003	0.0058
2-156-0-A	2	23 years	0.0003	0.0058
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/17/98
MODEL RUN 10-44

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, In-Port FRI-time adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
1-148-0-Q	2	20 years	0.0018	0.0360
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
2-172-1-A	2	22 years	0.0013	0.0295
4-108-0-E	2	26 years	0.0011	0.0286
2-156-02-A	2	23 years	0.0011	0.0253
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0005	0.0136
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/12/98
MODEL RUN 6-17

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, At-Sea FRI time-adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0044	0.1016
03-62-0-C	2	26 years	0.0038	0.0991
02-56-1-C	2	26 years	0.0023	0.0599
02-90-0-Q	3	18 years	0.0024	0.0424
02-56-2-C	2	26 years	0.0016	0.0411
1-108-0-Q	2	23 years	0.0018	0.0403
01-92-0-Q	2	22 years	0.0018	0.0391
1-114-2-Q	2	20 years	0.0019	0.0382
1-93-0-L	2	24 years	0.0014	0.0333
1-121-0-L	2	24 years	0.0013	0.0323
1-99-1-Q	2	22 years	0.0011	0.0252
1-148-0-Q	2	20 years	0.0012	0.0230
2-172-1-A	2	22 years	0.0010	0.0222
4-108-0-E	2	26 years	0.0007	0.0189
1-159-2-A	2	23 years	0.0007	0.0153
1-159-1-A	2	23 years	0.0007	0.0153
2-156-02-A	2	23 years	0.0006	0.0145
4-143-0-A	2	25 years	0.0005	0.0125
4-188-0-E	2	26 years	0.0003	0.0082
2-156-1-A	2	23 years	0.0002	0.0042
2-156-0-A	2	23 years	0.0002	0.0042
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/12/98
MODEL RUN 6-18

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, At-Sea FRI time-adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0054	0.1241
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
02-90-0-Q	3	18 years	0.0028	0.0503
1-93-0-L	2	24 years	0.0020	0.0484
1-121-0-L	2	24 years	0.0020	0.0479
1-108-0-Q	2	23 years	0.0020	0.0453
1-114-2-Q	2	20 years	0.0022	0.0447
01-92-0-Q	2	22 years	0.0020	0.0443
1-99-1-Q	2	22 years	0.0015	0.0325
2-172-1-A	2	22 years	0.0013	0.0290
1-148-0-Q	2	20 years	0.0014	0.0277
1-159-1-A	2	23 years	0.0011	0.0252
2-156-02-A	2	23 years	0.0011	0.0250
1-159-2-A	2	23 years	0.0011	0.0245
4-108-0-E	2	26 years	0.0009	0.0231
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0004	0.0113
2-156-1-A	2	23 years	0.0003	0.0060
2-156-0-A	2	23 years	0.0003	0.0060
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/12/98
MODEL RUN 6-19

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, At-Sea FRI time-adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0045	0.1041
03-62-0-C	2	26 years	0.0038	0.0991
02-56-1-C	2	26 years	0.0023	0.0599
02-90-0-Q	3	18 years	0.0024	0.0432
1-108-0-Q	2	23 years	0.0018	0.0420
02-56-2-C	2	26 years	0.0016	0.0411
1-114-2-Q	2	20 years	0.0020	0.0409
01-92-0-Q	2	22 years	0.0018	0.0397
1-121-0-L	2	24 years	0.0015	0.0361
1-93-0-L	2	24 years	0.0015	0.0353
1-148-0-Q	2	20 years	0.0015	0.0304
1-99-1-Q	2	22 years	0.0012	0.0262
4-108-0-E	2	26 years	0.0009	0.0232
2-172-1-A	2	22 years	0.0010	0.0226
1-159-2-A	2	23 years	0.0009	0.0202
1-159-1-A	2	23 years	0.0009	0.0202
2-156-02-A	2	23 years	0.0006	0.0146
4-143-0-A	2	25 years	0.0005	0.0125
4-188-0-E	2	26 years	0.0004	0.0102
2-156-1-A	2	23 years	0.0002	0.0056
2-156-0-A	2	23 years	0.0002	0.0056
4-156-0-E	2	26 years	0.0001	0.0027
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
11/12/98
MODEL RUN 6-20

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Baseline, At-Sea FRI time-adjusted M values

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
1-148-0-Q	2	20 years	0.0018	0.0360
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
2-172-1-A	2	22 years	0.0013	0.0295
4-108-0-E	2	26 years	0.0011	0.0286
2-156-02-A	2	23 years	0.0011	0.0253
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0005	0.0136
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

[This page intentionally left blank.]

Appendix D
Analysis of CGC DEPENDABLE - Post Paragon

In conjunction with the Paragon Project the following major changes were made to the installed fire protection equipment and manual firefighting procedures on the CGC DEPENDABLE:

- The existing fire detection and monitoring system was changed to a fully addressable system and 16 fixed surveillance cameras were installed.
- Manual firefighting procedures were changed to incorporate a rapid response team concept. In addition, the in port duty section was significantly reduced in size while the vessel is in homeport. Additional details concerning these and other changes are discussed in section 4 of this report.

The various input and output data produced in the analysis of post-Paragon conditions on CGC DEPENDABLE using SAFE, version 2.2, are documented in this appendix. The following index correlates SAFE input and output data with page numbers in this appendix for at sea, in homeport, and in port away from homeport conditions:

CGC DEPENDABLE M-VALUES ALTERNATIVE (RRT/ADDRESSABLE DETECTION) AT SEA

Plan ID	CUI	Comp	New Detectors	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
3-12-0-Q	AG	CHAIN LOCKER		15	A	S	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	1	1	0.8	0.8	1	1	0.95	0.95	0.18
2-52-02-A	AG	CLEANING GEAR LOCKER		31	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-75-1-A	AG	WARDROBE		∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-78-0-A	AG	HS STORES		∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-78-2-A	AG	REC LKR		11	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
2-180-2-A	AG	REPAIR PARTY LOCKER		4	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	0.75	0.9	1	0.675	1	1	0.95	0.95	0.22
1-20-2-A	AS	GENERAL STORES		16	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-52-1-A	AG	SHIPS SERVICE STORE		∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
1-57-1-A	AG	FWD REPAIR LOCKER		14	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
1-72-0-A	AG	REPAIR ANNEX		∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.29
01-89-2-A	AG	EQPT LKR		∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-156-0-A	AR	THAW BOX		4	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.14
2-156-1-A	AR	FREEZER BOX		4	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.14
2-164-2-A	AR	CHILL BOX		4	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.14
4-32-0-A	AS	STOREROOM	2-22	8	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.99	0.9	1	0.891	1	1	0.8	0.8	0.49
4-143-0-A	AS	ENGINEERS STOREROOM	8-23	12	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-16-0-A	AS	BOSUN'S STORES	1-7	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-156-02-A	AS	DRY PROVISIONS STORES	8-25	29	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-172-1-A	AS	HAWSER & RESCUE EQUIPMENT STORAGE	8-26	2	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.6	1	1	0.6	1	1	0.8	0.8	0.33
1-1-0-A	AS	GENERAL STORES	1-8	18	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
1-12-0-A	AS	BOSUN'S STORES		∞	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-159-1-A	AS	DRY STORES		∞	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
1-159-2-A	AS	DRY PROVISIONS STORES		22	A	M	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.24
3-72-0-C	C	IC AND GYRO ROOM	4-56	7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	1	1	0.99	0.9	0.9	0.8	0.648	0.42
2-136-0-C	C	CONTROL BOOTH	6-11	5	C	M	1	1	0.95	0.95	1	0.9	0.85	0.76	0.9	1	1	0.9	0.9	0.9	0.8	0.648	0.42
02-56-1-C	C	RADIO ROOM	11-110/11-111	8	C	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	0.99	0.8	0.8	0.633	0.9	0.9	0.8	0.648	0.29
02-56-2-C	C	CIC ROOM	11-109	7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	0.8	0.85	0.673	0.9	0.9	0.8	0.648	0.28
03-62-0-C	C	PILOT HOUSE	12-123	9	C	M	1	1	1	1	1	0.9	0.85	0.76	0.99	1	0.85	0.841	0.9	0.9	0.8	0.648	0.41
4-108-0-E	EM	ENGINE ROOM	6-7 to 6-10	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.7	1	0.8	0.56	0.95	0.95	0.65	0.586	0.15
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	2-21	2	B	L	0.95	0.95	0.95	0.85	1	0.8	0.9	0.72	0.6	1	1	0.6	0.95	0.95	0.65	0.586	0.21
2-72-1-L	L1	ENGINEERING OFFICER STATEROOM	4-55	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-44-0-L	L1	CO STATEROOM	10-98	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-44-1-L	L1	CO CABIN	10-97	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-72-0-L	L1	EXEC OFF STATEROOM	10-93	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-72-01-L	L1	OPS OFFICER	10-95	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50

Plan ID	CUI	Comp	New Detectors	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
		STATEROOM																					
2-72-4-L	L2	OFFICER STATEROOM	4-50	31	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-84-1-L	L2	OFFICER STATEROOM	4-54	26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-84-2-L	L2	OFFICER STATEROOM	4-51	26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-96-1-L	L2	CPO STATEROOM	4-53	25	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-96-2-L	L2	CPO STATEROOM	4-52	24	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-59-0-L	L2	OFFICER STATEROOM	10-96	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-32-01-L	L5	CREWS BERTHING	2-20	11	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
2-52-01-L	L5	CREWS BERTHING	3-34/3-35	11	A	M	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.54
1-32-0-L	L5	CREWS BERTHING	2-19	11	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
1-52-0-L	L5	CREWS BERTHING	3-33	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
1-80-0-L	LL	WARDROOM	4-47	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.47
1-93-0-L	LL	CPO MESS	4-48	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.47
1-121-0-L	LL	CREWS MESS	5-68/5-70	∞	A	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.51
1-114-0-L	LM	DISPENSARY	5-67	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
4-52-01-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-76-0A-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-76-0B-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-96-0-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-140-0A-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-140-0B-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-143-2-L	LP	STAIRWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-156-01A-L	LP	PASSAGEWAY	8-27	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-156-01B-L	LP	PASSAGEWAY	8-27	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-156-01C-L	LP	PASSAGEWAY	8-27	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-172-0-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01A-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01B-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-01C-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-108-1-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-143-2-L	LP	STAIRWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-69-0-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
02-69-2-L	LP	PASSAGEWAY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
02-69-4-L	LP	VESTIBULE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-32-0-L	LW	CREWS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-52-0-L	LW	CREWS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-72-0-L	LW	OFFICERS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-72-2-L	LW	OFFICERS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.394
2-88-1-L	LW	OFFICERS SANITARY		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39

Plan ID	CUI	Comp	New Detectors	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
		SPACE																					
2-88-2-L	LW	OFFICERS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
2-99-0-L	LW	CPO SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-20-4-Q	LW	DECON SHWR		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
1-52-2-L	LW	CREWS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-44-2-L	LW	CO SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-56-2-L	LW	OFFICERS SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.513	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-87-0-L	LW	XO SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
01-87-1-L	LW	OPS OFFICER SANITARY SPACE		∞	A	S	0.6	0.9	0.95	0.51	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.39
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	4-57	2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.648	0.22
3-96-0-E	QA	AUX MACHINERY SPACE	6-6	2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.648	0.22
4-156-0-E	QA	AUX MACHINERY SPACE	8-22	2	B	M	0.95	0.95	0.95	0.85	0.7	0.9	0.85	0.53	0.6	1	0.9	0.54	0.85	0.85	0.8	0.578	0.14
4-188-0-E	QA	STEERING GEAR ROOM	9-38	2	B	M	0.95	0.95	0.95	0.85	0.9	0.9	0.85	0.68	0.6	1	0.8	0.48	0.85	0.85	0.8	0.578	0.16
01-92-0-Q	QA	HELO SERVICE	10-94	2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.648	0.22
1-63-1-Q	QF	FAN ROOM		1	C	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.95	0.769	0.04
1-63-2-Q	QF	FAN ROOM		1	C	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.95	0.769	0.04
02-81-2-Q	QF	FAN ROOM		2	C	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.95	0.769	0.09
02-90-0-Q	QF	PLENUM ROOM		2	C	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.95	0.769	0.09
1-114-2-Q	QG	SCULLERY	5-69	2	A	S	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	1	0.6	1	1	0.95	0.95	0.37
1-146-0-Q	QG	GALLEY	7-81	2	B	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	0.9	1	0.54	0.85	0.85	0.8	0.578	0.20
1-20-0-Q	QL	LAUNDRY	1-6	3	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.7	1	1	0.7	1	1	0.8	0.8	0.36
2-143-2-Q	QO	ENGINEERING OFFICE	8-28	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	1	0.9	1	1	0.8	0.8	0.47
1-72-2-Q	QO	SUPPLY OFFICE	4-46	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
1-99-1-Q	QO	SHIPS OFFICE	4-49	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
2-140-1-Q	QS	ENGINEERS WORKSHOP	8-24	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
2-172-2-Q	QS	ELECTRIC WORKSHOP		∞	A	M	0.6	0.9	0.95	0.51	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.25
02-78-1-Q	QS	ELEC LAB AND STORAGE	11-108	∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
3-52-2-M	TH	AMMO HOIST		2	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	0.4	1	0.9	0.36	1	1	0.95	0.95	0.11
1-108-0-Q	TU	UPTAKE		2	B	L	0.5	0.9	0.95	0.42	1	0.8	0.9	0.72	0.4	1	0.9	0.36	0.85	0.85	0.65	0.469	0.05
01-99-0-Q	TU	UPTAKE AND FAN ROOM		3	B	L	0.5	0.9	0.95	0.42	1	0.8	0.9	0.72	0.6	1	0.9	0.54	0.85	0.85	0.65	0.469	0.07

Calculated FRI Times

Plan ID	CUI	Comp	FRI	Class	Size	dan	nan	san	An	fap	vap	pap	Ap	saa	aaa	daa	Aa	qae	cae	bae	Ae	A|EB
4-108-0-E	EM	**ENGINE ROOM**	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.23
4-16-0-K	K	**FLAMMABLE LIQUIDS STOREROOM**	2	B	L	0.95	0.95	0.95	0.86	1	0.8	0.9	0.72	0.95	1	1	0.95	1	0.9	0.85	0.77	0.45
3-96-0-E	QA	**AUX MACHINERY SPACE**	2	B	M	0.95	0.95	0.95	0.86	1	0.9	0.85	0.77	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.32
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	L	0.95	0.95	0.95	0.86	0.7	0.9	0.85	0.54	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.22
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.95	0.95	0.95	0.86	0.9	0.9	0.85	0.69	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.29
1-146-0-Q	QG	**GALLEY**	2	B	M	0.95	0.95	0.95	0.86	1	0.9	0.85	0.77	0.9	1	1	0.9	1	1	0.9	0.9	0.53

An=dan*nan*san where dan=detection of fire, nan=notification of Bridge, and san=sound the alarm

Ap=fap*vap*cap where fap=secure the fuel supply, vap=secure the ventilation, and cap=secure the electrical power

Aa=saa*aaa*daa where saa=alignment of automated system, aaa=agent discharges from nozzle, and daa=agent discharges on the fire

Ae=qae*cae*bae where qae=quantity of agent is adequate, cae=concentration of agent is adequate, and bae=blackout occurs

A|EB=An*Ap*Aa*Ae where An=Notification, Ap=Preparation, Aa=Agent Application, and Ae=Fire Extinguishment

Installed Automated Systems:

Fixed CO2 Total Flooding System in the Flammable Liquids Storeroom, Aqueous Potassium Carbonate System in the Galley,
and AFFF Bilge Sprinkling in the Engine Room, Auxiliary Machinery Spaces and Steering Gear Room.

Notes:

The Galley is occupied 30% of the time, however, it is assumed that if a grease fire occurs on the Galley stove, it is assumed that a crew member is present in the Galley.

The probability of the Galley's automated system successfully extinguishing the fire is based on grease fires on the stove only.

Calculated FRI Times

CGC DEPENDABLE
12/31/98
MODEL RUN 14-63

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, At-Sea Post-Paragon RRT Concept M values (revised A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0035	0.0807
03-62-0-C	2	26 years	0.0028	0.0733
02-56-1-C	2	26 years	0.0018	0.0455
02-90-0-Q	3	18 years	0.0019	0.0349
1-108-0-Q	2	23 years	0.0014	0.0321
02-56-2-C	2	26 years	0.0012	0.0313
01-92-0-Q	2	22 years	0.0014	0.0301
1-114-2-Q	2	20 years	0.0013	0.0255
1-93-0-L	2	24 years	0.0009	0.0212
1-121-0-L	2	24 years	0.0008	0.0183
1-99-1-Q	2	22 years	0.0008	0.0173
2-172-1-A	2	22 years	0.0006	0.0128
1-148-0-Q	2	20 years	0.0006	0.0122
4-108-0-E	2	26 years	0.0004	0.0113
1-159-2-A	2	23 years	0.0004	0.0081
1-159-1-A	2	23 years	0.0004	0.0081
4-143-0-A	2	25 years	0.0003	0.0069
2-156-02-A	2	23 years	0.0003	0.0063
4-188-0-E	2	26 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0023
2-156-1-A	2	23 years	0.0000	0.0015
2-156-0-A	2	23 years	0.0000	0.0015
4-156-0-E	2	26 years	0.0000	0.0010
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 14-64

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, At-Sea Post-Paragon RRT Concept M values (revised A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0052	0.1206
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
02-90-0-Q	3	18 years	0.0027	0.0492
1-93-0-L	2	24 years	0.0019	0.0462
1-121-0-L	2	24 years	0.0018	0.0438
01-92-0-Q	2	22 years	0.0020	0.0435
1-108-0-Q	2	23 years	0.0019	0.0433
1-114-2-Q	2	20 years	0.0021	0.0419
1-99-1-Q	2	22 years	0.0014	0.0310
2-172-1-A	2	22 years	0.0013	0.0286
2-156-02-A	2	23 years	0.0011	0.0248
1-148-0-Q	2	20 years	0.0010	0.0207
4-108-0-E	2	26 years	0.0008	0.0200
1-159-2-A	2	23 years	0.0008	0.0184
1-159-1-A	2	23 years	0.0008	0.0184
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0004	0.0097
2-156-1-A	2	23 years	0.0002	0.0045
2-156-0-A	2	23 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 14-65

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, At-Sea Post-Paragon RRT Concept M values (revised A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0037	0.0840
03-62-0-C	2	26 years	0.0028	0.0733
02-56-1-C	2	26 years	0.0018	0.0455
02-90-0-Q	3	18 years	0.0020	0.0355
1-108-0-Q	2	23 years	0.0015	0.0339
02-56-2-C	2	26 years	0.0012	0.0313
01-92-0-Q	2	22 years	0.0014	0.0311
1-114-2-Q	2	20 years	0.0014	0.0282
1-121-0-L	2	24 years	0.0010	0.0234
1-148-0-Q	2	20 years	0.0011	0.0228
1-93-0-L	2	24 years	0.0009	0.0222
1-99-1-Q	2	22 years	0.0008	0.0182
4-108-0-E	2	26 years	0.0006	0.0162
1-159-2-A	2	23 years	0.0007	0.0152
1-159-1-A	2	23 years	0.0007	0.0152
2-172-1-A	2	22 years	0.0006	0.0130
4-143-0-A	2	25 years	0.0003	0.0069
2-156-02-A	2	23 years	0.0003	0.0063
4-188-0-E	2	26 years	0.0002	0.0063
2-156-1-A	2	23 years	0.0002	0.0041
2-156-0-A	2	23 years	0.0002	0.0041
1-63-1-Q	3	18 years	0.0001	0.0023
4-156-0-E	2	26 years	0.0000	0.0013
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 14-66

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . at SEA
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, At-Sea Post-Paragon RRT Concept M values (revised A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
1-148-0-Q	2	20 years	0.0018	0.0360
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
2-172-1-A	2	22 years	0.0013	0.0295
4-108-0-E	2	26 years	0.0011	0.0286
2-156-02-A	2	23 years	0.0011	0.0253
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0005	0.0136
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE M-VALUES ALTERNATIVE (IN HOMEPORT) IN PORT

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
3-12-0-Q	AG	CHAIN LOCKER			15	A	S	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	1	1	0.8	0.8	1	1	0.9	0.9	0.17
2-52-02-A	AG	CLEANING GEAR LOCKER			31	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.24
2-75-1-A	AG	WARDROBE			∞	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.9	0.9	0.22
2-78-0-A	AG	HS STORES			∞	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	0.8	0.72	1	1	0.5	0.5	0.09
2-78-2-A	AG	REC LKR			11	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	0.9	0.81	1	1	0.9	0.9	0.20
2-180-2-A	AG	REPAIR PARTY LOCKER			4	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.9	1	0.67	1	1	0.9	0.9	0.16
1-20-2-A	AG	GENERAL STORES			16	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.12
1-52-1-A	AG	SHIPS SERVICE STORE			∞	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.9	0.9	0.22
1-57-1-A	AG	FWD REPAIR LOCKER			14	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.9	0.9	0.22
1-72-0-A	AG	REPAIR ANNEX			1	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.2	0.9	0.9	0.16	1	1	0.9	0.9	0.04
01-89-2-A	AG	EQPT LKR			∞	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.24
2-156-0-A	AR	THAW BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.5	0.5	0.07
2-156-1-A	AR	FREEZER BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.5	0.5	0.07
2-164-2-A	AR	CHILL BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.5	0.5	0.07
4-32-0-A	AS	STOREROOM	2-22		8	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.99	0.9	1	0.89	1	1	0.5	0.5	0.30
4-143-0-A	AS	ENGINEERS STOREROOM	8-23		12	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-16-0-A	AS	BOSUN'S STORES	1-7	10	∞	A	M	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.33
2-156-02-A	AS	DRY PROVISIONS STORES	8-25		29	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-172-1-A	AS	HAWSER & RESCUE EQUIPMENT STORAGE	8-26		2	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.6	1	1	0.6	1	1	0.5	0.5	0.20
1-1-0-A	AS	GENERAL STORES	1-8		18	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
1-12-0-A	AS	BOSUN'S STORES			∞	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.12
1-159-1-A	AS	DRY STORES			∞	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.12
1-159-2-A	AS	DRY PROVISIONS STORES			22	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.12
3-72-0-C	C	IC AND GYRO ROOM	4-56		7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	1	1	0.99	0.9	0.9	0.5	0.40	0.26
2-136-0-C	C	CONTROL BOOTH	6-11		5	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.9	1	1	0.9	0.9	0.9	0.5	0.40	0.23
02-56-1-C	C	RADIO ROOM	11-110/11-111		8	C	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	0.99	0.8	0.8	0.63	0.9	0.9	0.5	0.40	0.18
02-56-2-C	C	CIC ROOM	11-109		7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	0.8	0.85	0.67	0.9	0.9	0.5	0.40	0.17
03-62-0-C	C	PILOT HOUSE	12-123		9	C	M	0.95	0.95	1	0.90	1	0.9	0.85	0.76	0.99	1	0.85	0.84	0.9	0.9	0.5	0.40	0.23
4-108-0-E	EM	ENGINE ROOM	6-7 to 6-10	7, 13, 14	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.7	1	0.8	0.56	0.95	0.95	0.25	0.22	0.06
4-16-0-K	K	FLAMMABLE LIQUIDS STOREROOM	2-21		2	B	L	0.95	0.95	0.95	0.85	1	0.8	0.9	0.72	0.6	1	1	0.6	0.95	0.95	0.25	0.22	0.08
2-72-1-L	L1	ENGINEERING	4-55		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
		OFFICER STATEROOM																						
01-44-0-L	L1	CO STATEROOM	10-98		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
01-44-1-L	L1	CO CABIN	10-97		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
01-72-0-L	L1	EXEC OFF STATEROOM	10-93		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
01-72-01-L	L1	OPS OFFICER STATEROOM	10-95		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-72-4-L	L2	OFFICER STATEROOM	4-50		31	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-84-1-L	L2	OFFICER STATEROOM	4-54		26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-84-2-L	L2	OFFICER STATEROOM	4-51		26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-96-1-L	L2	CPO STATEROOM	4-53		25	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-96-2-L	L2	CPO STATEROOM	4-52		24	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
01-59-0-L	L2	OFFICER STATEROOM	10-96		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.5	0.5	0.31
2-32-01-L	L5	CREWS BERTHING	2-20		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.5	0.5	0.31
2-52-01-L	L5	CREWS BERTHING	3-34/3-35		∞	A	M	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.5	0.5	0.33
1-32-0-L	L5	CREWS BERTHING	2-19		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.5	0.5	0.31
1-52-0-L	L5	CREWS BERTHING	3-33		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.5	0.5	0.31
1-80-0-L	LL	WARDROOM	4-47		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.5	0.5	0.29
1-93-0-L	LL	CPO MESS	4-48		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.5	0.5	0.29
1-121-0-L	LL	CREWS MESS	5-68/5-70	5	∞	A	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.5	0.5	0.32
1-114-0-L	LM	DISPENSARY	5-67		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.26
4-52-01-L	LP	PASSAGEWAY		11	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
2-76-0A-L	LP	PASSAGEWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-76-0B-L	LP	PASSAGEWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-96-0-L	LP	PASSAGEWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-140-0A-L	LP	PASSAGEWAY		8	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
2-140-0B-L	LP	PASSAGEWAY		8	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
2-143-2-L	LP	STAIRWAY		8	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
2-156-01A-L	LP	PASSAGEWAY	8-27	9	∞	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.67
2-156-01B-L	LP	PASSAGEWAY	8-27	9	∞	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.67
2-156-01C-L	LP	PASSAGEWAY	8-27	9	∞	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.67
2-172-0-L	LP	PASSAGEWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
1-52-01A-L	LP	PASSAGEWAY		2	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
1-52-01B-L	LP	PASSAGEWAY		2	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
1-52-01C-L	LP	PASSAGEWAY		2	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
1-108-1-L	LP	PASSAGEWAY		2	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
1-143-2-L	LP	STAIRWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
01-69-0-L	LP	PASSAGEWAY			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
02-69-2-L	LP	PASSAGEWAY		1	∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.62
02-69-4-L	LP	VESTIBULE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-32-0-L	LW	CREWS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-52-0-L	LW	CREWS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-72-0-L	LW	OFFICERS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-72-2-L	LW	OFFICERS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-88-1-L	LW	OFFICERS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-88-2-L	LW	OFFICERS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
2-99-0-L	LW	CPO SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
1-20-4-Q	LW	DECON SHWR			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
1-52-2-L	LW	CREWS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
01-44-2-L	LW	CO SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
01-56-2-L	LW	OFFICERS SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
01-87-0-L	LW	XO SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
01-87-1-L	LW	OPS OFFICER SANITARY SPACE			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.9	0.9	0.31
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	4-57		2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.5	0.40	0.14
3-96-0-E	QA	AUX MACHINERY SPACE	6-6	12	2	C	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.5	0.40	0.15
4-156-0-E	QA	AUX MACHINERY SPACE	8-22	15	2	B	M	0.99	0.99	0.95	0.93	0.7	0.9	0.85	0.53	0.6	1	0.9	0.54	0.85	0.85	0.5	0.36	0.09
4-188-0-E	QA	STEERING GEAR ROOM	9-38	16	2	B	M	0.99	0.99	0.95	0.93	0.9	0.9	0.85	0.68	0.6	1	0.8	0.48	0.85	0.85	0.5	0.36	0.11
01-92-0-Q	QA	HELO SERVICE	10-94		2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.5	0.40	0.14
1-63-1-Q	QF	FAN ROOM			1	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.9	0.72	0.03
1-63-2-Q	QF	FAN ROOM			1	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.9	0.72	0.03
02-81-2-Q	QF	FAN ROOM			2	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.9	0.72	0.06
02-90-0-Q	QF	PLENUM ROOM			2	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.9	0.72	0.06
1-114-2-Q	QG	SCULLERY	5-69		2	A	S	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	1	0.6	1	1	0.9	0.9	0.35
1-146-0-Q	QG	GALLEY	7-81		2	B	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	0.9	1	0.54	0.85	0.85	0.5	0.36	0.12
1-20-0-Q	QL	LAUNDRY	1-6		3	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.7	1	1	0.7	1	1	0.5	0.5	0.22
2-143-2-Q	QO	ENGINEERING OFFICE	8-28		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	1	0.9	1	1	0.5	0.5	0.29
1-72-2-Q	QO	SUPPLY OFFICE	4-46		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.26

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	qme	cme	bme	Me	MIEB
1-99-1-Q	QO	SHIPS OFFICE	4-49		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.26
2-140-1-Q	QS	ENGINEERS WORKSHOP	8-24		∞	A	S	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.26
2-172-2-Q	QS	ELECTRIC WORKSHOP			∞	A	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.13
02-78-1-Q	QS	ELEC LAB AND STORAGE	11-108		∞	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.5	0.5	0.26
3-52-2-M	TH	AMMO HOIST			2	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.4	1	0.9	0.36	1	1	0.9	0.9	0.08
1-108-0-Q	TU	UPTAKE			2	B	L	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	0.4	1	0.9	0.36	0.85	0.85	0.25	0.18	0.01
01-99-0-Q	TU	UPTAKE AND FAN ROOM			3	B	L	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	0.6	1	0.9	0.54	0.85	0.85	0.25	0.18	0.02

CALCULATED FRI TIMES

Plan ID	CUI	Comp	FRI	Class	Size	dan	nan	san	An	fap	vap	pap	Ap	saa	aaa	daa	Aa	qae	cae	bae	Ae	A|EB
4-108-0-E	EM	**ENGINE ROOM**	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.23
4-16-0-K	K	**FLAMMABLE LIQUIDS STOREROOM**	2	B	L	0.95	0.95	0.95	0.86	1	0.8	0.9	0.72	0.95	1	1	0.95	1	0.9	0.85	0.77	0.45
3-96-0-E	QA	**AUX MACHINERY SPACE**	2	B	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.77	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.35
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	L	0.99	0.99	0.95	0.93	0.7	0.9	0.85	0.54	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.24
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.99	0.99	0.95	0.93	0.9	0.9	0.85	0.69	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.31
1-146-0-Q	QG	**GALLEY**	2	B	M	0.95	0.95	0.95	0.86	1	0.9	0.85	0.77	0.9	1	1	0.9	1	1	0.9	0.9	0.53

An=dan*nan*san where dan=detection of fire, nan=notification of Bridge, and san=sound the alarm

Ap=fap*vap*cap where fap=secure the fuel supply, vap=secure the ventilation, and cap=secure the electrical power

Aa=saa*aaa*daa where saa=alignment of automated system, aaa=agent discharges from nozzle, and daa=agent discharges on the fire

Ae=qae*cae*bae where qae=quantity of agent is adequate, cae=concentration of agent is adequate, and bae=blackout occurs

A|EB=An*Ap*Aa*Ae where An=Notification, Ap=Preparation, Aa=Agent Application, and Ae=Fire Extinguishment

Installed Automated Systems:
Fixed CO2 Total Flooding System in the Flammable Liquids Storeroom, Aqueous Potassium Carbonate System in the Galley, and AFFF Bilge Sprinkling in the Engine Room, Auxiliary Machinery Spaces and Steering Gear Room.

Notes:
The Galley is occupied 30% of the time, however, it is assumed that if a grease fire occurs on the Galley stove, it is assumed that a crew member is present in the Galley.
The probability of the Galley's automated system successfully extinguishing the fire is based on grease fires on the stove only.

CGC DEPENDABLE
12/31/98
MODEL RUN 15-67

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0118	0.3063
03-62-0-C	2	26 years	0.0041	0.1067
01-99-0-Q	2	23 years	0.0041	0.0935
02-56-1-C	2	26 years	0.0023	0.0586
02-90-0-Q	3	18 years	0.0022	0.0387
02-56-2-C	2	26 years	0.0015	0.0386
01-92-0-Q	2	22 years	0.0016	0.0350
1-108-0-Q	2	23 years	0.0015	0.0338
1-20-0-Q	3	19 years	0.0016	0.0308
2-136-0-C	2	26 years	0.0012	0.0302
1-114-2-Q	2	20 years	0.0014	0.0273
2-172-1-A	2	22 years	0.0012	0.0270
1-93-0-L	2	24 years	0.0011	0.0269
4-188-0-E	2	26 years	0.0009	0.0245
1-121-0-L	2	24 years	0.0010	0.0238
1-20-2-A	2	25 years	0.0009	0.0234
1-99-1-Q	2	22 years	0.0009	0.0204
1-148-0-Q	2	20 years	0.0007	0.0140
2-156-02-A	2	23 years	0.0006	0.0137
1-159-2-A	2	23 years	0.0005	0.0109
1-159-1-A	2	23 years	0.0005	0.0109
4-143-0-A	2	25 years	0.0004	0.0095
2-156-1-A	2	23 years	0.0001	0.0028
2-156-0-A	2	23 years	0.0001	0.0028
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0015
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-68

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0127	0.3304
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0052	0.1206
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
02-90-0-Q	3	18 years	0.0027	0.0492
1-93-0-L	2	24 years	0.0019	0.0462
2-172-1-A	2	22 years	0.0020	0.0442
1-121-0-L	2	24 years	0.0018	0.0438
01-92-0-Q	2	22 years	0.0020	0.0435
2-136-0-C	2	26 years	0.0017	0.0434
1-108-0-Q	2	23 years	0.0019	0.0433
1-114-2-Q	2	20 years	0.0021	0.0419
1-20-0-Q	3	19 years	0.0021	0.0401
1-20-2-A	2	25 years	0.0014	0.0353
2-156-02-A	2	23 years	0.0015	0.0342
4-188-0-E	2	26 years	0.0012	0.0322
1-99-1-Q	2	22 years	0.0014	0.0310
1-148-0-Q	2	20 years	0.0010	0.0207
1-159-2-A	2	23 years	0.0008	0.0184
1-159-1-A	2	23 years	0.0008	0.0184
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0002	0.0045
2-156-0-A	2	23 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-69

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0153	0.3990
03-62-0-C	2	26 years	0.0041	0.1067
01-99-0-Q	2	23 years	0.0042	0.0970
02-56-1-C	2	26 years	0.0023	0.0586
02-90-0-Q	3	18 years	0.0022	0.0402
2-136-0-C	2	26 years	0.0015	0.0392
02-56-2-C	2	26 years	0.0015	0.0386
1-108-0-Q	2	23 years	0.0016	0.0361
01-92-0-Q	2	22 years	0.0016	0.0357
4-188-0-E	2	26 years	0.0013	0.0328
2-172-1-A	2	22 years	0.0014	0.0310
1-20-0-Q	3	19 years	0.0016	0.0308
1-114-2-Q	2	20 years	0.0015	0.0307
1-121-0-L	2	24 years	0.0013	0.0305
1-93-0-L	2	24 years	0.0012	0.0284
1-148-0-Q	2	20 years	0.0013	0.0259
1-20-2-A	2	25 years	0.0009	0.0234
1-99-1-Q	2	22 years	0.0010	0.0217
1-159-2-A	2	23 years	0.0009	0.0202
1-159-1-A	2	23 years	0.0009	0.0202
2-156-02-A	2	23 years	0.0006	0.0145
4-143-0-A	2	25 years	0.0004	0.0095
2-156-1-A	2	23 years	0.0002	0.0053
2-156-0-A	2	23 years	0.0002	0.0053
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0019
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-70

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0166	0.4317
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
2-136-0-C	2	26 years	0.0022	0.0564
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
2-172-1-A	2	22 years	0.0023	0.0508
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
4-188-0-E	2	26 years	0.0016	0.0428
1-20-0-Q	3	19 years	0.0021	0.0401
2-156-02-A	2	23 years	0.0017	0.0382
1-148-0-Q	2	20 years	0.0018	0.0360
1-20-2-A	2	25 years	0.0014	0.0353
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0041	0.1067
01-99-0-Q	2	23 years	0.0041	0.0935
02-56-1-C	2	26 years	0.0023	0.0586
02-90-0-Q	3	18 years	0.0022	0.0387
02-56-2-C	2	26 years	0.0015	0.0386
01-92-0-Q	2	22 years	0.0016	0.0350
1-108-0-Q	2	23 years	0.0015	0.0338
1-114-2-Q	2	20 years	0.0014	0.0273
1-93-0-L	2	24 years	0.0011	0.0269
1-121-0-L	2	24 years	0.0010	0.0238
1-99-1-Q	2	22 years	0.0009	0.0204
2-172-1-A	2	22 years	0.0008	0.0174
4-108-0-E	2	26 years	0.0006	0.0145
1-148-0-Q	2	20 years	0.0007	0.0140
2-156-02-A	2	23 years	0.0005	0.0117
1-159-2-A	2	23 years	0.0005	0.0109
1-159-1-A	2	23 years	0.0005	0.0109
4-143-0-A	2	25 years	0.0004	0.0095
4-188-0-E	2	26 years	0.0002	0.0055
2-156-1-A	2	23 years	0.0001	0.0028
2-156-0-A	2	23 years	0.0001	0.0028
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0015
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-72

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0052	0.1206
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
02-90-0-Q	3	18 years	0.0027	0.0492
1-93-0-L	2	24 years	0.0019	0.0462
1-121-0-L	2	24 years	0.0018	0.0438
01-92-0-Q	2	22 years	0.0020	0.0435
1-108-0-Q	2	23 years	0.0019	0.0433
1-114-2-Q	2	20 years	0.0021	0.0419
1-99-1-Q	2	22 years	0.0014	0.0310
2-172-1-A	2	22 years	0.0013	0.0285
2-156-02-A	2	23 years	0.0011	0.0247
1-148-0-Q	2	20 years	0.0010	0.0207
4-108-0-E	2	26 years	0.0008	0.0200
1-159-2-A	2	23 years	0.0008	0.0184
1-159-1-A	2	23 years	0.0008	0.0184
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0004	0.0094
2-156-1-A	2	23 years	0.0002	0.0045
2-156-0-A	2	23 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-73

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0041	0.1067
01-99-0-Q	2	23 years	0.0042	0.0970
02-56-1-C	2	26 years	0.0023	0.0586
02-90-0-Q	3	18 years	0.0022	0.0402
02-56-2-C	2	26 years	0.0015	0.0386
1-108-0-Q	2	23 years	0.0016	0.0361
01-92-0-Q	2	22 years	0.0016	0.0357
1-114-2-Q	2	20 years	0.0015	0.0307
1-121-0-L	2	24 years	0.0013	0.0305
1-93-0-L	2	24 years	0.0012	0.0284
1-148-0-Q	2	20 years	0.0013	0.0259
1-99-1-Q	2	22 years	0.0010	0.0217
1-159-2-A	2	23 years	0.0009	0.0202
1-159-1-A	2	23 years	0.0009	0.0202
4-108-0-E	2	26 years	0.0008	0.0201
2-172-1-A	2	22 years	0.0008	0.0178
2-156-02-A	2	23 years	0.0005	0.0120
4-143-0-A	2	25 years	0.0004	0.0095
4-188-0-E	2	26 years	0.0003	0.0085
2-156-1-A	2	23 years	0.0002	0.0053
2-156-0-A	2	23 years	0.0002	0.0053
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0019
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 15-74

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port Post-Paragon, In Home Port M-values (rev. A-vals)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
1-148-0-Q	2	20 years	0.0018	0.0360
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
2-172-1-A	2	22 years	0.0013	0.0295
4-108-0-E	2	26 years	0.0011	0.0286
2-156-02-A	2	23 years	0.0011	0.0253
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0005	0.0136
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE M-VALUES ALTERNATIVE (AWAY FROM HOMEPORT) IN PORT 11/17/98

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	Qme	cme	bme	Me	MIEB
3-12-0-Q	AG	CHAIN LOCKER			15	A	S	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	1	1	0.8	0.8	1	1	0.95	0.95	0.18
2-52-02-A	AG	CLEANING GEAR LOCKER			31	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.26
2-75-1-A	AG	WARDROBE			¥	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
2-78-0-A	AG	HS STORES			¥	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	0.8	0.72	1	1	0.8	0.8	0.15
2-78-2-A	AG	REC LKR			11	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	0.9	0.81	1	1	0.95	0.95	0.21
2-180-2-A	AG	REPAIR PARTY LOCKER			4	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.9	1	0.67	1	1	0.95	0.95	0.17
1-20-2-A	AG	GENERAL STORES			16	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-52-1-A	AG	SHIPS SERVICE STORE			¥	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
1-57-1-A	AG	FWD REPAIR LOCKER			14	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.95	0.95	0.23
1-72-0-A	AG	REPAIR ANNEX			1	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.2	0.9	0.9	0.16	1	1	0.95	0.95	0.04
01-89-2-A	AG	EQPT LKR			¥	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.26
2-156-0-A	AR	THAW BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.11
2-156-1-A	AR	FREEZER BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.11
2-164-2-A	AR	CHILL BOX			4	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.75	0.8	0.9	0.54	1	1	0.8	0.8	0.11
4-32-0-A	AS	**STOREROOM**	2-22		8	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.99	0.9	1	0.89	1	1	0.8	0.8	0.49
4-143-0-A	AS	**ENGINEERS STOREROOM**	8-23		12	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-16-0-A	AS	**BOSUN'S STORES**	1-7	10	¥	A	M	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.54
2-156-02-A	AS	DRY PROVISIONS STORES	8-25		29	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-172-1-A	AS	**HAWSER & RESCUE EQUIPMENT STORAGE**	8-26		2	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	0.6	1	1	0.6	1	1	0.8	0.8	0.33
1-1-0-A	AS	GENERAL STORES	1-8		18	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
1-12-0-A	AS	BOSUN'S STORES			¥	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-159-1-A	AS	DRY STORES			¥	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
1-159-2-A	AS	DRY PROVISIONS STORES			22	A	M	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.19
3-72-0-C	C	IC AND GYRO ROOM	4-56		7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	1	1	0.99	0.9	0.9	0.8	0.64	0.42
2-136-0-C	C	**CONTROL BOOTH**	6-11		5	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.9	1	1	0.9	0.9	0.9	0.8	0.64	0.38
02-56-1-C	C	**RADIO ROOM**	11-110/11-111		8	C	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	0.99	0.8	0.8	0.63	0.9	0.9	0.8	0.64	0.29
02-56-2-C	C	**CIC ROOM**	11-109		7	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.99	0.8	0.85	0.67	0.9	0.9	0.8	0.64	0.28
03-62-0-C	C	**PILOT HOUSE**	12-123		9	C	M	0.95	0.95	1	0.90	1	0.9	0.85	0.76	0.99	1	0.85	0.84	0.9	0.9	0.8	0.64	0.37
4-108-0-E	EM	**ENGINE ROOM**	6-7 to 6-10	7, 13, 14	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.7	1	0.8	0.56	0.95	0.95	0.65	0.58	0.15
4-16-0-K	K	**FLAMMABLE LIQUIDS STOREROOM**	2-21		2	B	L	0.95	0.95	0.95	0.85	1	0.8	0.9	0.72	0.6	1	1	0.6	0.95	0.95	0.65	0.58	0.21
2-72-1-L	L1	**ENGINEERING OFFICER STATEROOM**	4-55		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-44-0-L	L1	**CO STATEROOM**	10-98		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-44-1-L	L1	**CO CABIN**	10-97		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.500
01-72-0-L	L1	**EXEC OFF**	10-93		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.500

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	Qme	cme	bme	Me	MIEB
		STATEROOM																						
01-72-01-L	L1	OPS OFFICER STATEROOM	10-95		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.500
2-72-4-L	L2	OFFICER STATEROOM	4-50		31	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-84-1-L	L2	OFFICER STATEROOM	4-54		26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-84-2-L	L2	OFFICER STATEROOM	4-51		26	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-96-1-L	L2	CPO STATEROOM	4-53		25	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-96-2-L	L2	CPO STATEROOM	4-52		24	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
01-59-0-L	L2	OFFICER STATEROOM	10-96		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	0.9	1	0.9	1	1	0.8	0.8	0.50
2-32-01-L	L5	CREWS BERTHING	2-20		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
2-52-01-L	L5	CREWS BERTHING	3-34/3-35		¥	A	M	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.54
1-32-0-L	L5	CREWS BERTHING	2-19		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
1-52-0-L	L5	CREWS BERTHING	3-33		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	0.9	0.9	1	1	0.8	0.8	0.50
1-80-0-L	LL	WARDROOM	4-47		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.47
1-93-0-L	LL	CPO MESS	4-48		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.47
1-121-0-L	LL	CREWS MESS	5-68/5-70	5	¥	A	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	1	1	0.9	0.9	1	1	0.8	0.8	0.51
1-114-0-L	LM	DISPENSARY	5-67		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
4-52-01-L	LP	PASSAGEWAY		11	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-76-0A-L	LP	PASSAGEWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-76-0B-L	LP	PASSAGEWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-96-0-L	LP	PASSAGEWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-140-0A-L	LP	PASSAGEWAY		8	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-140-0B-L	LP	PASSAGEWAY		8	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-143-2-L	LP	STAIRWAY		8	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
2-156-01A-L	LP	PASSAGEWAY	8-27	9	¥	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.71
2-156-01B-L	LP	PASSAGEWAY	8-27	9	¥	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.71
2-156-01C-L	LP	PASSAGEWAY	8-27	9	¥	A	S	0.99	0.99	0.95	0.93	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.71
2-172-0-L	LP	PASSAGEWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-01A-L	LP	PASSAGEWAY		2	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
1-52-01B-L	LP	PASSAGEWAY		2	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
1-52-01C-L	LP	PASSAGEWAY		2	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
1-108-1-L	LP	PASSAGEWAY		2	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
1-143-2-L	LP	STAIRWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-69-0-L	LP	PASSAGEWAY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
02-69-2-L	LP	PASSAGEWAY		1	¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.65
02-69-4-L	LP	VESTIBULE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-32-0-L	LW	CREWS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-52-0-L	LW	CREWS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-72-0-L	LW	OFFICERS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-72-2-L	LW	OFFICERS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-88-1-L	LW	OFFICERS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-88-2-L	LW	OFFICERS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
2-99-0-L	LW	CPO SANITARY			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32

Plan ID	CUI	Comp	New Detectors	In View of Cam	Act FRI	Class	Size	dmn	nmn	smn	Mn	fmp	vmp	pmp	Mp	sma	ama	dma	Ma	Qme	cme	bme	Me	MIEB
		SPACE																						
1-20-4-Q	LW	DECON SHWR			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
1-52-2-L	LW	CREWS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-44-2-L	LW	CO SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-56-2-L	LW	OFFICERS SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-87-0-L	LW	XO SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
01-87-1-L	LW	OPS OFFICER SANITARY SPACE			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.9	0.81	1	1	1	1	1	1	0.95	0.95	0.32
4-84-0-Q	QA	A/C MACHINERY AND SEWAGE DISPOSAL ROOM	4-57		2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.64	0.22
3-96-0-E	QA	**AUX MACHINERY SPACE**	6-6	12	2	C	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.64	0.24
4-156-0-E	QA	AUX MACHINERY SPACE	8-22	15	2	B	M	0.99	0.99	0.95	0.93	0.7	0.9	0.85	0.53	0.6	1	0.9	0.54	0.85	0.85	0.8	0.57	0.15
4-188-0-E	QA	STEERING GEAR ROOM	9-38	16	2	B	M	0.99	0.99	0.95	0.93	0.9	0.9	0.85	0.68	0.6	1	0.8	0.48	0.85	0.85	0.8	0.57	0.17
01-92-0-Q	QA	**HELO SERVICE**	10-94		2	C	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	0.9	0.54	0.9	0.9	0.8	0.64	0.22
1-63-1-Q	QF	FAN ROOM			1	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.95	0.76	0.03
1-63-2-Q	QF	FAN ROOM			1	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.2	1	0.9	0.18	0.9	0.9	0.95	0.76	0.03
02-81-2-Q	QF	FAN ROOM			2	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.95	0.76	0.07
02-90-0-Q	QF	PLENUM ROOM			2	C	S	0.4	0.9	0.95	0.34	1	0.9	0.85	0.76	0.4	1	0.9	0.36	0.9	0.9	0.95	0.76	0.07
1-114-2-Q	QG	**SCULLERY**	5-69		2	A	S	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	1	1	0.6	1	1	0.95	0.95	0.37
1-146-0-Q	QG	**GALLEY**	7-81		2	B	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.6	0.9	1	0.54	0.85	0.85	0.8	0.57	0.20
1-20-0-Q	QL	**LAUNDRY**	1-6		3	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	0.7	1	1	0.7	1	1	0.8	0.8	0.36
2-143-2-Q	QO	**ENGINEERING OFFICE**	8-28		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	1	0.9	1	1	0.8	0.8	[illegible]
1-72-2-Q	QO	**SUPPLY OFFICE**	4-46		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
1-99-1-Q	QO	**SHIPS OFFICE**	4-49		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
2-140-1-Q	QS	ENGINEERS WORKSHOP	8-24		¥	A	S	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
2-172-2-Q	QS	ELECTRIC WORKSHOP			¥	A	S	0.5	0.9	0.95	0.42	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.21
02-78-1-Q	QS	**ELEC LAB AND STORAGE**	11-108		¥	A	M	0.95	0.95	0.95	0.85	1	0.9	0.85	0.76	1	0.9	0.9	0.81	1	1	0.8	0.8	0.42
3-52-2-M	TH	AMMO HOIST			2	A	S	0.4	0.9	0.95	0.34	1	0.9	0.9	0.81	0.4	1	0.9	0.36	1	1	0.95	0.95	0.09
1-108-0-Q	TU	UPTAKE			2	B	L	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	0.4	1	0.9	0.36	0.85	0.85	0.65	0.46	0.04
01-99-0-Q	TU	UPTAKE AND FAN ROOM			3	B	L	0.4	0.9	0.95	0.34	1	0.8	0.9	0.72	0.6	1	0.9	0.54	0.85	0.85	0.65	0.46	0.06

Plan ID	CUI	Comp	FRI	Class	Size	dan	nan	san	An	fap	vap	pap	Ap	saa	aaa	daa	Aa	qae	cae	bae	Ae	A|EB
4-108-0-E	EM	**ENGINE ROOM**	3	B	L	0.99	0.99	0.95	0.93	0.8	0.8	0.8	0.51	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.23
4-16-0-K	K	**FLAMMABLE LIQUIDS STOREROOM**	2	B	L	0.95	0.95	0.95	0.86	1	0.8	0.9	0.72	0.95	1	1	0.95	1	0.9	0.85	0.77	0.45
3-96-0-E	QA	**AUX MACHINERY SPACE**	2	B	M	0.99	0.99	0.95	0.93	1	0.9	0.85	0.77	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.35
4-156-0-E	QA	AUX MACHINERY SPACE	2	B	L	0.99	0.99	0.95	0.93	0.7	0.9	0.85	0.54	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.24
4-188-0-E	QA	STEERING GEAR ROOM	2	B	M	0.99	0.99	0.95	0.93	0.9	0.9	0.85	0.69	0.85	1	0.8	0.68	0.9	1	0.8	0.72	0.31
1-146-0-Q	QG	**GALLEY**	2	B	M	0.95	0.95	0.95	0.86	1	0.9	0.85	0.77	0.9	1	1	0.9	1	1	0.9	0.9	0.53

An=dan*nan*san where dan=detection of fire, nan=notification of Bridge, and san=sound the alarm

Ap=fap*vap*cap where fap=secure the fuel supply, vap=secure the ventilation, and cap=secure the electrical power

Aa=saa*aaa*daa where saa=alignment of automated system, aaa=agent discharges from nozzle, and daa=agent discharges on the fire

Ae=qae*cae*bae where qae=quantity of agent is adequate, cae=concentration of agent is adequate, and bae=blackout occurs

A|EB=An*Ap*Aa*Ae where An=Notification, Ap=Preparation, Aa=Agent Application, and Ae=Fire Extinguishment

Installed Automated Systems:

Fixed CO2 Total Flooding System in the Flammable Liquids Storeroom, Aqueous Potassium Carbonate System in the Galley, and AFFF Bilge Sprinkling in the Engine Room, Auxiliary Machinery Spaces and Steering Gear Room.

Notes:

The Galley is occupied 30% of the time, however, it is assumed that if a grease fire occurs on the Galley stove, it is assumed that a crew member is present in the Galley.

The probability of the Galley's automated system successfully extinguishing the fire is based on grease fires on the stove only.

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0105	0.2721
01-99-0-Q	2	23 years	0.0036	0.0827
03-62-0-C	2	26 years	0.0030	0.0773
02-56-1-C	2	26 years	0.0018	0.0467
02-90-0-Q	3	18 years	0.0020	0.0359
1-108-0-Q	2	23 years	0.0014	0.0325
02-56-2-C	2	26 years	0.0012	0.0305
01-92-0-Q	2	22 years	0.0014	0.0305
1-114-2-Q	2	20 years	0.0013	0.0256
1-20-0-Q	3	19 years	0.0013	0.0252
4-188-0-E	2	26 years	0.0008	0.0216
2-136-0-C	2	26 years	0.0008	0.0215
1-93-0-L	2	24 years	0.0009	0.0215
2-172-1-A	2	22 years	0.0009	0.0189
1-121-0-L	2	24 years	0.0008	0.0184
1-99-1-Q	2	22 years	0.0008	0.0175
1-20-2-A	2	25 years	0.0007	0.0169
1-148-0-Q	2	20 years	0.0006	0.0122
1-159-2-A	2	23 years	0.0004	0.0086
1-159-1-A	2	23 years	0.0004	0.0086
4-143-0-A	2	25 years	0.0003	0.0069
2-156-02-A	2	23 years	0.0003	0.0063
1-63-1-Q	3	18 years	0.0001	0.0024
2-156-1-A	2	23 years	0.0000	0.0016
2-156-0-A	2	23 years	0.0000	0.0016
4-156-0-E	2	26 years	0.0000	0.0010
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0127	0.3304
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0052	0.1206
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
02-90-0-Q	3	18 years	0.0027	0.0492
1-93-0-L	2	24 years	0.0019	0.0462
2-172-1-A	2	22 years	0.0020	0.0442
1-121-0-L	2	24 years	0.0018	0.0438
01-92-0-Q	2	22 years	0.0020	0.0435
2-136-0-C	2	26 years	0.0017	0.0434
1-108-0-Q	2	23 years	0.0019	0.0433
1-114-2-Q	2	20 years	0.0021	0.0419
1-20-0-Q	3	19 years	0.0021	0.0401
1-20-2-A	2	25 years	0.0014	0.0353
2-156-02-A	2	23 years	0.0015	0.0342
4-188-0-E	2	26 years	0.0012	0.0322
1-99-1-Q	2	22 years	0.0014	0.0310
1-148-0-Q	2	20 years	0.0010	0.0207
1-159-2-A	2	23 years	0.0008	0.0184
1-159-1-A	2	23 years	0.0008	0.0184
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0002	0.0045
2-156-0-A	2	23 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 16-77

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0137	0.3550
01-99-0-Q	2	23 years	0.0037	0.0862
03-62-0-C	2	26 years	0.0030	0.0773
02-56-1-C	2	26 years	0.0018	0.0467
02-90-0-Q	3	18 years	0.0021	0.0370
1-108-0-Q	2	23 years	0.0015	0.0342
01-92-0-Q	2	22 years	0.0014	0.0314
02-56-2-C	2	26 years	0.0012	0.0305
4-188-0-E	2	26 years	0.0011	0.0289
1-114-2-Q	2	20 years	0.0014	0.0283
2-136-0-C	2	26 years	0.0011	0.0280
1-20-0-Q	3	19 years	0.0013	0.0252
1-121-0-L	2	24 years	0.0010	0.0235
1-148-0-Q	2	20 years	0.0011	0.0229
1-93-0-L	2	24 years	0.0009	0.0225
2-172-1-A	2	22 years	0.0010	0.0219
1-99-1-Q	2	22 years	0.0008	0.0184
1-20-2-A	2	25 years	0.0007	0.0169
1-159-2-A	2	23 years	0.0007	0.0162
1-159-1-A	2	23 years	0.0007	0.0162
4-143-0-A	2	25 years	0.0003	0.0069
2-156-02-A	2	23 years	0.0003	0.0063
2-156-1-A	2	23 years	0.0002	0.0044
2-156-0-A	2	23 years	0.0002	0.0044
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0013
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 16-78

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . XRAY
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
4-108-0-E	2	26 years	0.0166	0.4317
03-62-0-C	2	26 years	0.0077	0.1991
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0033	0.0856
02-56-2-C	2	26 years	0.0024	0.0620
2-136-0-C	2	26 years	0.0022	0.0564
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
2-172-1-A	2	22 years	0.0023	0.0508
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
4-188-0-E	2	26 years	0.0016	0.0428
1-20-0-Q	3	19 years	0.0021	0.0401
2-156-02-A	2	23 years	0.0017	0.0382
1-148-0-Q	2	20 years	0.0018	0.0360
1-20-2-A	2	25 years	0.0014	0.0353
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
4-143-0-A	2	25 years	0.0005	0.0137
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 16-79

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive, Automatic, and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0036	0.0827
03-62-0-C	2	26 years	0.0030	0.0773
02-56-1-C	2	26 years	0.0018	0.0467
02-90-0-Q	3	18 years	0.0020	0.0359
1-108-0-Q	2	23 years	0.0014	0.0325
02-56-2-C	2	26 years	0.0012	0.0305
01-92-0-Q	2	22 years	0.0014	0.0305
1-114-2-Q	2	20 years	0.0013	0.0256
1-93-0-L	2	24 years	0.0009	0.0215
1-121-0-L	2	24 years	0.0008	0.0184
1-99-1-Q	2	22 years	0.0008	0.0175
2-172-1-A	2	22 years	0.0006	0.0129
1-148-0-Q	2	20 years	0.0006	0.0122
4-108-0-E	2	26 years	0.0004	0.0114
1-159-2-A	2	23 years	0.0004	0.0086
1-159-1-A	2	23 years	0.0004	0.0086
4-143-0-A	2	25 years	0.0003	0.0069
2-156-02-A	2	23 years	0.0003	0.0063
4-188-0-E	2	26 years	0.0002	0.0043
1-63-1-Q	3	18 years	0.0001	0.0024
2-156-1-A	2	23 years	0.0000	0.0016
2-156-0-A	2	23 years	0.0000	0.0016
4-156-0-E	2	26 years	0.0000	0.0010
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

CGC DEPENDABLE
12/31/98
MODEL RUN 16-80

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Automatic
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0052	0.1206
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
02-90-0-Q	3	18 years	0.0027	0.0492
1-93-0-L	2	24 years	0.0019	0.0462
1-121-0-L	2	24 years	0.0018	0.0438
01-92-0-Q	2	22 years	0.0020	0.0435
1-108-0-Q	2	23 years	0.0019	0.0433
1-114-2-Q	2	20 years	0.0021	0.0419
1-99-1-Q	2	22 years	0.0014	0.0310
2-172-1-A	2	22 years	0.0013	0.0285
2-156-02-A	2	23 years	0.0011	0.0247
1-148-0-Q	2	20 years	0.0010	0.0207
4-108-0-E	2	26 years	0.0008	0.0200
1-159-2-A	2	23 years	0.0008	0.0184
1-159-1-A	2	23 years	0.0008	0.0184
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0004	0.0094
2-156-1-A	2	23 years	0.0002	0.0045
2-156-0-A	2	23 years	0.0002	0.0045
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive and Manual
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . 60 minutes
COMMENTS. . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
01-99-0-Q	2	23 years	0.0037	0.0862
03-62-0-C	2	26 years	0.0030	0.0773
02-56-1-C	2	26 years	0.0018	0.0467
02-90-0-Q	3	18 years	0.0021	0.0370
1-108-0-Q	2	23 years	0.0015	0.0342
01-92-0-Q	2	22 years	0.0014	0.0314
02-56-2-C	2	26 years	0.0012	0.0305
1-114-2-Q	2	20 years	0.0014	0.0283
1-121-0-L	2	24 years	0.0010	0.0235
1-148-0-Q	2	20 years	0.0011	0.0229
1-93-0-L	2	24 years	0.0009	0.0225
1-99-1-Q	2	22 years	0.0008	0.0184
4-108-0-E	2	26 years	0.0006	0.0164
1-159-2-A	2	23 years	0.0007	0.0162
1-159-1-A	2	23 years	0.0007	0.0162
2-172-1-A	2	22 years	0.0006	0.0132
4-143-0-A	2	25 years	0.0003	0.0069
4-188-0-E	2	26 years	0.0003	0.0066
2-156-02-A	2	23 years	0.0003	0.0063
2-156-1-A	2	23 years	0.0002	0.0044
2-156-0-A	2	23 years	0.0002	0.0044
1-63-1-Q	3	18 years	0.0001	0.0024
4-156-0-E	2	26 years	0.0000	0.0013
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

INDIVIDUAL TARGET OPTION - SUMMARY LEVEL REPORT

RELATIVE LOSS FACTORS OF INDIVIDUAL TARGETS

READINESS CONDITION . YOKE
CONFIGURATION . . . . Passive
CASE. . . . . Worst
ASSUMED LOCATION. . . in Port
RUN TIME. . . . . . . 60 minutes
COMMENTS. . . . . . .
Alternative, In-Port, Post-Paragon, Away from Home Port M-vals (rev.)

Targets listed include all compartments in model run with Magnitude of Acceptable Loss 1-3 and Relative Loss Factor (RLF) > 0.0000.

****

TARGET COMPART.	Magnitude/Frequency -of Acceptable Loss-		Rel Freq of Loss|FFS	Relative Loss Factor (RLF)
03-62-0-C	2	26 years	0.0074	0.1933
01-99-0-Q	2	23 years	0.0056	0.1284
02-56-1-C	2	26 years	0.0032	0.0835
02-56-2-C	2	26 years	0.0022	0.0582
1-121-0-L	2	24 years	0.0022	0.0529
02-90-0-Q	3	18 years	0.0029	0.0517
1-93-0-L	2	24 years	0.0021	0.0509
1-114-2-Q	2	20 years	0.0024	0.0483
1-108-0-Q	2	23 years	0.0021	0.0478
01-92-0-Q	2	22 years	0.0021	0.0452
1-148-0-Q	2	20 years	0.0018	0.0360
1-99-1-Q	2	22 years	0.0016	0.0343
1-159-1-A	2	23 years	0.0014	0.0328
1-159-2-A	2	23 years	0.0014	0.0319
2-172-1-A	2	22 years	0.0013	0.0295
4-108-0-E	2	26 years	0.0011	0.0286
2-156-02-A	2	23 years	0.0011	0.0253
4-143-0-A	2	25 years	0.0005	0.0137
4-188-0-E	2	26 years	0.0005	0.0136
2-156-1-A	2	23 years	0.0003	0.0079
2-156-0-A	2	23 years	0.0003	0.0079
4-156-0-E	2	26 years	0.0001	0.0031
1-63-1-Q	3	18 years	0.0001	0.0024
3-52-2-M	3	18 years	0.0000	0.0000
4-32-0-A	2	21 years	0.0000	0.0000

Appendix E

Methodology for Assigning Probabilities of Flame Termination

The following guidelines may be used for assigning probabilities of flame termination in conjunction with the conduct of a fire safety analysis of a ship using the Ship Fire Safety Engineering Methodology (SFSEM). There are three ways a fire may terminate in a compartment:

1. The fire may self-terminate or extinguish **I**tself without any action on the part of the crew or without discharging a firefighting agent from any of the ship's fire extinguishing systems; this probability is referred to as the I-Value in the SFSEM.
2. The fire may be extinguished by the application of a firefighting agent from an installed or **A**utomated fire extinguishing system with no human intervention other than activation of the system; this probability is referred to as the A-Value in the SFSEM.
3. The fire may be extinguished by the **M**anual application of a firefighting agent from a portable fire extinguisher, semiportable fire extinguishing system, or hoseline; this probability is referred to as the M-Value in the SFSEM.

As noted in the Theoretical Basis of the SFSEM [1], I, A, & M-values are determined by assigning probabilities to various subfactors that together affect the overall calculation of the probability of flame termination. Detailed information concerning the construction and use of network diagrams for the calculations of probabilities of flame termination are provided in Appendix F: Network Diagrams of the Final Report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender. [2] Detailed information concerning the various conditions and parameters that influence each subfactor are provided in Appendix G: Fire Growth Factors of the same report. [2]

The following guidelines are used to establish the spreadsheets and document various key parameters that are taken into account during the assignment of probabilities at the subfactor level. Specific guidance for assigning probabilities at the subfactor level is provided in the three attachments to these general guidelines. **Note: These are guidelines only, the engineer must alter recommended values based on experience and sound engineering judgment taking into account conditions expected or observed in each compartment.**

1. Assign a Compartment Use Indicator (CUI) to all compartments in accordance with the guidelines provided in the SAFE User Manual (Appendix H). [3]
2. Enter the Plan IDs, CUI assignments, and Compartment Names as the first three columns in an Excel spreadsheet; sort on CUI and compartment name as the secondary sort.
3. Estimate FRI time in minutes for each CUI based on modeling/calculations and then adjust up or down according to existing conditions in each compartment. Appendix G: Fire Growth Factors of the Final Report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender [2] provides detailed information concerning the factors that affect FRI times. Insert FRI times in column 4 and note in the footer of the spreadsheet that FRI times are estimated.
4. Columns 5 and 6 are used to record the class of fire (A, B, or C) that is most likely to occur in the compartment and the estimated size of the fire (small, medium, or large) that will likely be encountered by the fire party as they arrive on scene. Fire size is relative to the size of the compartment. The following table provides guidance of what constitutes a small, medium, and large fire in terms of the percentage of deck area occupied in compartments of varying size.

	Small Fire	Medium Fire	Large Fire
Small Compt	<50% of deck area	50%<deck area<75%	>75% deck area
Medium Compt	<33% of deck area	33%<deck area<66%	>66% deck area
Large Compt	<25% of deck area	25%<deck area<50%	>50% deck area

Some other factors that affect the judgment of fire size include FRI time, compartment geometry (ceiling height), fuel load, fuel type, fuel package distribution, ventilation, and fire scenario (spray fire, smoldering fire, flammable liquid pool fire etc.). The following table provides guidance of what constitutes a small, medium, and large fire in terms of these other factors.

	Small Fire	Medium Fire	Large Fire
FRI Time	FRI Time > 10 minutes	3 minutes < FRI Time < 10 minutes	FRI Time < 3 minutes
Ceiling Height	Ceiling ht >9 ft	7 ft < ceiling ht < 9 ft	Ceiling ht < 7 ft
Fuel Load	Fuel load density < 2 psf cellulosics equivalent	2 psf cellulosics equivalent < fuel load density < 4 psf cellulosics equivalent	Fuel load density > 4 psf cellulosics equivalent
Fuel Type	Primarily cellulosics	Cellulosics and plastics	Primarily plastics
Fuel Package Distribution	Most fuel packages separated greater than 1 meter apart	Most fuel packages separated by approximately 1 meter	Most fuel packages separated less than 1 meter apart
Ventilation	Little to no ventilation	Forced ventilation or open doors to interior compartments	Large openings to outside air (weather)
Fire Scenario	Smoldering fire	Pool fire	Spray fire

5. Columns 7 and 8 are used to record the most probable ignition source and location in the compartment. For example, "Galley Stove" (column 7) and "bulkhead" (column 8). Typical ignition sources include lighting fixture, a specific electrical appliance, a specific motor or controller, a bunk, wastebasket, and rag bag, etc. Locations are usually limited to one of the following bulkhead, corner, center, overhead, and bilges.
6. Copy this spreadsheet such that three separate spreadsheets are established for I, A, and M-values. The ship's name, the parameter to be calculated (I, A, or M-Value) and the date are recommended for inclusion in the header of each spreadsheet; the footer may include additional information such as estimated or calculated FRI times, baseline analysis, or analysis of a specific alternative etc.

Attachment 1
Methodology for Assigning I-Values

1. Set up columns 9 through 13 to calculate I|EB (probability the fire will self-terminate or extinguish itself before full room involvement occurs given that established burning has occurred in the compartment) based on three subfactors as described in this attachment. The factors and subfactors should be shown as column headings and formulas should be embedded in the spreadsheet in accordance with the Theoretical Basis of the SFSEM. [1] Probabilities should be expressed as a number between 0 and 1 (two decimal places). Notes at the bottom of this spreadsheet should define the subfactors and factors as well as the formulas for calculating the I-values.
2. Column 9, Subfactor: "Iebar" - Fire Grows to the Enclosure Point. Assign a probability that the fire will grow from EB to the enclosure point. This probability is dependent on many elements including:
    - Fuel type, quantity, and distribution of fuel packages
    - Bulk density of fuel and orientation of the fuel packages (i.e. vertical or horizontal)
    - Ignition temperature, location and deck area covered by ignition source
    - Boundary insulation
3. Column 10, Subfactor: "Icbar" - Fire Grows to the Ceiling Point. The probability that the fire will grow from the enclosure point to the ceiling point. This probability is dependent on many elements including:
    - Fuel type, quantity, and distribution of fuel packages
    - Height of the fuel packages
    - Boundary insulation and combustibility of bulkhead and ceiling linings
    - Height of overhead
    - Ventilation Factor (i.e. A*H^.5)

Detailed information concerning these factors is provided in Appendix G: Fire Growth Factors of the Final Report of the Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender [2]

4. Column 11, Subfactor: "Irbar" - Fire Grows to the Room Point. The probability that the fire will grow from the ceiling point to the room point. This probability is dependent on many elements including:
    - Fuel type, quantity, and distribution of fuel packages.
    - Boundary insulation and combustibility of bulkhead and ceiling linings.
    - Compartment width/depth ratio.
    - Ventilation Factor (i.e. A*H^.5).
5. Column 12, Factor: "Ibar" - Probability that the fire will not self-terminate is calculated in accordance with the following formula: Ibar=Iebar*Icbar*Irbar.
6. Column 13, Factor: "I|EB" - Probability that the fire will self-terminate before full room involvement given that established burning has occurred, is calculated in accordance with the following formula: I|EB=1-Ibar.
7. The spreadsheet will now show calculated values for I|EB. These values should be reviewed by comparing I-values between various CUIs and I-values for compartments having identical CUIs. The values typically range from ".25" for spaces with short FRI times, high fuel loads, and significant probabilities of large fires to ".85" for Stairways, Passageways, and Sanitary Spaces with infinite FRI times, negligible fuel loads, and probabilities of small fires. If a set of I-values for a CUI or an individual compartment's I-value seems inconsistent with other I-values the engineer should revisit the values assigned to the three individual subfactors and reassign more appropriate probabilities. This process should be repeated until the engineer is satisfied that the calculated I-values are reasonable and consistent.

Attachment 2
Methodology for Assigning A-Values

The compartments shown on this spreadsheet should be limited to those that have an automated fire extinguishing system. Typical automated systems include the following:

- CO_2 Total Flooding System (typically installed in Flammable Liquids Storeroom, Paint Lockers, Engine Rooms, and Auxiliary Machinery Spaces such as JP-5 Pump Rooms)
- AFFF Bilge Sprinkling Systems (typically installed in Engine Rooms, Auxiliary Machinery Spaces such as Steering Gear Rooms and Hydraulic Machinery Spaces)
- AFFF Sprinkling Systems (typically installed in Auxiliary Machinery Spaces such as Bow Thruster Machinery Rooms)
- Aqueous Potassium Carbonate (APC) Systems (typically installed in Galleys)
- Water Sprinkling Systems (typically installed in Cargo Holds)
- Halon/Halon Alternatives (e.g., FM 200) (typically installed in Engine Rooms)

1. Set up columns 9 through 25 to calculate A|EB (probability of an automated fire extinguishing system extinguishing the fire before full room involvement occurs given that established burning has occurred in the compartment) based on 12 subfactors as described in this attachment . The factors and subfactors should be shown as column headings and formulas should be embedded in the spreadsheet in accordance with the Theoretical Basis of the SFSEM. [1]. Probabilities should be expressed as a number between 0 and 1 (express probabilities to two decimal places). Notes should be included at the bottom of this spreadsheet that define the factors as well as the formulas for calculating the A-values.
2. Column 9, Subfactor: "dan" - Detection of Fire. Estimate the percentage of time around the clock that the compartment is monitored by an automatic detection device or by a human. Note the percentage of time a compartment is *monitored* is usually higher than the percentage of time it is *occupied*. Reasons for this include the ability to observe conditions in one compartment from another compartment through open doors or hatches. Normally, the "dan" factor will not vary significantly between in port and at sea conditions since compartments with automated systems typically include automatic detection systems. However, two sets of A-Values should be prepared (i.e. In Port and At Sea) if "dan" values vary between in port and at sea conditions. The following guidelines for assigning probabilities to the "dan" subfactor apply to compartments with automatic detection devices:
    - If a compartment has multiple automatic detectors in a single zone, assign ".99" (equivalent to a fully addressable system).
    - If a compartment has a single detector in a single zone, assign ".95" (equivalent to a fully addressable system).
    - If a compartment has multiple automatic detectors but the compartment is one of many in a single zone, assign ".90".
    - If a compartment has a single detector but the compartment is one of many in a single zone, assign ".85".
    - If the following conditions are noted: missing or inoperative detectors, dead batteries or faulty wiring, reports of numerous false alarms, etc. the assigned probabilities should be reduced in accordance with the perceived reliability of the system.

    The following guidelines for assigning probabilities to the "dan" subfactor apply to compartments without automatic detection devices:
    - If a compartment is normally occupied part of the day, assign a value that is calculated by dividing the total number of hours a week the compartment is occupied

by 168 and then increase this value to account for the possibility of observing fires from another compartment. This should result in values ranging from ".50" to ".80". This range is also applicable to compartments in view of a surveillance camera

- If a compartment is not normally occupied and is remotely located (i.e. out of the main stream of normal traffic) assign ".50" or less depending on its degree of remoteness. This range is also applicable to compartments not in view of a surveillance camera.

3. Column 10, Subfactor: "nan" - Notification of the Bridge. Assign a value that is equal to "dan" if the compartment has an automatic detection device. For compartments without an automatic detection device assign ".90".
4. Column 11, Subfactor: "san" - Sound the Alarm. It is assumed that if the Bridge receives the notification, the alarm will be sounded due to the military discipline and training that can be expected on Coast Guard cutters. However, there is a slight possibility of announcing the wrong location and there is a very remote probability that the PA system will be inoperative, thus a probability of ".95" is assigned.
5. Column 12, Factor: "An" - Notification is calculated in accordance with the following formula: An=dan*nan*san.
6. Column 13, Subfactor: "fap" - Secure the Fuel Supply. The primary concern here is the likelihood of securing the flammable liquid supply to potential spray fires. Main machinery Spaces (CUI=EM) on ships are normally equipped with remote fuel shut-off valves accessible from outside the compartment. Therefore assign ".80" to compartments with a CUI of "EM". "QA" and "QE" spaces may be subject to flammable liquid spray fires but are not generally equipped with remote shut-off valves. Therefore assign values of ".70" to ".90" depending on the presence of internal combustion engines or flammable liquid fuel lines in these spaces. Assign a value of "1.00" to all other spaces unless they have internal combustion engines or flammable liquid fuel lines in the compartment.
7. Column 14, Subfactor: "vap" - Secure the Ventilation. Forced ventilation is most likely installed in spaces with a CUI of "EM", "TU" and "K". Therefore ventilation in these spaces may not be secured with the certainty that it can in spaces without forced ventilation unless the automated suppression system automatically secures the ventilation system. Therefore in spaces with forced ventilation systems (e.g. CUI of "EM", "TU", or "K") assign a value of ".80" if the ventilation system is not automatically secured, assign a value of ".90" if the ventilation system is automatically secured. In all other spaces without forced ventilation assign a value of ".95".
8. Column 15, Subfactor: "pap" - Secure the Electrical Power. Due to the quantity of electrical motors and controllers installed in spaces with a CUI = "EM" or "EE" assign a value of ".80". Most other spaces have, as a minimum, electrical lighting and may have electrical equipment installed in addition to lighting. Therefore in all other spaces assign values ranging from ".80" to ".90".
9. Column 16, Factor: "Ap" - Preparation is calculated in accordance with the following formula: Ap=fap*vap*pap.
10. Column 17, Subfactor: "saa" - Alignment of Automated System. System alignment involves all the physical devices (e.g., electrical, mechanical, pneumatic, hydraulic) that must be properly configured for the system to work if activated. AFFF sprinkling systems primarily involves piping systems and valves, but the system also requires proper alignment of the AFFF proportioner and storage tank. CO_2 systems are less complex in that they usually include fewer valves and other components compared with AFFF sprinkling systems. APC systems for deep fat fryers and Galley stoves include even fewer valves and components. Therefore the following guidelines are provided for assigning probabilities to the "saa" subfactor:

- AFFF Sprinkling: assign ".85"
- CO2 Total Flooding: assign ".90"
- Halon/Halon Alts: assign ".90"
- APC System: assign ".95"

11. Column 18: Subfactor "aaa" - Agent Discharges from Nozzle. This subfactor describes the probability that an agent will flow from its storage location to the nozzle and discharge into the protected space. This probability is influenced by a potential blockage in the piping system, sufficient pressure to move the agent through the piping system, and potential failure of the nozzles themselves. These systems are designed to be inherently reliable. Therefore the following guidelines are provided for assigning probabilities to the "aaa" subfactor:
    - AFFF Sprinkling: assign ".90"
    - CO2 Total Flooding: assign ".95"
    - Halon/Halon Alts: assign ".95"
    - APC System: assign ".99"
12. Column 19: Subfactor "daa" - Agent Discharges on Fire. The design, location, and aim of the nozzles affect the ability of the agent to discharge directly on the fire. In addition the presence of high piled storage may block the agent from reaching the fire. Therefore the following guidelines are provided for assigning probabilities to the "daa" subfactor:
    - AFFF bilge sprinkling: assign ".85"
    - AFFF overhead sprinkling: assign ".90"
    - CO2 Total Flooding: assign "1.00"
    - Halon/Halon Alts: assign "1.00"
    - APC System: assign "1.00"
    - Significant obstructions: assign ".80 or less" (does not apply to gaseous systems)
13. Column 20, Factor: "Aa" - Agent Application is calculated in accordance with the following formula: Aa=saa*aaa*daa.
14. Column 21: Subfactor "qae" - Quantity of Agent Adequate. There is an inexhaustible supply of sea water available on board ships. Therefore, assign a value of "1.00" for water sprinkling systems. Ships normally carry large quantities of AFFF concentrate, additional AFFF is also usually available from other ships that are called to assist in firefighting efforts. Therefore, assign a value of ".95" for AFFF sprinkling systems. CO_2 and Halon systems are normally designed to flood the protected space one time. Spare bottles must be used for a second discharge and it is quite unlikely that there is sufficient quantity of agent on board to flood the space more than twice. Therefore, assign a value of ".90" for CO_2 and Halon systems. APC systems are designed with adequate quantities of agent to extinguish up to large class B fires in deep fat fryers or Galley stoves. However, the agent may be exhausted before very large fires are fully extinguished. Therefore, assign a value of ".90" for APC systems
15. Column 22: Subfactor "cae" - Concentration of Agent Adequate. The spacing and design of the nozzles as well as the system discharge pressure influence the concentration of agent in APC systems as well as AFFF and water sprinkling systems. The size of the space, the quantity of agent discharged into the space and the leakage factors determine the concentration of agent in CO_2 and Halon total flooding systems. Therefore, the following guidelines are provided for assigning probabilities for the "cae" factor:
    - AFFF Sprinkling: assign "1.00"
    - CO2 Total Flooding: assign ".90"
    - Halon/Halon Alts: assign ".90"
    - APC System: assign "1.00"

16. Column 23: Subfactor "bae" - Probability Blackout Occurs. The probability of blackout primarily depends on three factors: quantity of agent (accounted for in column 21), concentration of agent (accounted for in column 22), and the size of the fire (estimated in column 6). Therefore the following guidelines are provided to assign probabilities to the "bae" subfactor:
    - In compartments where large-sized fires are expected, assign a value of ".90".
    - In compartments where medium-sized fires are expected, assign a value of ".95".
    - In compartments where small-sized fires are expected, assign a value of ".99".
    - In multilevel engineering spaces, assign a value of ".85" or less.
17. Column 24: Factor "Ae" - Fire Extinguishment is calculated in accordance with the following formula: Ae=qae*cae*bae.
18. Column 25: Factor "A|EB" - The probability of Automated Fire Extinguishment before full room involvement given Established Burning has occurred, is calculated in accordance with the following formula: A|EB=An*Ap*Aa*Ae.
19. The spreadsheet will now show calculated values for A|EB. These values should be reviewed by comparing A-values for various compartments with the same automated fire extinguishing system. The values typically range from ".50" for AFFF bilge sprinkling systems to ".85" for APC systems to ".90" for CO_2 and Halon systems. Considerable variability has been noted in the probability of A|EB due to the range of probabilities assigned to the various subfactors for different compartments with the same automated system. In particular, the reliability of detection systems (subfactor "dan") varies greatly from ship to ship and compartment to compartment. If a set of A-values for a particular automated system or an individual compartment's A-value seems inconsistent with other A-values, the engineer should revisit the probabilities assigned to the 12 individual subfactors and reassign more appropriate values. This process should be repeated until the engineer is satisfied that the calculated A-values are reasonable and consistent.
20. After SAFE has been run on the baseline data set, actual FRI times will be part of the output results. It is extremely important that these calculated FRI times be compared to the estimated FRI times and updated in column 4. The engineer should revisit and change as necessary the assigned probabilities for affected subfactors and the size of the fire likely to be encountered by the fire party shown in column 6. The revised A|EB values should then be entered into SAFE as part of the baseline data set and the baseline results recalculated.

Attachment 3
Methodology for Assigning M-Values

1. Set up columns 9 through 25 to calculate M|EB (probability of manually extinguishing the fire before full room involvement occurs, given that established burning has occurred in the compartment) based on 12 subfactors as described in this attachment. The factors and subfactors should be shown as column headings and formulas should be embedded in the spreadsheet in accordance with the Theoretical Basis of the SFSEM. [1]. Probabilities should be expressed as a number between 0.00 and 1.00 (express probabilities to two decimal places). Notes should be included at the bottom of this spreadsheet that define the subfactors and factors as well as the formulas for calculating the M-values.
2. Column 9, Subfactor: "dmn" - Detection of Fire. Estimate the percentage of time around the clock that the compartment is monitored by an automatic detection device or by a human. Note: The percentage of time a compartment is *monitored* is usually higher than the percentage of time it is *occupied*. Reasons for this include the ability to observe conditions in one compartment from another compartment through open doors or hatches. Normally, the "dmn" factor will vary significantly between in-port and at-sea conditions, especially on ships with relatively few automatic detectors installed throughout the ship. Therefore, two sets of M-Values are normally prepared (i.e., In Port and At Sea). The following guidelines for assigning probabilities to the "dmn" factor apply to compartments with automatic detection devices:
    - If a compartment has multiple automatic detectors in a single zone, assign ".99" (equivalent to a fully addressable system)
    - If a compartment has a single detector in a single zone, assign ".95" (equivalent to a fully addressable system)
    - If a compartment has multiple automatic detectors but the compartment is one of many in a single zone, assign ".90"
    - If a compartment has a single detector but the compartment is one of many in a single zone, assign ".85"
    - If the following conditions are noted: missing or inoperative detectors, dead batteries or faulty wiring, or reports of numerous false alarms, etc. the assigned probabilities should be reduced in accordance with the perceived reliability of the system.

   The following guidelines for assigning probabilities to the "dmn" factor apply to compartments without automatic detection devices:
    - If a compartment is normally occupied part of the day, assign a value that is calculated by dividing the total number of hours a week the compartment is occupied by 168 and then increase this value to account for the possibility of observing fires from another compartment. This should result in values ranging from ".50" to ".80". This range is also applicable to compartments in view of a surveillance camera
    - If a compartment is not normally occupied and is remotely located (i.e. out of the main stream of normal traffic) assign ".50" or less depending on its degree of remoteness. This range is also applicable to compartments not in view of a surveillance camera.
    - On ships that have a reduced in port duty section, there is less monitoring of spaces due to a reduction in personnel on board. On these ships, in spaces that are not protected by an automatic detection device, reduce dmn by 0.2 from the number generated in accordance with the guidelines above.
3. Column 10, Subfactor: "nmn" - Notification of the Bridge. Assign a value that is equal to "dmn" if the compartment has an automatic detection device. For compartments without an

automatic detection device assign ".90". Assign a value of "1.00" to the Bridge (aka Pilothouse) for At Sea conditions.

4. Column 11, Subfactor: "smn" - Sound the Alarm. It is assumed that if the Bridge receives the notification, the alarm will be sounded due to the military discipline and training that can be expected on Coast Guard cutters. However, there is a slight possibility of announcing the wrong location and there is a very remote probability that the PA system will be inoperative, thus a probability of ".95" is assigned. Assign a value of "1.00" to the Bridge (aka Pilothouse).
5. Column 12, Factor: "Mn" - Notification is calculated in accordance with the following formula: Mn=dmn*nmn*smn.
6. Column 13, Factor: "fmp" - Secure the Fuel Supply. The primary concern here is the likelihood of securing the flammable liquid supply to potential spray fires. Main machinery Spaces (CUI=EM) on ships are normally equipped with remote fuel shut-off valves accessible from outside the compartment. Therefore assign ".80" to compartments with a CUI of "EM". "QA" and "QE" spaces may be subject to flammable liquid spray fires but are not generally equipped with remote shut-off valves. Therefore assign values of ".70" to ".90" depending on the presence of internal combustion engines or flammable liquid fuel lines in these spaces. Assign a value of "1.00" to all other spaces unless they have internal combustion engines or flammable liquid fuel lines in the compartment.
7. Column 14, Subfactor: "vmp" - Secure the Ventilation. Forced ventilation is most likely installed in spaces with a CUI of "EM", "TU" and "K". Therefore ventilation in these spaces may not be secured with the certainty that it can in spaces without forced ventilation. Therefore in spaces with a CUI of "EM", "TU" or "K" assign a value of ".80" unless a compartment is equipped with an automated suppression system that automatically secures the ventilation. In this event assign a value of ".90". In all other spaces without forced ventilation assign ".90". In absolutely airtight spaces (no forced or natural ventilation) such as Voids and Water Tanks (CUI = "V" and "W") assign a value of "1.00".
8. Column 15, Subfactor: "pmp" - Secure the Electrical Power. Due to the quantity of electrical motors and controllers installed in spaces with a CUI = "EM" or "EE" assign a value of ".80". Most other spaces have, as a minimum, electrical lighting and may have electrical equipment installed in addition to lighting. Therefore in all other spaces assign values ranging from ".80" to ".90". In spaces without any electrical power including lighting such as Voids and Water Tanks (CUI = "V" or "W") assign a value of "1.00".
9. Column 16, Factor: "Mp" - Preparation is calculated in accordance with the following formula: Mp=fmp*vmp*pmp.
10. Column 17, Subfactor: "sma" - Firefighters Respond to the Scene. On a ship, the firefighters do not have great distances to travel; however their ability to arrive on the scene prior to full room involvement conditions is proportional to the assumed FRI time (estimated in column 4). This factor is significantly different on ships that employ a rapid response team (RRT) concept. Response to the scene is also enhanced in compartments that are equipped with a fully addressable detection system. Therefore, the following guidelines are used to assign the probabilities to the "sma" subfactor:

FRI Time (minutes)	sma (w/o RRT & w/o address. dets)	sma (w/ RRT & w/ address. dets.)	sma (w/ RRT & w/o address. dets.)
1	.10	.50	.20
2	.30	.60	.40
3	.50	.70	.60
4	.70	.80	.75

5	.90	.90	.90
6-9	.95	.99	.99
>10	1	1	1

11. Column 18: Subfactor "ama" - Firefighters Access Compartment. The ability to access a compartment on a ship is directly affected by the likelihood that the compartment is locked (and therefore the time to obtain a key or break down the door). Spaces such as storerooms, staterooms, ship store; weapons spaces such as the Armory; medical spaces such as the Dispensary and Sick Bay; and commissary spaces such as Dry Stores are quite likely to be locked. Therefore these spaces are assigned a value of ".90". Spaces such as Refrigerated Stores, Radio Room, and Combat Information Center are likely to be locked with high-security heavy-duty locks; therefore, these spaces are assigned a value of ".80". All other spaces are likely to be unlocked and are therefore assigned a value of "1.00".
12. Column 19: Subfactor "dma" - Agent Discharges on Fire. The following factors directly affect the ability of the firefighters to discharge an agent directly on the fire: size of the compartment, number of levels in the compartment, and amount of obstructions in the compartment. Therefore, the following guidelines are provided for assigning probabilities to the "dma" subfactor:
    - Large sized space, single level, no obstructions: assign ".85"
    - Medium sized space, single level, no obstructions: assign ".90"
    - Small sized space, single level, no obstructions: assign "1.00"
    - Multi-level compartments: assign ".80"
    - Significant obstructions: assign ".80"
13. Column 20, Factor: "Ma" - Agent Application is calculated in accordance with the following formula: Ma=sma*ama*dma.
14. Column 21: Subfactor "qme" - Quantity of Agent Adequate. The preferred agent for extinguishing Class A fires is water. There is an inexhaustible supply of sea water available on board ships. Therefore, in compartments where class A fires (shown in column 5) are expected, assign a value of "1.00". AFFF is the preferred agent for extinguishing Class B fires. Ships normally carry adequate quantities of AFFF concentrate, additional AFFF is also usually available from other ships that are called to assist in firefighting efforts. Therefore, in compartments where class B fires are expected, assign a value of ".95". CO_2 is the preferred agent for extinguishing class C fires. CO_2 portable extinguishers are normally located in close proximity to spaces with a class C fire threat, additional CO_2 extinguishers are also stored in the Repair Locker. Therefore, in compartments where class C fires (see column 5) are expected, assign a value of ".90".
15. Column 22: Subfactor "cme" - Concentration of Agent Adequate. The concentration of water for extinguishing class A fires is an important factor in building sprinkler systems. It is less of a factor in applying water from manually applied hose streams on ships. Therefore, in compartments where class A fires are expected, assign a value of "1.00". Fire suppression systems on ships are carefully designed to produce AFFF in the appropriate concentration of 6 percent. Therefore, in compartments where class B fires are expected, assign a value of ".95" to account for the possibility of a system malfunction in producing the correct concentration of agent. The concentration of CO_2 achieved with a portable extinguisher on a class C fire is a function of the size of the fire, the firefighting technique employed, and the quantity of extinguishers available. Therefore, in compartments where class C fires are expected, assign a value of ".90" to account for probable deficiencies in the applied concentration of CO_2.
16. Column 23: Subfactor "bme" - Probability Blackout Occurs. The probability of blackout primarily depends on three factors: quantity of agent (accounted for in column 19),

concentration of agent (accounted for in column 20), and the size of the fire (estimated in column 6). The following guidelines are provided to assign probabilities to the "bme" subfactor for ships with normal duty section sizes:

- In compartments where large-sized fires are expected, assign a value of ".65".
- In compartments where medium-sized fires are expected, assign a value of ".80".
- In compartments where small-sized fires are expected, assign a value of ".95".

On ships that have a reduced in-port duty section, rely on the local fire department and outside assistance from other ships that may be in port. This reduces the probability that blackout will occur compared with other ships. Therefore, the following guidelines are provided to assign probabilities to the bme subfactor for ships with reduced in port duty sections:

- In compartments where large-sized fires are expected, assign a value of ".25".
- In compartments where medium-sized fires are expected, assign a value of ".50".
- In compartments where small-sized fires are expected, assign a value of ".90".

17. Column 24: Factor "Me" - Fire Extinguishment is calculated in accordance with the following formula: Me=qme*cme*bme.
18. Column 25: Factor "M|EB" - The probability of Manual Fire Extinguishment before full room involvement given Established Burning has occurred is calculated in accordance with the following formula: M|EB=Mn*Mp*Ma*Me.
19. The spreadsheet will now show calculated values for M|EB. These values should be reviewed by comparing M-values for various CUIs and M-values for compartments within CUIs. The values typically range from ".05" for engineering spaces with short FRI times, high fuel loads, and significant probabilities of large class B spray fires to ".65" for Stairways, Passageways, and Sanitary Spaces with infinite FRI times, negligible fuel loads, and probabilities of small class A fires. If a set of M-values for a CUI or an individual compartment's M-value seems inconsistent with other M-values, the engineer should revisit the probabilities assigned to the 12 individual factors and reassign more appropriate probabilities. This process should be repeated until the engineer is satisfied that the M-values are reasonable and consistent.
20. After SAFE has been run on the baseline data set, actual FRI times will be part of the output results. It is extremely important that these calculated FRI times be compared with the estimated FRI times and updated in column 4. The engineer should revisit and adjust as necessary the assigned probabilities for affected subfactors (primarily "sma" shown in column 17) and the size of the fire likely to be encountered by the fire party shown in column 6. The revised M|EB values should then be entered into SAFE as part of the baseline data set and the baseline results recalculated.

References

1. Sprague, Chester M. & Dolph, Brian. Theoretical Basis of the Ship Fire Safety Engineering Methodology (Report No. CG-D-30-96, Final Report, September 1996).
2. Sprague, Chester M., White, Derek & Dolph, Brian. Fire Safety Analysis of the 180' WLB Seagoing Buoy Tender (Final Report, Pending Approval for Publication in the NTIS, July 1997).
3. Clouthier, Elizabeth, Rich, Doris & Romberg, Betty. Ship Applied Fire Engineering (SAFE) User Manual, Version 2.2, A Computer Model for the Implementation of The Ship Fire Safety Engineering Methodology (SFSEM) (Report No. CG-D-10-96, Final Report, March 1996).